THE UNC RADIOLOGIST ASSISTANT
(MASTERS IN RADIOLOGIC SCIENCE)
PROGRAM

INFORMATION PACKET FOR
PROSPECTIVE
RADIOLOGY PRACTICE MENTORS
INTRODUCTION

This packet was designed to help familiarize radiologists with the radiologist assistant profession as defined by the American College of Radiology (ACR), the American Society of Radiologic Technologists (ASRT) and the American Registry of Radiologic Technologists (ARRT). This packet will cover the history of this emerging profession along with its perceived benefit to the field of radiology. In addition, it will define the role of the radiology practice mentor. Additional information may be obtained by contacting the UNC-Chapel Hill Division of Radiologic Science directly:

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History

On March 9-10, 2002, a Radiologist Assistant Advisory Panel consisting of representatives from the ACR, ASRT, ARRT, state regulatory agencies, radiologic science education programs, radiology practitioner assistants (RPAs) and a medical imaging manufacturer met in Washington, D.C., to discuss the impending shortage of radiologic technologists and radiologists. They met to explore issues regarding the possible development of an advanced practice for radiologic technologists. This panel published a consensus statement (See Appendix I) regarding the educational preparation, roles and responsibilities, experience, level of supervision and level of regulatory oversight of the radiologist assistant.

On June 1, 2002, the Board of Chancellors of the American College of Radiology reviewed the consensus statements and agreed to pursue the concept of a radiologist assistant. Charles D. Williams, M.D., FACR, Chairman of the ACR Human Resources Commission released this statement in support of the development of the Radiologist Assistant Profession:

First, providing a pool of well-qualified and well-educated radiologist assistants will help radiology practices manage the current shortage of radiologists by allowing radiologists to more efficiently handle ever increasing patient workloads," he said. "The radiologist assistant also will give technologists a needed opportunity for advancement and career enhancements - two items that should help ameliorate the technologist shortage. Having a career path to the radiologist assistant will help retain more of the practicing technologists and attract more individuals to the radiologic technology profession.

(http://www.asrt.org/content/RTs/SpecialtySpecific/RadiologistAssistant/RA_Statement_From_ACR.aspx)

On Oct. 22, 2002, the leadership of the ACR and the ASRT held a meeting
to discuss the potential roles and responsibilities of the RA. In May 2003, during the ACR’s 80th Annual Meeting, the American College of Radiology Council approved a policy statement regarding the roles and responsibilities of the RA as jointly developed by the ACR and the ASRT. As noted in the LARS Summer 2003 Insights summation of the ACR 80th Annual Meeting:

A policy statement regarding the role and responsibility of a radiologist assistant was approved. The RA is identified as an “advanced-level radiologic technologist” who works under the supervision of a radiologist to enhance patient care by assisting the radiologist in the diagnostic imaging environment. As perceived, the RA will not interpret radiological examinations and will transmit observations of diagnostic images only to the supervising radiologist. The development of the RA will create a professionally appealing career path that will encourage more to enter the field. “We [ACR] feel that this will produce a worthwhile outcome that will allow us to address our critical workforce needs while ensuring the highest level of care for our patients.”

(http://www.larad.org/insights/Summer%202003%20Insights.pdf)

RA Role Delineation

To begin to define the role and education requirements for the RA, the ARRT developed a job analysis survey regarding RA roles and levels of supervision. This survey was administered to a random sample of radiologists and all RPAs. Radiologists rated 80 clinical activities and documented whether the activity should be considered for the RA scope of practice and if so, what level of radiologist supervision should correspond with this activity. **It is important to note that current Entry-Level Clinical Activities document supersedes the previous RA Role Delineation and it can be found in Appendix II.**
After administering the survey in January 2004, The ARRT appointed Advisory Committee comprised of four radiologists, two radiologist assistant program directors, two Radiology Practitioner Assistants, a physicist and liaisons from the ASRT, compiled the results. A draft of the role delineation was then posted at the ARRT website to solicit additional feedback. Feedback resulted in further refining of the Role Delineation and in January 2005 and it was approved by the ARRT Board of Trustees. The most recent version of the Role Delineation is called “Entry-Level Clinical Activities” and it can be found in Appendix II. In addition, the most recent version of the ARRT specifications for the RA certification exam and be found in Appendix III.

Who is a Radiologist Assistant?

A radiologist assistant (RA) is an advanced practice radiologic technologist who works under the supervision of a radiologist. The primary role of an RA is to enhance patient care by assisting the radiologist with patient assessment, patient management and radiological procedures. The RA also makes initial observations of diagnostic images but does not provide an official interpretation in the form of a written report (Advanced Practice Advisory Panel, 2002).

An RA must be an ARRT-certified radiographer who has successfully completed an advanced academic program encompassing a nationally recognized radiologist assistant curriculum and a radiologist directed clinical preceptorship (Advanced Practice Advisory Panel, 2002).
The UNC-Chapel Hill Radiologist Assistant (Masters in Radiologic Science) Program

The UNC-Chapel Hill Radiologist Assistant Program was developed over a two year period with the intent of being consistent with the national curriculum developed by the American Society of Radiologic Technologists (ASRT) and the American College of Radiology (ACR) and in accordance with the American Registry of Radiologic Technologists (ARRT) certification requirements.

The UNC-Chapel Hill RA program is 54 credit hours and 24 months in length (See Appendix IV for the “RA Course Sequence Grid”-a curriculum outline by semester and Appendix V for course descriptions). The program combines distance education and web-based instruction with a radiologist directed clinical preceptorship. This clinical preceptorship includes a minimum of 1824 clinical hours and is completed off-campus. Students are encouraged to identify a radiology practice to serve as preceptors. This radiology practice must include American Board of Radiology (ABR) certified radiologists who are willing to instruct and assess the competence of the RA student(s) working and learning under their supervision.

In addition to the distance education courses and clinical preceptorship, 1-2 on-campus seminars are required per semester. These sessions are designed to provide students the benefit of face-to-face contact with faculty and to enhance critical thinking and analysis skills related to radiological procedures and images. These sessions also give students the opportunity to network with other RA students and faculty.
Radiologist Preceptor Responsibilities

The preceptor group must include ABR certified radiologists who are willing to supervise, instruct and assess the competence of the RA student(s). The practice will be assigned a contact person from the university to assist in the planning of clinical rotations and to consult on any issues regarding preceptorship. The practice will be asked to provide the name of a primary liaison to promote open lines of communication between the practice and the university. In addition, the radiology practice will be required to sign an Affiliation Agreement with the University and a Memorandum of Understanding with the Division (See Appendix VI for a SAMPLE agreement).

While all radiologists in the group are ultimately responsible for the education and supervision of the RA student(s), the practice in conjunction with the program will determine clinical rotations and specific preceptor assignments. One model may include having one primary liaison and then supportive preceptors for each area of clinical competency.

The Radiologist Assistant Clinical Competency list can be seen in Appendix VII. The ARRT has designed evaluation instruments that are user-friendly and not time consuming.

The preceptor group is responsible for maintaining open lines of communication regarding the RA student(s) progress. The group is responsible for supervising, teaching and guiding the student during all interactions with patients and documenting successful completion of competencies as outlined by the ARRT (See Appendix VII). The preceptor group must also verify that the student(s) complete the minimum
clinical hours assigned each semester and the minimum number of cases required by the ARRT. The preceptor will be filling out evaluation forms each semester that assess the student's performance for that particular semester. The preceptor will also fill out a comprehensive clinical evaluation form (RASER) at the end of the program that assesses the student's performance over the course of the 2 years. In addition, the preceptor, as well as other radiologists in the group, will be filling out competency forms for different procedures.

The preceptor group will be responsible for providing a contact name from each clinical site. This person will be contacted by the UNC-Chapel Hill program to verify the need for site contracts.

**UNC-Chapel Hill Division of Radiologic Science Responsibilities**

**Assignment of Division Contact Person**

Each preceptor group will be assigned a contact person from the UNC-Chapel Hill Division of Radiologic Science. This person will be available to assist in planning the preceptor clinical model and to answer any questions that might arise during the preceptorship.

**Admissions and Record Keeping**

The UNC Division of Radiologic Science will be responsible for admissions, dismissals, graduation and certification procedures. In addition, grade submissions and calculations along with the associated record keeping will be handled by UNC-Chapel Hill.
Immunization and Health Requirements

The Division will be responsible for assuring each student has the proper initial training such as OSHA Safety and HIPAA training. The preceptor group may conduct additional training as required by their clinical sites. The Division will assure the student has obtained the immunizations required by the University and clinical sites (See pg. 58). The preceptor group may request other requirements as specified by its clinical sites.

Assignment and Monitoring of Radiation Badges

If requested, the Division of Radiologic Science will assign and monitor radiation badges which are exchanged on a quarterly basis. The Division’s contact person will send a monitoring and control badge to each student and it is the student’s responsibility to return the badges to the Division when requested.

Liability Insurance

Students enrolled in the Division of Radiologic Science are covered by the UNC-Chapel Hill School of Medicine Professional Liability Fund. The University maintains adequate professional liability insurance for each student in an amount not less than $1,000,000 per occurrence/$3,000,000 annual aggregate. Students are financially liable for damage to patient property not covered by the Liability Fund. This policy only covers students fulfilling clinical assignments for the program and does NOT cover students during work for pay. This liability insurance is not insurance covering injury to the student.
How the Radiologist Assistant Profession will benefit the Radiology Practice

It is noted that the ACR supports the development of the Radiologist Assistant profession:

ACR officials believe the development of the radiologist assistant position will relieve some of the time pressures experienced by radiologists due to ongoing workforce shortages, thereby permitting them to devote available resources to more productive patient care tasks.


The RA will assist the radiologist in handling the ever increasing patient workloads. This health care professional will assist with radiologist workflow thereby reducing patient wait times and subsequently increasing patient satisfaction. Some ways that the RA will assist with workflow include:

- Communicating with referring physicians
- Performing follow-up with patients
- Becoming a liaison with the department and staff related to image quality
- Performing studies that require much time
- Orienting new radiologists to the practice
- Marketing of the practice
- Completing documentation and paperwork as required

Each of these responsibilities will assist the practice in providing more efficient, higher quality patient care and will allow radiologists more time for image interpretation.
Appendix I: Consensus Statements from the Advanced Practice Advisory Panel

The Radiologist Assistant: Improving Patient Care While Providing Work Force Solutions
The Radiologist Assistant: Improving Patient Care While Providing Work Force Solutions

Consensus Statements from the Advanced Practice Advisory Panel

Introduction

The radiology community faces many challenges today, including increased patient demand, a growing shortage of radiologists and radiologic technologists, and the rapid expansion of new technology. In this fluctuating environment, it may be time for the radiology workplace to introduce a new type of radiologic technologist, a person whose advanced clinical skills can extend the role of the radiologist. Working with the supervision of a radiologist, an advanced-level radiologic technologist could take responsibility for patient assessment, patient education and patient management, perform fluoroscopy and other radiology procedures, and make initial image observations. By assuming responsibility for these tasks, the advanced-level technologist would improve productivity, increase patient access to radiologic services, and enhance the overall quality of patient care.

On March 9-10, 2002, an Advanced Practice Advisory Panel met in Washington, D.C., to explore key issues surrounding the development of an advanced clinical role for radiologic technologists. Members of the advisory panel included representatives from the American College of Radiology, the American Society of Radiologic Technologists, the American Registry of Radiologic Technologists, state regulatory agencies, radiologic science educational programs, and a medical imaging manufacturer. The panel also included two radiology practitioner assistants (RPAs).
The advisory panel represented a broad base of stakeholders, each of whom has unique concerns regarding the development of an advanced clinical role for radiologic technologists and the eventual incorporation of such a technologist into the radiology workplace. The goal of the panel members at their March 9-10 meeting was to reach consensus on key issues concerning the educational preparation, experience, roles and responsibilities, level of supervision and level of regulatory oversight of the advanced radiologic technologist. The panel wrote 12 consensus statements addressing these and other issues. Each consensus statement is presented below, accompanied by relevant discussion that took place at the panel's March 9-10 meeting.

Consensus Statement on Title and Definition

- The advisory panel recommends the title of “radiologist assistant” for the radiologic technologist working in an advanced clinical role. The panel supports the following definition of radiologist assistant:

  A radiologist assistant is an advanced-level radiologic technologist who enhances patient care by extending the capacity of the radiologist in the diagnostic imaging environment. The radiologist assistant is an ARRT-certified radiographer who has completed an advanced academic program encompassing a nationally recognized radiologist assistant curriculum and a radiologist-directed clinical preceptorship. With radiologist supervision, the radiologist assistant performs patient assessment, patient management, fluoroscopy and other radiology procedures. The radiologist assistant also makes initial observations of diagnostic images, but does not provide an official interpretation (final written report) as defined by the ACR Standard for Communication: Diagnostic Radiology.

Discussion: Panel members agreed the title “radiologist assistant” most accurately reflects the nature of the relationship between the radiologist and the radiologic technologist working in an advanced clinical role. The title clearly places the technologist’s professional role and clinical responsibilities within the radiology environment.
The panel noted that fewer than 100 advanced-level radiologic technologists in the United States have been certified by the Certification Board for Radiology Practitioner Assistants and are known as “radiology practitioner assistants.” The panel believes that the inclusion of the word “practitioner” in the job title is potentially misleading to the public and other health professionals, as it implies that the individual is an assistant to any medical practitioner, not just to radiologists. The title “radiologist assistant” clearly links the advanced-level technologist to the radiologist. The radiologist assistant supplements or extends the radiologist’s role.

