RADIOLOGIST ASSISTANT POST-BACCALAUREATE CERTIFICATE 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.

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. RPAs indicated if they performed any of the activities and what level of supervision was required. The radiologist group had a 30% response rate and the RPA group had a 50% response rate.
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, the final draft (See Appendix II) was approved by the ARRT Board of Trustees. In addition, the ARRT released the draft specifications for the RA certification exam (See 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 Post-Baccalaureate Certificate Program

The UNC-Chapel Hill Radiologist Assistant Post-Baccalaureate Certificate program has been in development for two years 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 59 credit hours and 20 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 1500 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 will be 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 will 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).

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 is in the process of designing evaluation instruments that will be user-friendly and not time consuming. These forms will be available for Spring 2006, after ARRT approval.

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 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**

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 these 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\(^2\) 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.\(^3\) 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.\(^4\)

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.\(^5\) In addition, many radiologists are retiring early or nearing
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.⁵

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\(^8\).
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 workforce 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: Radiologist Assistant Role Delineation
January 2005
Radiologist Assistant Role Delineation

January 2005

Background
The American Registry of Radiologic Technologists (ARRT) is developing a certification program for a new level of imaging technologist called the Radiologist Assistant (R.A.). A consensus statement developed by the American College of Radiology (ACR) and the American Society of Radiologic Technologists (ASRT) proposed that the R.A. is 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.A. performs patient assessment, patient management, and selected clinical imaging procedures. Certification as an R.A. does not qualify the R.A. to perform interpretations (preliminary, final, or otherwise) of any radiological examination.

The R.A. will be certified and registered in radiography by ARRT and, in addition, will have met the educational, ethics, and examination standards established by ARRT for certification and registration as an R.A.

Role Delineation Purpose
In order to develop certification standards, ARRT had to first identify the specific activities that define the role of the R.A. This role delineation serves as the basis upon which ARRT's R.A. certification standards will be based. Each activity has associated with it a level of radiologist supervision. The definitions of these levels of supervision (i.e., personal, direct, general) are consistent with those used by the Centers for Medicare & Medicaid Services (CMS) of the United States Department of Health and Human Services (see page 2), but may not correspond to current supervision levels established under CMS policy. The depth and range of knowledge covered on the certification examination and