The ACR Task Force on Human Resources supports the concept of the “radiology extender.” In a 2001 paper, the task force encouraged the ACR Commission on Human Resources to work with the ASRT to develop a curriculum and a job description for the job title, with the understanding that “the radiology extender is not a primary interpreter of imaging studies.” In the definition it drafted, the advisory panel emphasized that the radiologist assistant does not provide an official interpretation of any imaging examination and performs his or her duties with the supervision of a radiologist.

Consensus Statement on the Need for a Radiologist Assistant

- The need to develop a radiologist assistant is supported by several factors in the radiology environment, including the growing shortage of radiologic technologists and radiologists, the soaring demand for medical imaging procedures, and the radiology community’s desire to enhance the overall quality of patient care. The advisory panel believes the introduction of the radiologist assistant will have a positive impact in each of these areas, and it encourages the development and establishment of this profession.

Discussion: The concept of an advanced-level radiologic technologist is not new; educational programs to produce them were first developed in the early 1970s. However, there was little support for those programs because the need to introduce a nonphysician clinician into the
radiology environment could not be clearly demonstrated at the time. Today, work force shortages of radiologists and radiologic technologists have dramatically altered the picture.

There are approximately 226,000 registered radiographers in the United States today, but this number is inadequate to meet the demand for their services. According to a survey conducted by the American Hospital Association in the fall of 2001, the vacancy rate for medical imaging technologists is the highest of any health profession. The survey reported a 15.3 percent vacancy rate for imaging technologists, which means that nearly one out of every seven jobs cannot be filled. By comparison, the vacancy rate for registered nurses was 13 percent and the rate for pharmacists was 12.7 percent.

In November 2001, the U.S. Bureau of Labor Statistics released employment projections for the nation. The Bureau predicts the country will need 75,000 more radiologic technologists in 2010 than it did in 2000. The job openings represent positions that will be created as the result of growth in the profession, as well as positions that will become vacant when today's technologists retire or change careers.

Unfortunately, people are not entering the profession fast enough to meet the BLS's projections. The number of people taking the radiography certification examination offered by the American Registry of Radiologic Technologists declined from 10,629 in 1994 to only 7,434 in 2001. Meanwhile, many of the radiologic technologists practicing today will retire in the next 10 to 15 years. The average age of a radiologic technologist is 41 – one of the oldest averages among the allied health professions – and 17 percent of the profession is older than 51.

The radiologist community faces a similar work force problem: Not enough people are entering the specialty, and too many are leaving. The number of radiology residents dropped from 4,236 in 1994 to 3,600 in 1999. In addition, many radiologists are retiring early or nearing
typical retirement age. There are approximately 25,000 practicing radiologists in the United States, and nearly 40 percent of them are older than 50.⁵

Because of the increased number of retirements and the decreased number of residents, the American College of Radiology’s Task Force on Human Resources estimates that the number of radiologists is rising by only 2 percent per year. Their workload, meanwhile, is increasing 6 percent per year as measured by relative value units.¹

While the number of radiologists and radiologic technologists remains stagnant, demand for their services is soaring. A large part of the increased demand is being driven by the aging patient population. By 2030, the U.S. population aged 65 and older will double and the population aged 85 and older will triple. As the population ages, demand for health care services, including radiology, will rise dramatically. One study predicted a 140 percent increase in annual imaging procedures among the Medicare population by 2020.⁶

The introduction of a radiologist assistant could be an innovative, cost-effective way to address efficiency and productivity issues related to shortages of radiologists and radiologic technologists. By taking a lead role in patient assessment and management and by performing procedures such as fluoroscopy, the radiologist assistant could reduce the amount of time required of radiologists, allowing them to focus on the medical requirements of interpretation.

By making radiology workflow more efficient, the radiologist assistant also will improve patient access to radiologic care. Fifty-six percent of imaging department managers who responded to a September 2000 survey by U.S. Radiology Partners said that shortages of radiologists and radiologic technologists are limiting patient access to tests and delaying turnaround times.⁷ Incorporation of radiologist assistants can improve efficiency and productivity, permitting greater numbers of patients to be examined or treated.
Finally, the advisory panel also noted that development of a career pathway for radiologist assistants could serve as a potential recruitment and retention tool for the radiologic technologist profession, which has suffered from declining interest in recent years. Advanced-level radiologic technologists have been working in the United Kingdom for nearly 30 years. According to a report by Rebecca Clemens, a radiographer at East Surrey Hospital, Redhill, England, these technologists have enhanced job satisfaction, improved recruitment, enhanced self-esteem, stronger professional confidence and increased morale.

The advisory panel believes that introduction of the radiologist assistant into the career path for radiologic technologists will make the field more appealing to potential recruits and also will facilitate upward mobility among current technologists, leading to increased employee tenure. The radiologist assistant, as an advanced career path, presents radiologic technologists with a unique opportunity for professional growth.

Consensus Statements on Educational Preparation

- The advisory panel recommends that the educational preparation for the radiologist assistant should be a minimum of a baccalaureate degree. The panel recommends that the course of study follow a prescribed curriculum that contains both academic and clinical components. The clinical portion of the radiologist assistant's education should consist of a preceptorship with a radiologist.

- The advisory panel encourages the development of a standardized national curriculum for radiologist assistant programs.

- The advisory panel recommends that a national certification process be developed so that graduates of radiologist assistant programs can prove their competency upon completion of their education.

Discussion. The advisory panel noted that the academic and clinical education of the radiologist assistant must be sufficient in scope to allow a graduate to assume responsibility for performing
fluoroscopy and other selected radiology procedures with radiologist supervision. The graduate also must be prepared, through rigorous academic and clinical education, to make initial image observations and report their observations to the supervising radiologist. These responsibilities distinguish the radiologist assistant from the radiologic technologist.

The advisory panel asked the American Society of Radiologic Technologists to develop a standardized curriculum for radiologist assistant educational programs. The panel recommended that the curriculum include coursework in patient assessment, patient management, patient education, pharmacology, radiation safety, radiobiology, health physics, pathophysiology and clinical pathways. The curriculum also should include instruction in specific radiology examinations and procedures, as well as instruction in the initial observation of images and the communication of observations to the supervising radiologist. Each component of the academic program should be supplemented by a formal clinical preceptorship with a supervising radiologist.

Panel members volunteered to serve as advisors during the curriculum development process. Acknowledging that it is important to introduce significant numbers of radiologist assistants into the clinical environment as soon as possible, the panel also encouraged educational institutions throughout the country to develop programs to educate radiologist assistants.

Finally, the panel recommended that a national certification method be developed so that radiologist assistants can demonstrate that they are competent to provide the care they offer when they enter the profession. The panel suggested that the certification method be based upon a standardized national examination, and that appropriate credentials be awarded to individuals who pass the examination.
Consensus Statements on Roles and Responsibilities

- The panel agreed that the radiologist assistant should have three primary areas of responsibility, all performed with the supervision of a radiologist:
  1. Take responsibility for patient assessment, patient management and patient education.
  2. Evaluate image quality, make initial image observations and communicate observations to the supervising radiologist.
  3. Perform selected radiology procedures including, but not limited to, fluoroscopy.

- The panel agreed that the following responsibilities are not within the roles and responsibilities of the radiologist assistant:
  1. The radiologist assistant does not interpret images. The supervising radiologist retains responsibility for final image interpretation.
  2. The radiologist assistant does not make diagnoses. The supervising radiologist retains responsibility for preparing a final written report.
  3. The radiologist assistant does not prescribe medications or therapies.

Discussion. In determining the appropriate roles and responsibilities for the radiologist assistant, the advisory panel emphasized that it was not the tasks themselves, but the higher levels of accountability, responsibility and knowledge that will define the radiologist assistant’s role. The radiologist assistant not only will perform each function competently, but also will understand how that activity fits into the entire continuum of a patient’s care. The radiologist assistant is unique because of his or her ability to enhance the quality of care each patient receives. The radiologist assistant also could facilitate patient risk management processes.

Members of the panel emphasized that the radiologist assistant will work at all times with the supervision of a radiologist. The radiologist assistant is intended to be a supplement to, not a substitute for, the radiologist. The supervising radiologist will retain responsibility for final image interpretation and for preparing a final written report, as defined by the ACR Standard for Communication: Diagnostic Radiology.
Consensus Statement on Supervision Level

- The advisory panel recommends that the radiologist provide an appropriate level of supervision for the radiologist assistant. This level of supervision should be consistent with the educational preparation and experience level of the radiologist assistant, and may change over time as the radiologist assistant gains more expertise.

Discussion: The advisory panel noted that the radiologist assistant must always work with the supervision of a radiologist. However, the panel recognizes that the level of supervision may change as the radiologist assistant acquires more skills, experience, and confidence. The panel believes this consensus statement allows for evolution, growth, and progress on the part of the radiologist assistant and gives the radiologist discretion to determine an appropriate level of supervision.

Consensus Statements on Regulation

- The advisory panel believes that the radiologist assistant is an enhancement of the radiologic technology profession. Because of this status, the radiologist assistant is covered under existing radiologic technologist statutes as well as under state medical practice acts that authorize radiologists to delegate the performance of tasks with their supervision. For these reasons, the panel believes that separate state certification or licensure is not necessary for the radiologist assistant.

- The advisory panel acknowledges that regulations in some states prohibit some of the proposed roles and responsibilities of the radiologist assistant. The panel recommends that the American College of Radiology and the American Society of Radiologic Technologists develop materials to promote the role of radiologist assistants in all states as set forth in this document. The panel encourages the ACR and the ASRT to conduct these efforts in collaboration with the National Society of Radiology Practitioner Assistants.

Discussion: Panel members noted that 38 states partially or fully license radiologic technologists. In those states, an additional license would not be necessary for radiologist assistants because the job is an extension of the radiologic technologist profession. In the 12
states that do not license radiologic technologists, the radiologist assistant should be recognized as an "advanced" role for the radiologic technologist, a previously acknowledged health care occupation.

Consensus Statements on Other Issues

- The advisory panel encourages the ASRT to evaluate its code of ethics for radiologic technologists to determine if additional content is needed to address the expanded roles and responsibilities of radiologist assistants.

Discussion. It is important for any health profession to have a code of ethics that clearly outlines the profession's philosophy and values. The code should express the radiologic assistant's ethical responsibilities to patients, to his or her health care colleagues and to society as a whole. The code should serve as constant guidance for the professional conduct of the radiologist assistant.

- The advisory panel endorses the incorporation of radiologist assistants into the ACR Standards.

Discussion. As a collection of official statements reflecting the position of the American College of Radiology, the ACR Standards are the recognized authority on radiology practice. The panel believes that inclusion of the radiologist assistant into the ACR Standards would confer legitimacy on the profession and serve as recognition of the role radiologist assistants can play as part of the radiology team.

Conclusion
The professions of radiology and radiologic technology are more than 100 years old, yet they continue to evolve and progress. Every decade has brought improvements in safety, technology and the delivery of quality patient care. Today, as radiology strives to meet the challenges brought on by increasing patient demand and growing work force shortages, the time is right to introduce a health care professional who can extend the role of the radiologist by functioning as an advanced level radiologic technologist. The introduction of the radiologist assistant into the health care system represents an innovative, cost-effective way to meet patient needs while also improving the quality, efficiency and productivity of radiologic care.

References


2. The American Hospital Association, the Association of American Medical Colleges, the Federation of American Hospitals and the National Association of Public Hospitals and Health Systems. The Healthcare Workforce Shortage and Its Implications for America's Hospitals. Fall 2001.


Appendix: Advanced Practice Advisory Panel Participants

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Appendix II: Entry Level Clinical Activities (formerly Radiologist Assistant Role Delineation)
REGISTERED RADIOLOGIST ASSISTANT
ENTRY-LEVEL CLINICAL ACTIVITIES

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Introduction

Discussions among the American College of Radiology (ACR), the American Society of Radiologic Technologists (ASRT), and The American Registry of Radiologic Technologists® (ARRT®) culminated in 2003 with a consensus statement that defines the Registered Radiologist Assistant (R.R.A.) as an advanced-level radiographer who works under the supervision of a radiologist to promote high standards of patient care by assisting radiologists in the diagnostic imaging environment. Under radiologist supervision, the R.R.A. performs patient assessment, patient management, and selected clinical imaging procedures. Certification as an R.R.A. does not qualify the R.R.A. to perform interpretations (preliminary, final, or otherwise) of any radiological examination. The R.R.A. may make and communicate initial observations only to the radiologist.

The ARRT expanded this consensus definition to delineate more fully the entry-level role of a radiologist assistant and introduced a certification program based upon a job analysis in 2005. The R.R.A. certification requirements include certification, registration, and experience in radiography (i.e., R.T.(R)(ARRT)) and R.R.A.-specific educational, ethics, and examination standards. Details are available on ARRT's website (www.arrt.org).

ARRT’s certification requirements are periodically updated to incorporate changing practice patterns and expectations. This document reflects the entry-level clinical activities for the radiologist assistant resulting from the most recent job analysis. One of the revisions was to change the name of the document from the Registered Radiologist Assistant Role Delineation to the Registered Radiologist Assistant Entry-Level Clinical Activities (ELCA). The name change was proposed to avoid confusion over the purpose of this document as explained below.

Purpose of this Document

In order to develop certification standards, ARRT first identifies a core set of activities that individuals should be qualified to perform at entry into that role. The list of entry-level clinical activities is then used to create ARRT test development and education requirements for certification. The ELCA is not intended as a scope of practice. Inclusion of activities in the ELCA does not indicate that the activities may be legally performed in all states by those certified nor that the activities, if performed, are eligible for reimbursement under current CMS regulations. State, institutional, and employer requirements should be consulted to determine the specific role allowed in an individual situation. Similarly, exclusion of activities from the ELCA is not to be interpreted as prohibiting the performance of the activities provided that state, institutional, and employer requirements support the performance of the activities and that appropriate education, training, and competence assessment have been completed for the procedures. For all ARRT certification programs it is assumed that the procedures covered by the certification requirements will serve as the foundation for developing qualifications to perform additional procedures.

*ACR ASRT Joint Policy Statement - Radiologist Assistant: Roles and Responsibilities (2003).*

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Initial Role Delineation Development

ARRT published the initial role delineation in 2005. It was developed based upon a survey of radiologists and radiology practitioner assistants (RPAs) conducted in early 2004. Radiologists were asked to rate clinical activities as to whether the activity could be performed by an appropriately prepared radiologist assistant and, if so, the suggested level of radiologist supervision. RPAs were asked to indicate if they performed the activities and, if so, the level of supervision they received.

An ARRT Advisory Committee composed of four radiologists, two R.R.A. educational program directors, two RPAs, one physicist, and organizational liaisons reviewed the survey responses. A draft description of the role of a radiologist assistant was produced. After additional refinements by the Advisory Committee based upon organizational and community feedback, the ARRT Board of Trustees adopted the R.R.A. Role Delineation in January 2005. Eligibility requirements and examination content specifications were approved in June 2005.

2014 Job Analysis Update

ARRT typically performs an interim update of the job analysis, upon which certification requirements are based, within three years of introduction of a new version of the requirements. A comprehensive update is performed after six years. Accordingly, the revised certification requirements for the R.R.A. are scheduled to be implemented in July 2014.

A survey, that included the new activities identified by the Registered Radiologist Assistant Examination Committee and Essay Evaluation Committee, was administered during the summer of 2012. The survey was sent to all R.R.A.s currently in the ARRT database. Radiologist surveys were also handed out by R.R.A.s to the radiologists for whom they worked. The response rate was 35.5% from the R.R.A.s and 69 surveys were returned by radiologists. The survey results were reviewed by the R.R.A. committees.

The draft survey and the draft ELCA were reviewed by the Inter-Societal Commission on Radiologist Assistants (ICRA). ICRA is composed of representatives of ACR, ASRT, ARRT and will assist with the participation of representatives from the Society of Radiology Physician Extenders. The suggestions from ICRA were incorporated into this document. The ARRT Board of Trustees approved the ELCA for implementation July of 2014.
Conclusion

The clinical procedures included in the ELCA reflect procedures performed by a significant percentage of radiologist extenders and which radiologists were generally comfortable delegating to an R.R.A. under their supervision. The survey identified many procedures that were being performed by some radiologist extenders, but not by a sufficient percentage to warrant inclusion in the ELCA. Exclusion from this document is not intended to limit the procedures performed by an R.R.A. provided that appropriate education, training, and competence assessment have been documented for those procedures and provided that state, institutional, and employer requirements support the performance.

Radiologist supervision of R.R.A. performed procedures is assumed. The ARRT test development and education requirements for certification assume that the level of supervision for entry-level R.R.A.s will be at the direct level for clinical procedures. "Direct supervision" is defined as the radiologist present in the radiology facility and immediately available to furnish assistance and direction throughout the performance of the procedure, but not required to be present in the room when the procedure is performed. The assumption of a specific level of supervision is intended to assist in the development of entry-level certification requirements. The actual level of radiologist supervision for an R.R.A. in practice will depend upon the R.R.A.'s experience as well as state, institutional, and employer requirements. Best practice for all exams requiring consent includes the radiologist meeting the patient.

It is expected that R.R.A.s who perform procedures other than those listed in the ELCA will have received appropriate training and competence assessment on these procedures to assure patient safety and quality imaging. The additional clinical education and competence assessment should be documented within the individual R.R.A.'s portfolio. All activities should be performed in compliance with state, institutional, and employer requirements.

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1This definition of direct supervision is based upon that of the Centers for Medicare and Medicaid Services (CMS).
Entry-Level Clinical Activities for the Registered Radiologist Assistant

Clinical activities

1. Review the patient’s medical record to verify the appropriateness of a specific exam or procedure and report significant findings to radiologist.
2. Assist the radiologist in determining whether indications meet the ACR Appropriateness Criteria® when advising those who order examinations.
3. Interview patient to obtain, verify, or update medical history.
4. Explain procedure to patient or significant others, including a description of risks, benefits, alternatives, and follow-up.*
5. Participate in obtaining informed consent.*
6. Determine if patient has followed instructions in preparation for the exam (e.g., diet, premedications).
7. Assess risk factors that may contraindicate the procedure (e.g., health history, medications, pregnancy, psychological indicators, alternative medicines). (Note: Must be reviewed with radiologist.)
8. Perform and document a radiology-focused physical examination and analysis of data (e.g., signs and symptoms, laboratory values, significant abnormalities, vital signs) and report findings to the supervising radiologist for the following:
   a. abdominal
   b. thoracic
   c. cardiovascular
   d. musculoskeletal
   e. peripheral vascular
   f. neurological and endocrine
   g. breast and axillae
9. Monitor ECG and recognize abnormal rhythms.
11. Perform venipuncture.
12. Monitor IV therapy for flow rate and complications.
13. Participate in the administration of moderate (conscious) sedation.
14. Observe and assess patient who has received moderate (conscious) sedation.
15. Assess patient’s vital signs and level of anxiety/pain and inform radiologist when appropriate.
16. Recognize and respond to medical emergencies (e.g., drug reactions, cardiac arrest, hypoglycemia) and activate emergency response systems, including notification of the radiologist.
17. Administer and monitor oxygen as prescribed.
18. Operate a fixed/mobile fluoroscopic unit.

* Patient must be able to communicate with the radiologist if he/she requests or if any questions arise that cannot be appropriately answered by the radiologist assistant.
Clinical activities

19. Assure documentation of fluoroscopy time.
20. Explain effects and potential side effects to the patient of the pharmaceutical required for the examination.
21. Administer contrast agents and radiopharmaceuticals as prescribed by the radiologist.
22. Administer general medications as prescribed by the radiologist.
23. Monitor patient for side effects or complications of the pharmaceutical.
24. Advocate for patient radiation safety and protection:
   a. assess the patient’s radiation dose history
   b. provide radiation procedure exposure and cumulative dose education
   c. recommend alternative procedures based on patient radiation dose
25. Perform procedures in compliance with Standards of Care, facility and regulatory requirements, and ARRT Standards of Ethics.
26. Perform the following GI and chest examinations and procedures including contrast media administration and operation of appropriate imaging equipment:
   a. esophageal study
   b. swallowing function study
   c. upper GI study
   d. small bowel study
   e. small bowel study via enteroclysis tube
   f. enema with barium, air, or water soluble contrast
   g. nasogastric/enteric and orogastric/enteric tube placement
   h. t-tube cholangiogram
   i. defecography
   j. chest fluoroscopy
27. Perform the following GU examinations and procedures including contrast media administration and operation of appropriate imaging equipment:
   a. antegrade urography through an existing catheter (e.g. pyelography, nephrostomy)
   b. cystography
   c. retrograde urethrogram or urethrocystography
   d. voiding cystourethrogram
   e. loopography through an existing catheter
   f. hysterosalpingography - imaging only
   g. hysterosalpingography - procedure and imaging (physician participation required)
28. Perform the following invasive nonvascular procedures with image guidance including contrast media administration and needle or catheter placement:
   a. joint injection and aspiration
   b. arthrogram (radiography, CT, and MR)
   c. lumbar puncture
Clinical activities

d. cervical, thoracic, or lumbar myelography – imaging only
e. lumbar puncture for myelography
f. thoracentesis with or without catheter
g. placement of catheter for pneumothorax
h. paracentesis
i. abscess, fistula, or sinus tract study
j. injection for sentinel node localization
k. breast needle localization
l. change of percutaneous tube or drainage catheter
m. thyroid biopsy
n. liver biopsy

29. Perform the following invasive vascular procedures with image guidance including contrast media administration and needle or catheter placement:
a. peripheral insertion of central venous catheter (PICC) placement
b. insertion of non-tunneled central venous catheter
c. insertion of tunneled central venous catheter
d. port injection
e. extremity venography

30. Perform CT post-processing.
32. Evaluate images for completeness and diagnostic quality, and recommend additional images as required (general radiography, CT, and MR). (Note: Additional images only in the same modality such as additional CT cuts.)
33. Review imaging procedures, make initial observations, and communicate observations only to the radiologist.
34. Record previously communicated initial observations of imaging procedures according to approved protocols.
35. Communicate radiologist’s report to appropriate health care provider consistent with ACR Practice Guideline for Communicating Diagnostic Imaging Findings. (Revised 2005-Res. 11 or its successor document)
36. Provide physician-prescribed pre- and post-care instructions to patients.
37. Perform follow-up patient evaluation, and post-procedure care, and communicate findings to the radiologist (includes inpatients and outpatients).
38. Document procedure and post-procedure evaluation in appropriate record.
39. Write patient admission and/or discharge summary for review and co-signature by radiologist.
40. Participate in quality improvement activities within radiology practice.
41. Assist with data collection and review for clinical trials or other research.
42. Assist the radiologist in presenting at multi-disciplinary conferences (e.g., tumor boards and case conferences).
Appendix III: ARRT Content Specifications for the Radiologist Assistant Examination
Content Specifications for the Registered Radiologist Assistant Examination

*Effective with the January 2011 Examination*

The American Registry of Radiologic Technologists (ARRT) administers the national certifying examination for Registered Radiologist Assistants (R.R.A.s). To establish certification requirements for this area of advanced practice, the ARRT periodically sponsors a practice analysis project. The most recent study was completed in 2009 under the direction of the R.R.A. Advisory Committee, which included representatives from the American College of Radiologists (ACR) and the American Society of Radiologic Technologists (ASRT). Participants in the study included national samples of radiologists and radiologist extenders. The project culminated in the Entry-Level Clinical Activities (ELCA) document which identifies activities and clinical procedures performed by R.R.A.s.

The ELCA serves as the basis for the content specifications presented on the following pages. The content specifications identifies the knowledge and cognitive skills required to effectively perform the activities and clinical procedures included in the ELCA.

The table below presents the six major content categories, along with the number of questions appearing in each category. The examination consists primarily of selected response test questions (e.g., multiple choice). In addition, case studies are presented that require an essay response to several questions. Candidates are allowed 3½ hours to complete the selected response multiple-choice section, and 2½ hours to complete the case study section.

The pages that follow provide a detailed listing of topics within each major content category. Although this document covers many of the same topics included in curricula guides and related documentation, it is not intended to serve as a guide for educational programs. Educational programs are likely to be broader in scope.

<table>
<thead>
<tr>
<th>Content Categories</th>
<th>Selected Response Points</th>
<th>Case Study Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Patient Communication, Assessment, and Management</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>B. Drugs and Contrast Materials</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>C. Anatomy, Physiology, and Pathophysiology</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>D. Radiologic Procedures</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>E. Radiation Safety, Radiation Biology, and Fluoroscopic Operation</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>F. Medical-Legal, Professional, and Governmental Standards</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Total Number</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Testing Time Allowed</td>
<td>3.5 hours</td>
<td>2.5 hours</td>
</tr>
</tbody>
</table>

Notes: (1) The exam also contains two case studies. Each case is followed by four to six essay questions worth 3 or 6 points each. A case also includes a few selected response questions (e.g., multiple choice). Refer to Overview of CBT at www.arrt.org for additional details. (2) Test content in sections C or D may refer to appropriate imaging. (3) The exam also consists of an additional 20 unscored pilot questions.

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A. PATIENT COMMUNICATION, ASSESSMENT, AND MANAGEMENT (45)

1. PATIENT COMMUNICATION (5)
   a. Patient Education
      1. explanation of procedure
      2. alternatives to current procedure
      3. risk versus benefit
      4. radiation procedure exposure and cumulative dose education
   b. Psychosocial Support
      1. communication skills and issues
      2. cultural awareness
      3. social support structures
   c. Pre- and Post-Procedural Care Instructions

2. PATIENT ASSESSMENT: (20)
   Includes adaptations for pediatric, geriatric, and special needs populations
   a. Medical Data Review
      1. indications for procedure (ACR Appropriateness Criteria®)
      2. contraindications for procedure
      3. laboratory values
      4. prior diagnostic studies
      5. current medications
      6. previous history (e.g., vital signs, nurses/physicians notes)
      7. assessment of vital signs, height, and weight
   b. Patient Interview
      1. verification
         a. patient identification and correct procedure
         b. patient preparation
         c. pregnancy status
      2. medical history
         a. chief complaint
         b. present illness
         c. past history
         d. family history
         e. personal and social history
         f. review of systems
      3. risk factors
         a. medications
         b. allergy history
         c. medical or psychological indicators
         d. alternative medicines
   c. Common Laboratory Tests, Analysis, and Significance
      1. complete blood count (CBC), RBC, WBC, hemoglobin, platelets
      2. electrolytes (sodium, potassium, bicarbonate, chloride)
      3. pancreatic and cardiac enzymes
      4. calcium
      5. albumin and total protein
      6. coagulation factors (e.g., prothrombin time (PT), partial thromboplastin time (PTT), International Normalized Ratio (INR), platelets)
      7. liver function
      8. renal function
      9. glucose
      10. culture and sensitivity
      11. cytology and histopathology
   d. Psychological Status
      1. cognitive abilities
      2. emotional stability
      3. speech and language skills
      4. disorders that affect communication
         a. dementia
         b. cognitive impairment
         c. drug and/or alcohol impairment

   (Section A continues on the following page)
e. Abdomen Assessment
1. assessment procedures
   a. visual inspection
   b. auscultation
   c. percussion
   d. palpation
   e. pre-procedure rectal exam
2. signs and symptoms
   a. tenderness on palpation
   b. diarrhea
   c. flatulence
   d. dysuria
   e. pain
   f. constipation
   g. reflux
   h. nausea and vomiting
f. Thorax and Lung Assessment
1. assessment procedures
   a. visual inspection
   b. auscultation
   c. percussion
   d. palpation
   e. chest wall excursion
   f. oxygen saturation measurement
2. signs and symptoms
   a. cough/sputum production
   b. pain
   c. breathing pattern
   d. skin changes (e.g., cyanosis)
   e. clubbing
   f. exercise/activity tolerance
g. Cardiovascular Assessment
1. assessment procedures
   a. visual inspection
   b. auscultation
   c. palpation
   d. vital signs
   e. electrocardiogram (ECG)
   f. perfusion status
2. signs and symptoms
   a. venous distention
   b. heart rate and rhythm
   c. peripheral pulse
   d. edema
   e. exercise/activity tolerance
   f. pain
   g. skin changes (e.g., ulceration)

h. Musculoskeletal Assessment
1. assessment procedures
   a. visual inspection
   b. palpation
   c. range of motion analysis
   d. mobility and strength testing
2. signs and symptoms
   a. skin changes (e.g., redness, temperature)
   b. swelling
   c. crepitus
   d. pain
   e. change in function
i. Peripheral Vascular Assessment
1. assessment procedures
   a. visual inspection
   b. auscultation
   c. palpation
   d. pulse and edema scoring
   e. ABI-Ankle Brachial Index
2. signs and symptoms of arterial occlusion and insufficiency
   a. pain
   b. skin changes
   c. altered pulses
   d. arterial bruits
   e. claudication
   f. thrills
3. signs and symptoms of venous obstruction and insufficiency
   a. skin changes
   b. generalized edema
   c. varicose veins
   d. venous hum
j. Neurological Assessment
1. assessment procedures
   a. visual inspection (e.g., pupil size, symmetry, and reactivity)
   b. sensory evaluation
   c. motor evaluation
2. signs and symptoms
   a. pain
   b. weakness
   c. sensory changes
   d. motor changes

(Section A continues on the following page)
3. PATIENT MANAGEMENT (20)
   a. Standard Precautions (mechanism of disease transmission)
   b. Sterile Technique
   c. Patients with Disabilities
   d. Patient Monitoring and Assessment (pre-, during, and post-procedure)
      1. physical status
      2. emotional status
      3. cardiac monitoring
   e. Intravenous Therapy
      1. venipuncture
      2. flow rate monitoring
      3. complications
   f. Oxygen Therapy
      1. level (flow rate)
      2. indications and contraindications
   g. Urinary Catheterization
      1. technique
      2. complications
      3. contraindications
   h. Medical Emergencies
      1. cardiac arrest
      2. hypoglycaemia
      3. seizure
      4. respiratory arrest
      5. shock
   i. Radiological Procedure Complications
      1. contrast related complications
         a. nephrotoxicity
            1. contrast induced nephropathy
            2. NSF (nephrogenic systemic fibrosis)
         b. neurotoxicity
         c. extravasation
      2. infection
      3. hemorrhage
      4. pneumothorax
      5. perforation (GI or GU)
      6. respiratory distress
      7. aspiration
      8. vasovagal reaction
      9. pulmonary edema
      10. vascular injury or occlusion
      11. complications of catheterization
      12. seizures
      13. pain
      14. anaphylactic shock
      15. neurologic deficit
      16. stroke
      17. cardiac arrest
      18. radiation injury
      19. physical injury
      20. death
   j. Medical Devices
      1. image appearance, indications, and purpose
         a. drainage catheters
         b. peritoneal dialysis catheters
         c. CSF shunts
         d. stents
         e. IABP
         f. pacers/ICD
         g. urinary catheters
         h. umbilical vascular catheters
         i. cardiovascular valves
         j. intrathecal catheters
         k. bariatric devices
         l. neuro stimulators
      2. image appearance, indications, purpose, appropriate location, and complications
         a. Swan Ganz catheters
         b. central venous catheters
         c. IVC filter
         d. chest tubes
         e. tracheal tubes
         f. gastrostomy tubes
B. DRUGS AND CONTRAST MATERIALS (30)

1. TERMINOLOGY (5)
   a. Regulations
      1. Federal Drug Administration (FDA)
      2. Drug Enforcement Agency (DEA)
      3. controlled substances
   b. Identifying Names
      1. generic
      2. trade
      3. United States Pharmacopoeia (USP)
   c. Drug Characteristics
      1. actions
      2. synergisms
      3. indications
      4. contraindications
      5. side effects
      6. adverse actions
   d. Dosage
      1. loading
      2. maintenance
      3. therapeutic dose
      4. lethal dose
   e. Safe Dosage Calculation
      1. ratio
      2. proportion
      3. pediatric
      4. geriatric
   f. Administration
      1. oral
      2. rectal
      3. sublingual
      4. parenteral
      5. intravenous
      6. intramuscular
      7. intrathecal
      8. cutaneous
      9. nasal

2. ANESTHETICS (7)
   a. Local Anesthetics
      1. short acting
      2. long acting
      3. injectables
      4. cutaneous
   b. Moderate/Conscious Sedation - American Society of Anesthesiologists (ASA) Guidelines
      1. definitions
      2. guidelines
         a. pre-procedure
            1. history and physical
            2. ASA guidelines
         b. intra-procedure
         c. post-procedure
         d. discharge scoring system
            1. motor activity
            2. respirations
            3. standing blood pressure
            4. consciousness
            5. oxygen saturation
      3. equipment
      4. medications (indications, contraindications, dosing guidelines)
         a) fentanyl
         b) morphine
         c) meperidine
         d) diazepam
         e) midazolam
         f) lorazepam
         g) pentobarbital
         h) chloral hydrate
         i) naloxone
         j) flumazenil
         k) epinephrine
         l) atropine

(Section B continues on the following page)
3. GENERAL MEDICATIONS: (9)
classifications, indications, contraindications

a. Anti-Infective Drugs
   1. antibiotics
   2. antivirals
   3. antifungals

b. Cardiac Drugs
   1. anti-hypertensive
      a. calcium channel blockers
      b. beta blockers
      c. ACE inhibitors
   2. vasoconstrictors
   3. vasodilators
   4. anti-arrhythmics

c. Gastrointestinal Drugs
   1. anti-reflux agents
   2. hypomollify (glucagon)
   3. cholecystokinin (cholecystokinin)
   4. antiemetics

d. Vascular Drugs
   1. coagulation modifiers
   2. tissue plasminogen activator (TPA)

e. Anti-Inflammatory Drugs
   1. analgesics (aspirin)
   2. non steroidal anti-inflammatory drugs (NSAIDs)
   3. corticosteroids

f. Endocrine Drugs
   1. diabetic medication
   2. anti-hypoglycemic (glucagon)
   3. insulin
   4. thyroid medications

g. Diuretics

4. CONTRAST MEDIA (9)

a. Agents (e.g., indications, contraindications,
adverse reactions, dosage, routes of
administration, excretion process)
   1. negative contrast agents
   2. positive contrast agents
   3. barium sulfate
   4. iodinated contrast media
      a. osmolality (high versus low)
      b. molecular structure
      c. advantages
   5. MRI agents
   6. special considerations
      a. hydration status
      b. renal status (e.g., creatinine levels, GFR)
      c. diseases of concern
         (e.g., multiple myeloma, diabetes)
      d. incompatible medications
         (e.g., metformin/Glucophage)

b. Allergies
   1. allergy history
   2. types of reactions (mild to severe)
   3. premedications
      a. diphenhydramine
      b. corticosteroids

c. Resuscitation
   1. life support
      a. basic life support (BLS)
      b. advanced cardiac life support (ACLS)
   2. basic drugs
      a. epinephrine
      b. atropine
      c. bronchodilator
      d. nitroglycerine
      e. lidocaine
      f. intravenous fluid
C. ANATOMY, PHYSIOLOGY, AND PATHOPHYSIOLOGY (55)

1. ANATOMY: (15) Includes gross and sectional anatomy, age-related changes, common surgical changes, congenital and developmental abnormalities/anomalies
   a. Abdominal Section
   b. Thoracic Section
   c. Musculoskeletal Section
   d. Neurological and Endocrine Section
   e. Vascular and Lymphatic Section
   f. Breast and Axilla Section

2. PHYSIOLOGY: (12) Includes age-related and surgery-related physiologic changes
   a. Abdominal Section
      1. gastrointestinal
      2. hepatobiliary
      3. urinary
      4. reproductive
   b. Thoracic Section
      1. cardiovascular
      2. pulmonary
   c. Musculoskeletal Section
      1. muscular
      2. skeletal
   d. Neurological and Endocrine Section
      1. neurological
      2. endocrine
   e. Vascular and Lymphatic Section
      1. vascular
      2. lymphatic
   f. Breast and Axilla Section

3. PATHOPHYSIOLOGY (28)
   a. Abdominal Section
      1. alteration in function related to disease/injury
      2. compensation mechanisms
      3. diseases/disorders/injuries (e.g., etiology, manifestations, physical examination, diagnostic studies, history and physical findings/clinical data)
         a. general abdomen
            1. abdominal calcifications
            2. abdominal aortic aneurysm
            3. normal and abnormal gas patterns – (e.g., ileus, obstruction, volvulus)
            4. pneumoniostasis intestinalis
            5. portal venous gas
            6. peritonitis
            7. pneumoperitoneum
            8. abscess
            9. free fluid
         b. gastrointestinal
            1. esophagus
               a. dysphagia
               b. achalasia
               c. scleroderma
               d. fistulae
               e. esophagitis
               f. varices
               g. Crohn's disease
               h. presbyesophagus
               i. webs
               j. diverticuli (Zenker's, Killian-Jamieson, epiphrenic)
         k. primary muscular and neural disorders
         l. malignant and benign masses
         m. Barrett's esophagus

(Section C continues on the following page)
2. stomach
   a. hiatal hernias
   b. gastric outlet obstruction
   c. malignant and benign masses
   d. gastroparesis
   e. volvulus
   f. pyloric stenosis
   g. bezoar
   h. ulcers
   i. gastritis
   j. gastroesophageal reflux disease (GERD)
   k. surgical variation (Roux-en-Y, gastric band, Nissen fundoplication)

3. small intestine
   a. diverticuli
   b. non-rotation and malrotation
   c. duodenitis
   d. Crohn's disease
   e. peptic ulcer disease
   f. malignant and benign tumors
   g. ischemia
   h. adhesions
   i. malabsorption
   j. hemias
   k. infections
   l. fistulae
   m. superior mesenteric artery (SMA) syndrome
   n. intussusception
   o. necrotizing enterocolitis
   p. Meckel's diverticulum

4. large intestine
   a. intussusception
   b. Crohn's disease
   c. polyps
   d. malignant and benign masses
   e. Hirschsprung's disease
   f. fistulae
   g. inflammatory diseases
   h. adhesions
   i. appendicitis
   j. non-rotation and malrotation
   k. colitis
   l. diverticulosis/diverticulitis
   m. volvulus
   n. constipation
   o. toxic megacolon

5. hepatobiliary, pancreas, and spleen
   a. hepatitis
   b. cirrhosis
   c. pancreatitis
   d. cholecystitis
   e. biliary calculi
   f. liver failure
   g. portal hypertension
   h. malignant and benign masses
   i. inflammatory processes
   j. biliary dyskinesia
   k. fatty liver
   l. Gaucher's disease
   m. splenomegaly
   n. pancreatic insufficiency
   o. pancreatic pseudocyst

6. urinary
   a. malignant and benign masses
   b. calculi
   c. inflammatory processes and abscesses
   d. acute and chronic renal failure
   e. glomerulonephritis and nephrotic syndrome
   f. infarcts, ischemia, thrombosis
   g. nephrocalcinosis
   h. renal papillary necrosis
   i. vesicoureteral reflux
   j. UPJ obstruction (congenital, adult)
   k. polycystic kidney disease

7. reproductive
   a. female
      1. endometriosis
      2. malignant and benign masses
      3. pelvic inflammatory disease
      4. polycystic ovary disease
      5. pregnancy
      6. ectopic pregnancy
   b. male
      1. benign prostatic hypertrophy
      2. malignant and benign masses
      3. inflammatory processes
      4. testicular torsion
      5. hydrocele

(Section C continues on the following page)
b. Thoracic Section
   1. alteration in function related to disease/injury
   2. compensation mechanisms
   3. diseases/disorders/injuries
      (e.g., etiology, manifestations, physical examination, diagnostic studies, history and physical findings/clinical data)
      a. inflammatory and infectious diseases
      b. malignant and benign masses
      c. adult respiratory distress syndrome (ARDS)
      d. infant respiratory distress syndrome (IRDS)
      e. hyaline membrane disease (HMD)
      f. bronchopulmonary dysplasia (BPD)
      g. chronic obstructive pulmonary disease (COPD)
      h. pleural effusions
      i. asthma
      j. diaphragmatic paresis
      k. pulmonary edema
      l. pulmonary fibrosis
      m. pulmonary emboli
      n. atelectasis
      o. pulmonary venous and arterial hypertension
      p. calcification
      q. pneumothorax
      r. pneumomediastinum
      s. congestive heart failure (CHF)
      t. coronary artery disease
      u. valvular heart disease
      v. pericardial disease
      w. cardiac dysrhythmias
      x. pleural diseases

c. Musculoskeletal Section
   1. alteration in function related to disease/injury
   2. compensation mechanisms
   3. diseases/disorders/injuries
      (e.g., etiology, manifestations, physical examination, diagnostic studies, history and physical findings/clinical data)
      a. arthritis
         1. gout
         2. osteoarthritis
         3. rheumatoid arthritis
         4. ankylosing spondylitis
         5. psoriatic arthritis
      b. trauma (fractures, dislocations, and associated soft tissue injuries)

c. tumors
   1. osteochondroma
   2. Ewing's sarcoma
   3. osteosarcoma
   4. enchondroma
   5. chondrosarcoma
   6. osteoid osteoma
   7. metastatic disease
   8. multiple myeloma/plasmacytoma

d. infections
   1. acute and chronic osteomyelitis
   2. soft tissue infection

e. diseases
   1. osteomalacia
   2. osteoporosis
   3. Paget's disease
   4. fibrous dysplasia
   5. osteogenesis imperfecta
   6. renal osteodystrophy

d. Neurological and Endocrine Section
   1. alteration in function related to disease/injury
   2. compensation mechanisms
   3. diseases/disorders/injuries
      (e.g., etiology, manifestations, physical examination, diagnostic studies, history and physical findings/clinical data)
      a. neurological
         1. cerebrovascular accident (CVA)
         2. malignant and benign masses
         3. Parkinson's disease
         4. amyotrophic lateral sclerosis (ALS)
         5. multiple sclerosis (MS)
         6. hydrocephalus
         7. normal pressure hydrocephalus (NPH)
         8. increased cranial pressure
         9. pseudotumor cerebri
         10. infection/inflammation
         11. open and closed head injuries
         12. spinal cord injury
         13. synx
         14. seizures
         15. myasthenia gravis
         16. Alzheimer's disease
         17. dementia
         18. herniated disc

(Section C continues on the following page)
b. endocrine
   1. osteoporosis
   2. hyperparathyroidism
   3. diabetes
   4. pituitary disorder
   5. thyroid disorders
      a. malignancy and benign masses
      b. hyperthyroidism
   6. adrenal disorders
   7. renovascular hypertension

e. Vascular and Lymphatic Section
   1. alteration in function related to
c      disease/injury
   2. compensation mechanisms
   3. diseases/disorders/injuries
      (e.g., etiology, manifestations,
      physical examination, diagnostic
      studies, history and physical
      findings/clinical data)
      a. blood clotting disorders
      b. anemias
      c. leukemias
      d. lymphomas
      e. shock
      f. hypertension
      g. arteriosclerosis and arteriosclerosis
      h. aneurysm
      i. varicosities
      j. arteriovenous malformations (AVM)
      k. lymphedema
      l. coarctation of aorta

f. Breast and Axilla
   1. benign and malignant masses
      a. cysts
      b. fibroadenoma
      c. invasive ductal carcinoma
      d. invasive lobular carcinomas
      e. phyllodes
      f. inflammatory breast cancers
      g. Paget's disease
      h. ductal carcinoma in situ
   2. inflammatory diseases
D. RADIOLOGIC PROCEDURES (40)

This section addresses radiographic procedures for the categories that follow (1-5). Questions will cover the following topics:

- Anatomy & Pathophysiology
- Indications for Procedure
- Contraindications for Procedure
- Patient Assessment and Preparation for the Procedure
- Alternative and/or Complementary Procedures
- Access Methods and Closure Devices
- Patient Management During Procedure
- Operation of Diagnostic Equipment to Reduce Patient Exposure
- Contrast and Drug Administration
- Image Enhancement and Post-Processing
- Evaluation of Images for Diagnostic Utility
- Complications and Response to Emergencies
- Post-Procedure Patient Care
- Outcomes Measurement

1. GI AND CHEST STUDIES (10)
   a. Esophageal Study*
   b. Swallowing Function Study*
   c. Upper GI Study*
   d. Small Bowel Study*
   e. Small Bowel Study via Enteroctysis Tube
   f. Enema with Barium, Air, or Water Soluble Contrast*
   g. Nasogastric/Enteric and Orogastric/Enteric Tube Placement*
   h. T-Tube Cholangiogram
   i. Defecography
   j. Chest Fluoroscopy

2. GU STUDIES (8)
   a. Antegrade Urography (e.g., Pyelography, Nephrostomy)
   b. Cystography*
   c. Retrograde Urethrogram or Urothrocystography
   d. Voiding Cystourethrography
   e. Loopography
   f. Hysterosalpingography

3. INVASIVE NONVASCULAR PROCEDURES (10)
   a. Joint Injection and Aspiration
   b. Arthrogram (Radiography, CT, and MRI)*
   c. Lumbar Puncture*
   d. Cervical, Thoracic, or Lumbar Myelography
   e. Thoracentesis*
   f. Placement of Tube for Pneumothorax
   g. Paracentesis*
   h. Abscess, Fistula, or Sinus Tract Study

* Two of the 12 marked procedures (identified as mandatory on the clinical experience and competence assessments) will be included in the case study section of the exam.
4. INVASIVE VASCULAR PROCEDURES (8)
   a. Peripheral Insertion of Central Venous Catheter (PICC) placement
   b. Insertion of Non-Tunneled Central Venous Catheter
   c. Insertion of Tunneled Central Venous Catheter
   d. Port Injection
   e. Extremity Venography

5. IMAGE POST-PROCESSING (4)
   a. CT
      1. 3D reconstruction
      2. modifications to field of view (FOV)
      3. slice spacing
      4. algorithm
      5. maximum intensity projection (MIP)
      6. multiplanar reconstruction (MPR)
      7. quantitative measurements (volume, distance, diameter)
      8. cardiac analysis (calcium scoring and coronary artery mapping)
      9. shunt graft measurements
     10. volume rendering
   b. MRI
      1. 3D reconstructions
      2. maximum intensity projection (MIP)
      3. volume rendering
      4. multiplanar reconstruction
      5. quantitative measurements (volume, distance, diameter)
      6. subtraction
E. RADIATION SAFETY, RADIATION BIOLOGY, AND FLUOROSCOPIC OPERATION (15)

1. RADIATION SAFETY (6)
   a. Exposure and Dose
      1. exposure
      2. absorbed dose, equivalent dose, effective dose
      3. measurement and calculation of quantities (e.g., CTDI, DAP)
      4. high dose exams and modalities
   b. Radiation Safety Standards
      1. organizations and their roles
         a. Nuclear Regulatory Commission (NRC)
         b. Occupational Safety and Health Administration (OSHA)
         c. Environmental Protection Agency (EPA)
         d. Food and Drug Administration (FDA)
         e. state health departments
      2. principles of dose limitation (time, distance, shielding, ALARA)
      3. monitoring and measuring devices
      4. effective dose limits
         a. National Council on Radiation Protection and Measurement (NCRP)
            1. role
            2. reports
         b. ACR Appropriateness Criteria®
            1. role
            2. reports
   c. Methods to Reduce Patient Exposure
      1. intermittent fluoroscopy
      2. limitation of field size
      3. exposure factors (x-ray and CT)
      4. filtration of the x-ray beam
      5. protective shielding
      6. immobilization
      7. grid selection
      8. limitation of fluoroscopic time
      9. proper fluoroscope use
     10. pediatric considerations
   d. Methods to Reduce Occupational Exposure
      1. location in radiation area
      2. shielding devices in x-ray rooms
      3. personal shielding devices
      4. proper fluoroscope use

2. RADIATION BIOLOGY (4)
   a. Cell Growth and Division
   b. Radiosensitivity of Cells
      1. direct and indirect effects
      2. linear energy transfer (LET)
      3. relative biological effectiveness (RBE)
      4. oxygen enhancement ratio (OER)
      5. dose rate, fractionation, and protraction
   c. Radiation Effects
      1. deterministic effects versus stochastic effects
      2. background radiation
      3. dose-response relationships
      4. skin effects
      5. acute radiation syndromes
      6. local tissue damage
      7. hematological effects
      8. carcinogenesis
      9. fetal effects
     10. genetic effects

3. FLUOROSCOPIC OPERATION (5)
   a. Fluoroscopy
      1. components
         a. x-ray tube
         b. image intensifier
         c. collimators
         d. recording devices
            1. digital cameras
            2. cine
            3. spot films
            4. photo spot
         e. generator
         f. controls
         g. display
         h. recording
      2. static image storage
      3. dynamic image storage
      4. pulsed fluoroscopy
      5. high-level or boost mode
      6. exposure factors
      7. cumulative timer
   b. Dose Monitoring Equipment
F. MEDICAL-LEGAL, PROFESSIONAL, AND GOVERNMENTAL STANDARDS (15)

1. MEDICAL RECORDS (3)
   a. Components of Documentation
      1. types of documentation for patient chart
      2. electronic and paper records
      3. fluoroscopic and image documentation
   b. Techniques and Procedures for Documentation
   c. Document Development and Administration
      1. examination findings
      2. exceptions from established protocol or procedure
      3. patient's questions and concerns
      4. information regarding patient care, the procedure and final outcome
      5. diagnostic/therapeutic procedure and patient data
      6. radiologists report to referring physician
      7. direct communication with referring physician
      8. discharge summary
   d. Informed Consent
      1. patient's competence
         a. cognitive impairment
            1. competence-assessment
            2. mental status
            3. medication
         b. surrogate consent
            1. health care power of attorney
            2. family
         c. patient education
            1. explain procedure
            2. risk versus benefit
            3. alternatives and options
            4. refusal of procedure and implications

2. REGULATORY REQUIREMENTS (3)
   a. Quality Assurance Management
      1. facility rules
      2. The Joint Commission requirements
   b. Credentialing
      1. local or hospital requirements
      2. state licensing/registration regulations
      3. continuing education requirements
      4. supervisory notification
      5. professional standards
   c. Government Regulations
      1. Medical Practice Act – supervisory requirements
      2. Health Insurance Portability and Accountability Act (HIPAA)

3. LEGAL CONSIDERATIONS (3)
   a. Definitions
      1. negligence and malpractice
         a. gross
      2. contributory
      3. standard of care
      4. assault and battery
      5. false imprisonment
      6. slander and libel
      7. elements of tort
   b. Legal Doctrines
      1. respondeat superior
      2. res ipsa loquitur
      3. foreseeability
      4. personal liability
      5. good samaritan law

(Section F continues on the following page)
4. ETHICS (3)
   a. Patient Bill of Rights
   b. ASRT Practice Standards
   c. ARRT Standards of Ethics
   d. Definitions
      1. morals
      2. values
      3. ethics

5. QUALITY IMPROVEMENT, DATA ANALYSIS, AND CLINICAL RESEARCH (3)
   a. Definitions
      1. measures of frequency
      2. measures of central tendency
      3. measures of variance
   b. Assessment of Outcomes
Appendix IV: RA Course Sequence Grid
Courses

Radiologist Assistant Program

First Professional Year

<table>
<thead>
<tr>
<th>Spring Semester Courses</th>
<th>Prerequisites</th>
<th>Credit Hrs.</th>
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<tbody>
<tr>
<td><strong>RADI 710</strong> Advanced Patient Assessment,</td>
<td>RA students only</td>
<td>3</td>
</tr>
<tr>
<td>Management, and Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RADI 711</strong> Abdominal Imaging and Procedures I</td>
<td>RA students only</td>
<td>3</td>
</tr>
<tr>
<td><strong>RADI 713</strong> Advanced Pathophysiology I</td>
<td>RA students only</td>
<td>3</td>
</tr>
<tr>
<td><strong>RADI 712</strong> Clinical Practicum I</td>
<td>RA students only</td>
<td>1</td>
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Semester Total

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<tr>
<th>Summer Session I Courses</th>
<th>Prerequisites</th>
<th>Credit Hrs.</th>
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<tr>
<td><strong>RADI 721</strong> Abdominal Imaging and Procedures II</td>
<td>RADI 711- 713</td>
<td>3</td>
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<tr>
<td><strong>RADI 722</strong> Clinical Practicum II</td>
<td>RADI 711- 713</td>
<td>2</td>
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Semester Total

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<th>Summer Session II</th>
<th>Prerequisites</th>
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<tr>
<td><strong>RADI 742</strong> Musculoskeletal Imaging and</td>
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<tr>
<td>Procedures</td>
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<tr>
<td><strong>RADI 732</strong> Clinical Practicum III</td>
<td>RADI 722</td>
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Semester Total

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<th>Fall Semester</th>
<th>Prerequisites</th>
<th>Credit Hrs.</th>
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<tr>
<td><strong>RADI 741</strong> Thoracic Imaging and Principles</td>
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<tr>
<td><strong>RADI 714</strong> Advanced Pathophysiology II</td>
<td>RADI 713</td>
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</tr>
<tr>
<td><strong>RADI 743</strong> Clinical Practicum IV</td>
<td>RADI 732</td>
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</table>

Semester Total

| First Year Total                               |                                      | 28          |

Second Professional Year

<table>
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<tr>
<th>Spring Semester</th>
<th>Prerequisites</th>
<th>Credit Hrs.</th>
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<td>Course Code</td>
<td>Course Title</td>
<td>Type</td>
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<tr>
<td>-------------</td>
<td>-------------------------------------------------------</td>
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</tr>
<tr>
<td>RADI 755</td>
<td>Research Methodology &amp; Statistics</td>
<td>First Yr. Courses</td>
</tr>
<tr>
<td>RADI 752</td>
<td>Vascular and Lymphatic Imaging and Procedures</td>
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<td>RADI 753</td>
<td>Clinical Practicum V</td>
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<td></td>
<td>Summer Session I</td>
<td>Prerequisites</td>
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<tr>
<td>RADI 751</td>
<td>Neurological and Endocrine Imaging and Procedures</td>
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<td>RADI 762</td>
<td>Clinical Practicum VI</td>
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<td></td>
<td>Summer Session II</td>
<td>Prerequisites</td>
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<td>RADI 731</td>
<td>Pharmacology and Clinical Decision Making in Radiology</td>
<td>RADI 710- 762</td>
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<td>RADI 772</td>
<td>Clinical Practicum VII</td>
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<td></td>
<td>Fall Semester</td>
<td>Prerequisites</td>
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<tr>
<td>RADI 761</td>
<td>Practice Issues</td>
<td>RADI 710- 755, 762, 772</td>
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<td>RADI 771</td>
<td>Professional Practice Seminar</td>
<td>RADI 710- 755, 772</td>
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<td>RADI 781</td>
<td>Clinical Practicum VIII</td>
<td>RADI 772</td>
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<td>Second Year Total</td>
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<td></td>
<td>Program (First and Second Years)</td>
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</tbody>
</table>
Appendix V: Course Descriptions
Course Descriptions

Radiologist Assistant Program

RADI 710 Advanced Patient Assessment, Management, and Education
Content introduces a model for clinical thinking to aid in patient assessment and analysis and interpretation of physiological data. Clinical skills acquired will include interviewing skills and assessment techniques. The focus is on the application of anatomy and physiology knowledge to assist in patient assessment and management.

RADI 711 & 721 Abdominal Imaging and Procedures I and II
These courses include abdominal anatomy, physiology, and pathophysiology with clinical pathways. Fluoroscopic equipment operation and radiation safety are also included. The following procedures will be covered with an emphasis on patient assessment, management, preparation, post-procedure care, indications, contraindications, possible complications, contrast media, drugs, image evaluation and observation reporting: UGI, Ba Swallow, SB studies, BE, cystogram, nasoenteric and oroenteric tube placement, paracentesis, fistulagram, sonogram, hysterosalpingogram, loopogram, RUG, and tube injections.

RADI 712, 722, 732, 743, 753, 762, 772, 781 Clinical Practicum I- VIII
Mentored clinical experience is the cornerstone in the development of the radiologist assistant. RA students work closely with radiologist mentors to maximize the learning opportunities available in the clinical environment. It is recognized that no two diagnostic imaging centers will be exactly the same. The RA student and radiologist mentor collaborate to establish goals and expectations for this portion of the curriculum. A clear understanding of the degree of autonomy in the performance of diagnostic/therapeutic procedures and the assistant’s contribution to the radiologist’s final diagnosis related to the procedures is essential to the clinical experience (ASRT, 2002). Throughout the program, students will be required to complete competencies for imaging procedures.

RADI 713 Pathophysiology I & II
Using a system approach, this course is designed to focus on the characteristics and manifestations of disease caused by alterations or injury to the structure or function of the body. Concepts basic to pathophysiology as well as common disease conditions are studied and serve as prototypes in understanding alterations that occur in the major body systems. Emphasis is placed on the characteristic manifestations and image correlation with these pathologies observed through diagnostic imaging. Section I will focus on
gastrointestinal, genitourinary and cardiovascular systems. Section II will cover respiratory, neurological, endocrine and reproductive systems.

**RADI 731 Pharmacology and Clinical Decision Making in Radiology**
The course includes pharmaceuticals common to radiology patients and will address indications, contraindications, complications, the intended use of these drugs and their effect on physiology, diseases and conditions. After learning this content and possessing the appropriate clinical skills, the radiologist assistant will analyze the patient’s current condition with regards to medications and other therapies and determine the significance to the radiology procedure. He or she will suggest the appropriate action plan for the procedure for the specific patient. The radiologist assistant will be responsible for the delivery and documentation of procedure-related pharmaceuticals and for patient assessment and monitoring before, during and after the procedure and drug administration. It is essential that the radiologist assistant have a clear understanding of the laws and policies related to pharmaceuticals in his or her practice setting.

**RADI 741 Thoracic Imaging and Principles**
This course includes thoracic and breast anatomy, physiology, and pathophysiology with clinical pathways. The following procedures will be covered with an emphasis on patient assessment, management, preparation, post-procedure care, indications, contraindications, possible complications, contrast media, drugs, image evaluation and observation reporting: thoracentesis, ductogram, and breast needle localization.

**RADI 742 Musculoskeletal Imaging and Procedures**
This course includes musculoskeletal anatomy, physiology, and pathophysiology with clinical pathways. The following procedures will be covered with an emphasis on patient assessment, management, preparation, post-procedure care, indications, contraindications, possible complications, contrast media, drugs, image evaluation and observation reporting: arthrogram, joint injection and joint aspiration.

**RADI 751 Neurological and Endocrine Imaging and Procedures**
This course includes neurological and endocrine system anatomy, physiology, and pathophysiology with clinical pathways. Content includes CT and MRI Imaging principles. The following procedures will be covered with an emphasis on patient assessment, management, preparation, post-procedure care, indications, contraindications, possible complications, contrast media, drugs, image evaluation and observation reporting: lumbar puncture and myelogram.
RADI 752 Vascular and Lymphatic Imaging and Procedures
This course includes lymphatic and vascular anatomy, physiology, and pathophysiology with clinical pathways. The following procedures will be covered with an emphasis on patient assessment, management, preparation, post-procedure care, indications, contraindications, possible complications, contrast media, drugs, image evaluation and observation reporting: PICC placement, port injection, non-tunneled venous catheter central line placement, and venous catheter placement for dialysis.

RADI 755 Research Methodology & Statistics
Content is designed to aid in the development of inquiry and research skills. Learning research skills and conducting research projects benefits the individual and the profession. The individual benefits by learning new knowledge and skills; the profession benefits by adding to the professional body of knowledge. Technological innovations result in new procedures, equipment and expanded or new modalities that require technologists to remain current in their knowledge and skills. One method of meeting this professional obligation is to read, study professional literature or conduct research. Learning does not end when a student completes the formal educational process; therefore, as a professional, the technologist must develop inquiry skills, determine continuing education needs and pursue methods to meet those needs. The course will culminate in a master’s thesis that will be presented on campus.

RADI 761 Practice Issues
Content is designed to impart an understanding of protection of individual and population groups against the harmful effects of ionizing and nonionizing radiation. This includes an overview of the regulatory bodies and patient radiation safety regulations affecting the modern diagnostic imaging environment. The effect of ionizing radiations on biological samples will be included. Interaction of ionizing radiation with matter, units of exposure and dose, radiation detection and measurement devices will be discussed. Practical techniques and QA/QC procedures for reducing patient and operator risk of exposure to ionizing radiation will be introduced. Content also provides a fundamental background in the law and regulatory issues of today’s health care culture. Advanced legal terminology, concepts and principles will be presented, discussed and applied in relation to clinical practice. Content includes basic concepts of patient information management and medical records management, including privacy and regulatory issues.

RADI 771 Professional Practice Seminar
Content introduces guidelines for reporting initial observations made by the radiologist assistant during radiology procedures and image assessment. The radiologist assistant
role in the systematic analysis of the quality of care - the diagnosis and treatment, the resources, procedures and resulting outcomes, including the patient's quality of life - will be discussed. Topics of sensitivity and specificity as they relate to diagnostic testing will be presented. Also included will be predictive values, prior probability and bias as they relate to the analysis of information obtained from diagnostic testing.
Appendix VI: Sample Affiliation Agreement and Memorandum of Understanding
MEMORANDUM OF UNDERSTANDING
BETWEEN
RADIOLOGIST ASSISTANT PROGRAM
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
DIVISION OF RADILOGIC SCIENCE
AND
RADIOLOGY PRACTICE PRECEPTORSHIP

Both the University and the Preceptorship agree and understand the following:

a. University appoints a Clinical Education Coordinator who will be liaison representative for the University. (The name and address of the Coordinator shall be communicated to the Practice. Any change in the Coordinator shall be communicated in writing to the Practice.)

b. The University will provide written communication regarding the Practice’s performance in providing clinical education experiences, and communication may include general information on the students’ evaluations of their experiences with the Practice.

c. The University assures that all assigned students meet the immunization and health requirements of the University and clinical sites, and provides the Practice with evidence of such immunizations and health requirements upon request.

d. The University provides the Practice with an exposure control plan and guidelines for its students in accordance with OSHA Standards for Bloodborne Pathogens and TB, or other applicable guidelines upon request. Adequate OSHA safety and HIPAA training will occur prior to any clinical experience.

e. The University will be responsible for admissions, matriculation, grade submissions, exchanging and monitoring radiation badges, dismissals, graduation and certification procedures.

f. The Practice will provide the supervision, physical facilities, and equipment necessary for the clinical education experience.

g. The Practice will designate a Clinical Preceptorship Coordinator to be the liaison representative to the University. (The name and address of said representative and any change in said representative shall be communicated in writing to the University.)

h. The Practice will provide the University with the name and contact information of a person at each clinical site to be notified of student participation at the site. This person may be a Radiology Manager, Legal Services employee, or any other appropriate personnel who can verify the need for site contracts.

i. The Practice will submit to the University evaluations of each student’s performance and progress based on his/her activities during the clinical experience assignment. All evaluation and assessment forms will be provided by the University. The Practice shall provide the student ongoing feedback regarding his/her performance and a final evaluation conference will be held.

j. The Practice will submit verification of student completion of minimum required clinical hours each semester. The RA student must complete at least ten (10) clinical contact hours per week in Fall 1, at least twenty-five (25) clinical contact hours per week in the Spring I, Summer I and II, and Fall II semesters and at least thirty (30) clinical hours per week in the Spring II semester.

k. The Practice will ensure that the RA student completes all RA mandatory clinical competencies and the appropriate number of elective competencies as identified by the UNC RA
curriculum and the ARRT Role Definition document. Competencies will be evaluated and reported according to program documentation.

1. The Practice will retain full authority and responsibility for the care and treatment of its patients.

m. The Practice will ensure that each and every Party of the Practice is aware of this Memorandum of Understanding and are informed of his or her responsibilities. If at any time a designated preceptor leaves or enters the practice, the University must be notified in writing.

n. The Practice will ensure that each and every Party of the Practice who is designated as a preceptor understands his/her role. The Radiologist Preceptor duties include, but are not limited to:

1. Clinical Instruction and guidance of the RA student as he/she develops overall RA clinical skills.
2. Supervision and oversight of all RA student interactions with patients.
3. Teaching, evaluating, and documenting successful completion of RA Clinical Competencies (Required and Elective) as identified by the UNC RA curriculum and the ARRT Role Delineation document. Competencies will be evaluated and reported according to program documentation.
4. Maintaining communication with the UNC faculty about the progress of the RA student in the RA program.

FOR AND ON BEHALF OF:
The Practice
"Company"
"Address1"
"Address2"
"City", "State", "PostalCode"

THE DIVISION OF RADIOLOGIC SCIENCE

Joy Remer
Director, UNC-CH Division of Radiologic Science
Date: __________________________

Authorized Signature for the Practice
Printed Name:____________________
Title:____________________________
Date:____________________________
Phone:___________________________
Email:___________________________
AFFILIATION AGREEMENT

BETWEEN

THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
AND

«Company»

THIS AFFILIATION AGREEMENT, made and entered into this the «CurrentDate» day of «CurrentMonth», «CurrentYear» is by and between the University of North Carolina at Chapel Hill, hereinafter referred to as "the University," for its Department of Allied Health Sciences in the School of Medicine, and «Company», hereinafter referred to as "the Facility."

The purpose of this Agreement is to form a working relationship between the Facility and the University to provide clinical learning experiences for Allied Health students of the University and to enrich the program of the Faculty through the stimulation of the relationship with the University and its students. During the term of this Affiliation Agreement, the Facility agrees to accept students from the Allied Health Programs set forth in Exhibit A, attached hereto and the terms of which are incorporated herein by reference. During the original term of this Agreement or its renewal, the University may desire, and the Facility may agree, to accept students from additional Allied Health Programs. In such event, the University will notify the Facility in writing prior to assigning any additional students to the Facility, and Exhibit A will be revised and the terms of which will be incorporated herein by reference.

NOW, THEREFORE, in consideration of the foregoing purpose and the mutual covenants set forth below, the Facility and the University agree as follows:

1. The University and the Facility will be mutually responsible for planning the schedule of student assignments to the Facility, including the number of students and the time periods of the assignment. The number of students accepted by the Facility shall be subject to the availability of the personnel of the Facility for teaching and supervising as well as other commitments. The University will send information to the Facility prior to the initiation of the clinical education experience; such information includes dates of assignment, number of students, names and pertinent information about students, University’s objectives for clinical education, curriculum outline, and types of previous clinical experiences. The Facility will provide clinical education experiences and supervise students. The nature of the clinical experience shall be arranged by the responsible personnel of the Facility after consultation with the responsible personnel of the University.

2. The Facility requires that the student adhere to the rules, regulations, and holiday schedule of the Facility while assigned there and wear uniforms acceptable to the Facility. The student shall be informed of said rules, regulations, holiday schedule, and acceptable uniforms by the Facility. The University will make available to the student, prior to their arrival at the Facility, any rules, regulations, holiday schedules, and orientation materials that may be sent to the University by the Facility.

3. Communications and visits between the officially designated representatives of the Facility and the University shall be arranged as deemed necessary by either party. Advance notice of visitsations shall be given. Each party will keep the other informed of changes in curriculum program and staff that may affect the clinical educational program.

4. Withdrawal of a student from an assignment may be requested by the Facility, the University, or the student. The Facility may withdraw the student from the clinical education experience at the Facility upon the request of the Facility or when, in the University’s judgment, the clinical experiences do not meet the needs of the student. It is understood that only the University can dismiss the student from the professional education program for performance or conduct not justifying continuance in professional education.

5. To the fullest extent permitted by applicable law, the Facility shall indemnify and hold the University and its employees harmless from any and all liability of every nature and description arising out of this Affiliation Agreement, including but not limited to, property damage or personal injuries including death to the extent caused by the negligent acts or omissions or willful misconduct of the Facility or its employees or agents in performing its obligations under this Affiliation Agreement.

Each party shall be solely liable for any claims, actions, demands or damages arising out of its performance of this Affiliation Agreement.

Affiliation Agreement between «Company»
«Address1» «Address2» «City» «State» «PostalCode»
and UNC-CH

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The University shall maintain professional liability insurance, including medical malpractice insurance, for itself in amounts not less than required by the North Carolina Tort Claims Act and for any of its faculty members who provide professional services under this Affiliation Agreement in an amount of $7 million per occurrence.

To the extent permitted by the North Carolina Tort Claims Act, the University shall indemnify and hold the Facility and its employees harmless from any and all liability of every nature and description arising out of this Affiliation Agreement, including but not limited to, property damage or personal injuries including death to the extent caused by the negligence of the University or its employees or agents in performing its obligations under this Affiliation Agreement.

6. The University shall do or cause to be done the following:

   a. Assign to the Facility only such students as are to the University’s knowledge, and in the University’s judgment, physically and mentally capable of performing the duties associated with their clinical education at the time of entering for their clinical education. The University shall, to the extent of its knowledge and within the guidelines of applicable laws and regulations regarding confidentiality, inform the facility of any special health issues any assigned student may have.

   b. Appoint a Clinical Education Coordinator who will be liaison representative for the University. (The name and address of said Coordinator shall be communicated to the Faculty. Any change in said Coordinator shall be communicated in writing to the Facility.)

   c. Provide written communication to the facility regarding the latter’s performance in providing clinical education experiences; said communication may include general information on the students’ evaluations of their experiences with the Facility.

   d. Maintain adequate professional liability insurance for each student in an amount of $7,000,000 per occurrence.

   e. Inform the student that he/she must provide his/her own transportation to the Facility.

   f. Assure that all assigned students meet the immunization and health requirements of Appendix A, attached hereto and the items of which are incorporated herein by reference, and to provide the Facility with evidence of such immunizations and health requirements upon request.

   g. Provide Faculty with an exposure control plan and guidelines for its students in accordance with OSHA Standards for Bloodborne Pathogens and TB, or other applicable guidelines upon request.

   h. Inform the student that it is the responsibility of the student or his/her parents to obtain adequate health insurance for the student.

   i. Provide adequate safety training prior to any clinical experience.

   j. Assign to the Facility only those students who have been educated in the concepts of privilege and confidentiality in a patient care setting.

7. The Facility shall:

   a. Provide the supervision, physical facilities, and equipment necessary for the clinical education experience.

   b. Designate an individual who may be called the Clinical Education Coordinator to be the liaison representative to the University. (The name and address of said representative and any change in said representative shall be communicated in writing to the University.)

   c. Send a representative to attend clinical education conferences and meetings, if convenient.
d. Provide the student access to first aid and emergency care for illnesses or incidents occurring on the property operated by the Facility. The student shall be responsible for the costs of such care. The Facility shall also assist the University in providing appropriate post-exposure evaluation and follow-up as required by the OSHA standards for Bloodborne Pathogens and TB. In the event of exposure incidents involving students during clinical training within the Facility, Students will be responsible for all costs incurred during their post-evaluation and follow-up. In the event of a blood borne pathogen exposure incident, students will go to [Insert name of Medical Treatment Facility Site on the above line] to receive appropriate emergency counseling and treatment. Students will be responsible for all costs incurred during counseling and treatment. The Facility may contact the Clinical Education Coordinator with questions concerning where a student should receive counseling and treatment.

e. Submit to the University an evaluation of each student’s performance and progress based on his/her activities during the clinical experience assignment. Said evaluations shall be provided on forms provided by the University or forms approved by the University at a time specified by the University at the beginning of each assignment period. The Facility shall provide the student ongoing feedback regarding his/her performance and a final evaluation conference will be held.

f. Require each student assigned to the Facility to have adequate professional liability insurance, and require proof of such insurance upon request.

g. Retain full authority and responsibility for the care and treatment of its patients.

h. Provide adequate professional liability insurance in an amount not less than $1,000,000 per occurrence/$3,000,000 annual aggregate that will cover its employees and agents who perform services pursuant to the Affiliation Agreement.

i. Ensure that safety procedures are in place and followed, and supervise student safety.

8. This Agreement shall become effective on [Effective On Date] and terminate on [Terminate On Date] and shall be reviewed by the appropriate representatives of each institution thirty (30) days prior to the expiration date. If the Agreement is renewed without modification, such renewal may be evidenced by a written agreement signed by the officials of both parties. Both parties reserve the right to terminate the Agreement at any time upon thirty (30) days prior written notice. If this Agreement is terminated, any students currently in clinical placement with the Facility shall be allowed to complete their placement under the terms of this Affiliation Agreement.

9. The Facility hereby agrees with the University that its educational and/or employment practices will comply with such non-discrimination laws as may be applicable to it in the performance of this contract.

10. This agreement contains the entire understanding of the parties and shall not be altered, amended or modified, except by an agreement in writing executed by the duly authorized officials of both parties.
IN WITNESS WHEREOF, the parties, acting through their duly authorized officials, have executed this Affiliation Agreement on the dates listed below.

FOR AND ON BEHALF OF:  
THE FACILITY  
«Company»  
«Address1»  
«Address2»  
«City, State, PostalCode»  

THE UNIVERSITY OF NORTH CAROLINA  
AT CHAPEL HILL

Authorized Signature for the Facility  
Printed Name: ____________________________  
Title: ____________________________  
Date: ____________________________  
Phone: ____________________________  
Email: ____________________________

William L. Roper, MD, MPH, Dean, School of Medicine and Vice Chancellor for Medical Affairs, UNC-CH  
Date: ____________________________

Lee McLean, Ph.D.  
Chair, Department of Allied Health Sciences, UNC-CH  
Date: ____________________________
<table>
<thead>
<tr>
<th>Check box (if applicable)</th>
<th>Division Name</th>
<th>Division Signature (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Division of Clinical Laboratory Science</td>
<td>For and on behalf of Division of Clinical Laboratory Science, UNC-CH Date:</td>
</tr>
<tr>
<td></td>
<td>Division of Cytotechnology</td>
<td>For and on behalf of Division of Cytotechnology, UNC-CH Date:</td>
</tr>
<tr>
<td></td>
<td>Division of Occupational Science</td>
<td>For and on behalf of Division of Occupational Science, UNC-CH Date:</td>
</tr>
<tr>
<td></td>
<td>Division of Physical Therapy</td>
<td>For and on behalf of Division of Physical Therapy, UNC-CH Date:</td>
</tr>
<tr>
<td></td>
<td>Division of Radiologic Science</td>
<td>For and on behalf of Division of Radiologic Science, UNC-CH Date:</td>
</tr>
<tr>
<td></td>
<td>Division of Rehabilitation, Counseling and Psychology</td>
<td>For and on behalf of Division of Rehabilitation, Counseling and Psychology, UNC-CH Date:</td>
</tr>
<tr>
<td></td>
<td>Division of Speech and Hearing Sciences</td>
<td>For and on behalf of Division of Speech and Hearing Sciences, UNC-CH Date:</td>
</tr>
</tbody>
</table>

Affiliation Agreement between Company
(Address) Address (City) State (Postal Code) and UNC-CH

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APPENDIX A

IMMUNIZATION AND HEALTH REQUIREMENTS

All University of North Carolina at Chapel Hill students are required to provide documentation of the following immunizations:

1) Diphtheria – one dose must have been within the last 10 years.

2) Tetanus – one dose must have been within the last 10 years.

3) Rubella – proof of immunization or a titer greater than 1:8, or documentation of physician-diagnosed disease.

4) Measles – live virus vaccine administered on or after 12 months of age, or documentation of physician-diagnosed disease.

Students in the Department of Allied Health Sciences are required to provide the following additional documentation as indicated:

1) DTP – documentation of complete series required for students in the Division of Physical Therapy.

2) Rubella – additional dose required for students in the Division of Physical Therapy.

3) Measles – additional dose required of students born after Jan 1, 1957 in the Division of Clinical Laboratory Science, Division of Physical Therapy, and Division of Radiologic Science (unless physician-diagnosed disease is documented). The second dose must be administered at least one month after the first for Clinical Laboratory Science students, and at least 1 year after the first for Radiologic Science students.

4) Mumps – live virus vaccine administered on or after 12 months of age, documentation of physician-diagnosed disease, or laboratory evidence of immunity required of students born after Jan 1, 1957 in the Division of Clinical Laboratory Science and Division of Radiologic Science. Students in the Division of Physical Therapy must document two doses of vaccine, unless documentation of physician-diagnosed disease is available.

5) Varicella – vaccine, positive titer, or history of disease is required by the Division of Clinical Laboratory Science and Division of Radiologic Science. Two doses of vaccine, positive titer, or official documentation of disease is required by the Division of Physical Therapy.

6) Hepatitis B – vaccination or informed refusal is required of all students in the Department of Allied Health Sciences.

7) TB – screening for tuberculosis (i.e., by PPD) and proper evaluation of positive results (i.e., by chest X-ray) is required of all students in the Department of Allied Health Sciences. PPD’s must have been administered within the last 12 months.

8) Visual exam – students in the Division of Cytology and Histology must complete a visual exam, including a test for color blindness.

9) OSHA training – for TB and Bloodborne Pathogens required when student will be in patient care areas.

10) Others – required by Facility (please specify):
Appendix VII : RA Clinical Competency List
2013
Registered Radiologist Assistant (R.R.A.)
Component 1: Clinical Experience Documentation and Competence Assessments

The R.R.A. Entry-Level Clinical Activities (ELCA) document identifies the radiologic procedures and clinical activities that serve as the basis for R.R.A. certification standards. As part of the preceptorship, the student will be exposed to the vast majority of those procedures. This document identifies those clinical procedures the candidate is expected to master to become eligible for certification by ARRT.

As part of their preceptorship, candidates for certification will satisfy two types of clinical requirements. First, they must submit documentation indicating the number of cases completed for a broad range of radiologic procedures. Second, candidates are required to demonstrate competence performing the various radiologic procedures. The specific requirements for the Clinical Experience Documentation and Competence Assessments follow. Forms for documenting the clinical and assessment requirements appear on pages 42-48. Candidates must complete all clinical procedures prior to the examination administration date. Examination results will not be released until all clinical experience and competence assessment forms have been received and evaluated by ARRT.

Clinical Experience Documentation

A minimum of 500 total cases are required. A total of 36 procedures comprise the clinical experience and competence requirements for R.R.A. certification. All candidates are required to perform 12 mandatory procedures for the specified minimum number of cases. In addition, candidates select a subset from the 24 elective procedures. The maximum number of mandatory and elective cases indicates the maximum reportable cases, not the maximum number a student may perform during their training program. Candidates are encouraged to complete as many additional mandatory and elective procedures as achievable.

Mandatory Procedures: The table on the following pages identifies the 12 mandatory radiologic procedures and the minimum and the maximum number of cases required for each procedure. Candidates are required to complete:

- A minimum of 375 of the cases must be from the mandatory procedures category.
- For each mandatory procedure, the specified minimum number of cases must be completed.

For example, assume a hypothetical candidate performed 70 upper GI, 60 small bowel studies, 55 barium enemas, 50 cystograms, 65 arthrograms, 30 lumbar punctures, 30 NG tube placements, 20 paracenteses, and 75 PICC procedures. Of those, 30 upper GI, 25 small bowel studies, 55 barium enemas, 30 cystograms, 45 arthrograms, 25 lumbar punctures, 25 NG tube placements, 20 paracenteses, and 30 PICC line placements equaled 285 cases, which count toward the minimum 375 mandatory cases.

Elective Procedures: The table on the following pages also identifies 24 elective procedures from which candidates must select a minimum of 3 elective procedures. Candidates are required to complete:

- A minimum of 125 cases must be from the elective procedures category.
- For each selected elective, the specified minimum number of cases must be completed for that procedure.

For example, assume a hypothetical candidate performed 30 fluorograms, 5 extremity venograms, 10 port injections, 20 myelograms, 5 breast needle localizations, 5 retrograde urethrogram, and 15 insertions of tunneled central venous catheters. Of those, 15 fluorograms, 5 extremity venograms, 10 port injections, 10 myelograms, 5 breast needle localizations (did not meet the minimum required number), 5 retrograde urethrogram, and 15 insertions of tunneled central venous catheters total 70 which count toward the minimum 125 elective cases.

Candidates must use Form CR-1 for summarizing the number of cases for each procedure. In addition, candidates are expected to keep a detailed record of each case completed (e.g., date, time, facility) for audit purposes.
Clinical Competence Assessment

For all mandatory and elective procedures, candidates must be evaluated according to the following guidelines. The competence assessment is to be completed:

- Once for each procedure. A minimum of 15 assessment forms (12 mandatory and 3 elective) are to be submitted to ARRT.
- By a radiologist using the ARRT evaluation forms that follow. Note that there are separate forms for each class of procedures (GI and Chest, GU, invasive vascular, invasive nonvascular, and post-processing activities).
- At any time during the preceptorship, presumably after the student has completed a sufficient number of cases under appropriate instruction to acquire proficiency.

It is not necessary for the student to complete all cases (e.g., 15 cystograms) prior to presenting for competence assessment. The assessment may be completed at any time after the student has acquired sufficient skill performing a procedure.

During training it is expected that students will receive appropriate levels of supervision. For additional information on supervision, refer to the ELCA document. All procedures must be performed on actual patients; simulated procedures cannot be used to satisfy the competence assessments.

Required Documentation

Form CR-1: Summary of Clinical Experience and Competence Assessments
1. This form is completed by the student as he or she: (a) completes the requisite number of cases for the mandatory and elective procedures; and (b) is evaluated by a radiologist on the mandatory and elective procedures.
2. The student records the number of cases completed for each mandatory and elective procedure he or she performs.
3. The student records only the date that the competency assessment was completed. Note that the actual competence assessments are completed by a radiologist using Form CR-2, as described immediately below.
4. The preceptor and program director must verify and sign the bottom of Form CR-1. This form is submitted to ARRT at the time of application.

Form CR-2: Clinical Competence Assessments (Forms CR-2A through CR-2E)

1. These forms are completed by the radiologist at the time he or she evaluates the student. There are separate evaluation forms for each class of radiologic procedures:
   - Form CR-2A: GU/Chest
   - Form CR-2B: GU
   - Form CR-2C: invasive nonvascular
   - Form CR-2D: invasive vascular
   - Form CR-2E: post-processing activities
2. The radiologist and student are required to sign the bottom of Form CR-2 for each assessment, which is subsequently reviewed and signed by the program director.
3. The student must submit a minimum total of 15 assessment forms to ARRT (12 mandatory and 3 elective procedures).
# Form CR-1

**Summary of Clinical Experience and Competence Assessments**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Experience Documentation</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal and Chest</td>
<td>Mandatory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esophageal study – must fluoro and image the esophagus, may be with UGI</td>
<td>Mandatory</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Swallowing function study (participate in procedure and provide initial observations to radiologist)</td>
<td>Mandatory</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Upper GI study</td>
<td>Mandatory</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Small bowel study – direct the study and spot TI</td>
<td>Mandatory</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Small bowel study via enteroclysis tube</td>
<td>Elective</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Enema with barium, air, or water soluble contrast</td>
<td>Mandatory</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Nasogastric/enteric and orogastric/enteric tube placement – may not require image guidance</td>
<td>Mandatory</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>T-tube cholangiogram</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Defecography</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Perform chest fluoroscopy for diaphragmatic motion</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Genitourinary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anuretgrade urography through existing tube (e.g., pyelography, nephrostography)</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Cystography or voiding cystourethrogram, with a minimum of 10 bladder catheterizations</td>
<td>Mandatory</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Retrograde urethrography or urethrocystography</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Loopography through existing tube</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Hysterosalphangiography – imaging only</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Hysterosalphangiography – procedure and imaging (physician participation required)</td>
<td>Elective</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Procedure</td>
<td>Experience Documentation</td>
<td>Minimum and Maximum Number of Repetitions</td>
<td>Actual Number Completed</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>--------------------------</td>
<td>------------------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Invasive Nonvascular</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthrogram (radiography, CT, and MR) joint injection and aspiration</td>
<td>Mandatory</td>
<td>15</td>
<td>45</td>
</tr>
<tr>
<td>Lumbar puncture</td>
<td>Mandatory</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Cervical, thoracic, or lumbar myelography – imaging only</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Lumbar puncture with contrast</td>
<td>Elective</td>
<td>15</td>
<td>45</td>
</tr>
<tr>
<td>Thoracentesis with or without catheter</td>
<td>Mandatory</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Placement of catheter for pneumothorax</td>
<td>Elective</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Paracentesis</td>
<td>Mandatory</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Abscess, fistula, or sinus tract study</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Injection for sentinel node localization</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Breast needle localization</td>
<td>Elective</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Change of percutaneous tube or drainage catheter</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Thyroid biopsy</td>
<td>Elective</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Liver biopsy (random)</td>
<td>Elective</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Invasive Vascular</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peripheral insertion of central venous catheter (PICC) placement</td>
<td>Mandatory</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Insertion of non-tunneled central venous catheter</td>
<td>Elective</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Insertion of tunneled central venous catheter</td>
<td>Elective</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Port injection</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Extremity venography</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Post-Processing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform CT post-processing</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Perform MR post-processing</td>
<td>Elective</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Total Number of Cases</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chief Preceptor Signature and Date
Program Director Signature and Date
Student Signature and ARRT ID #
# Form CR-2A

**Clinical Competence Assessment for GI and Chest Procedures**

(Endoscopic study; swallowing function study; upper GI study; small bowel study via enterolysis tube; enema with barium, air, or water-soluble contrast; nasogastric/enteric and orogastric/enteric tube placement; T-tube cholangiogram, defecography; chest fluoroscopy)

**Directions:** This form should be completed by the radiologist supervising the procedure after the student has completed a sufficient number of cases to merit evaluation. To meet the required performance standard, the student must perform each clinical activity safely and effectively on a consistent basis.

<table>
<thead>
<tr>
<th>Clinical Activity</th>
<th>Performance Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review patient record and other information to verify appropriateness of procedure. Assess patient for possible contraindications (e.g., history, medications, pregnancy, psychological status).</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Intervene to obtain, verify, or update medical history. Explain procedure (risks, benefits, alternatives, and follow-up) and any required pharmaceuticals. Obtain or verify informed consent and confirm adequate exam preparation (e.g., diet, medications).</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Perform physical exam and evaluate lab studies as needed; report findings to the radiologist.</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Prepare and administer contrast agents prescribed by radiologist. Position patient, operate fluoroscopy unit, modifying procedure as necessary; observe and evaluate structure and function; document fluoroscopy time.</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Monitor patient status and respond as needed (e.g., discomfort, drug reactions, cardiac distress).</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Evaluate procedure for completeness and diagnostic quality; recommend additional images as required; communicate initial observations to the radiologist.</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Educate patient regarding follow-up care and verify comprehension.</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Document procedure and record exceptions from established protocol.</td>
<td>□ □ □</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall Evaluation</th>
<th>does not meet</th>
<th>meets</th>
<th>exceeds</th>
</tr>
</thead>
</table>

**Radiologist Comments** (Note any particular strengths or areas for improvement for the student, or unusual features of the case that warrant consideration.)

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**Radiologist Signature**

**Student Signature**

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# Form CR-2B

**Clinical Competence Assessment for GU Procedures**

*Non-contrast urography, cystography or voiding cystourethrogram, retrograde urography or retrograde cystography, hysterosalpingography, hysteroscopy)*

**Directions:** This form should be completed by the radiologist supervising the procedure after the student has completed a sufficient number of cases to merit evaluation. To meet the required performance standard, the student must perform each clinical activity safely and effectively on a consistent basis.

**Procedure:** ___________________________  **Date Performed:** ________________

<table>
<thead>
<tr>
<th>Clinical Activity</th>
<th>Performance Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review patient record and other information to verify appropriateness of procedure.</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Assess patient for possible contraindications (e.g., history, medications, pregnancy, psychological status).</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Interview patient to obtain, verify, or update medical history. Explain procedure (risks, benefits, alternatives, and follow-up) and any required pharmaceuticals. Obtain or verify informed consent and confirm adequate exam preparation (e.g., diet, medications).</td>
<td>□ □ □</td>
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<tr>
<td>Perform physical exam and evaluate lab studies as needed; report findings to the radiologist.</td>
<td>□ □ □</td>
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<tr>
<td>Perform urinary catheterization; prepare and administer contrast agents prescribed by radiologist.</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Position patient, operate fluoros unit, modifying procedure as necessary; observe and evaluate structure and function, and document fluoroscopy time.</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Monitor patient status and respond as needed (e.g., discomfort, drug reactions, cardiac distress).</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Evaluate procedure for completeness and diagnostic quality; recommend additional images as required; communicate initial observations to the radiologist.</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Educate patient regarding follow-up care and verify comprehension.</td>
<td>□ □ □</td>
</tr>
<tr>
<td>Document procedure and record exceptions from established protocol.</td>
<td>□ □ □</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Overall Evaluation</th>
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**Radiologist Comments**

(Notes any particular strengths or areas for improvement for the student, or unusual features of the case that warrant consideration.)

<table>
<thead>
<tr>
<th>Radiologist Comments</th>
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<table>
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<tr>
<th>Student Signature</th>
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</table>
**Form CR-2C**

**Clinical Competence Assessment for Invasive Nonvascular Procedures**

(normogram, joint injection and aspiration, lumbar puncture, myelography lumbar puncture with contrast, thoracentesis, placement of catheter for pneumothorax paracentesis; abscess, fistula, or sinus tract study; injection for sentinel node localization; breast needle localization; change of percutaneous tube or drainage catheter; thyroid biopsy; liver biopsy)

**Directions:** This form should be completed by the radiologist supervising the procedure after the student has completed a sufficient number of cases to merit evaluation. To meet the required performance standard, the student must perform each clinical activity safely and effectively on a consistent basis.

Procedure: ______________________________ Date Performed: ______________________________

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<td>Assess patient for possible contraindications (e.g., history, medications, pregnancy, psychological status)</td>
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<tr>
<td>Interview patient to obtain, verify, or update medical history. Explain procedure (risks, benefits, alternatives, and follow-up) and any required pharmaceuticals. Obtain or verify informed consent and confirm adequate exam preparation (e.g., diet, medications).</td>
<td></td>
</tr>
<tr>
<td>Perform physical exam and evaluate lab studies as needed; report findings to the radiologist.</td>
<td></td>
</tr>
<tr>
<td>Administer local anesthetic; select and insert needle, catheter, or tube to required location; collect fluids and measure pressures as needed; administer prescribed contrast; maintain aseptic environment throughout procedure.</td>
<td></td>
</tr>
<tr>
<td>Position patient; operate fluoroscope unit; modifying procedure as necessary; observe and evaluate structure and function; and document fluoroscopy time.</td>
<td></td>
</tr>
<tr>
<td>Monitor patient status and respond as needed (e.g., discomfort, drug reactions, cardiac distress).</td>
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<td>Evaluate procedure for completeness and diagnostic quality; recommend additional images as required; communicate initial observations to the radiologist.</td>
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<td>Educate patient regarding follow-up care and verify comprehension.</td>
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<td>does not meet</td>
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**Radiologist Comments**

(Note any particular strengths or areas for improvement for the student, or unusual features of the case that warrant consideration.)

Radiologist Signature: ______________________________ Date: ________________

Student Signature: ______________________________ Date: ________________
Form CR-2D
Clinical Competence Assessment for Invasive Vascular Procedures
(PICC placement; insertion of non-tunneled central venous catheter; insertion of tunneled central venous catheter; port injection; extremity venography)

Directions: This form should be completed by the radiologist supervising the procedure after the student has completed a sufficient number of cases to merit evaluation. To meet the required performance standard, the student must perform each clinical activity safely and effectively on a consistent basis.

Procedure: __________________________ Date Performed: __________________________

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<td>Interview patient to obtain, verify, or update medical history. Explain procedure (risks, benefits, alternatives, and follow-up) and any required pharmaceuticals. Obtain or verify informed consent and confirm adequate exam preparation (e.g., diet, medications).</td>
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</tr>
<tr>
<td>Perform physical exam and evaluate lab studies as needed; report findings to the radiologist.</td>
<td></td>
</tr>
<tr>
<td>Administer local anesthetic; select and insert needle or catheter to required location; administer contrast and guide catheter; maintain aseptic environment throughout procedure.</td>
<td></td>
</tr>
<tr>
<td>Position patient; operate fluoroscan; modifying procedure as necessary; observe and evaluate structure and function; and document fluoroscopy time.</td>
<td></td>
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<td>Monitor patient status and respond as needed (e.g., discomfort, drug reactions, cardiac distress).</td>
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Radiologist Comments
(Notes any particular strengths or areas for improvement for the student, or unusual features of the case that warrant consideration.)

Radiologist Signature __________________________ Date __________

Student Signature __________________________ Date __________
Form CR-2E
Clinical Competence Assessment for
Post-Processing Activities
(CT post-processing, MR post-processing)

**Directions:** This form should be completed by the radiologist supervising the procedure after the student has completed a sufficient number of cases to merit evaluation. To meet the required performance standard, the student must perform each clinical activity safely and effectively on a consistent basis.

Procedure: ___________________________ Date Performed: ___________________________

<table>
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<tbody>
<tr>
<td>Retrieve image data from archive system.</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Preview image data set.</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Load image data set.</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Display volume using MPR, MIP, SSD, VRT, or CPR.</td>
<td>□ □ □ □</td>
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<tr>
<td>Use segmentation or editing tools to remove obstructive anatomy.</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Evaluate final images.</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Use measuring tools (distance, ROI, percent of stenosis calculation).</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Export images to server, secure web site, or report.</td>
<td>□ □ □ □</td>
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</table>

<table>
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<tr>
<th>Overall Evaluation</th>
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<th>meets</th>
<th>exceeds</th>
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**Radiologist Comments**
(Note any particular strengths or areas for improvement for the student, or unusual factors of the case that warrant consideration.)

__________________________________________________________

Radiologist Signature __________________________ Date __________

Student Signature __________________________ Date __________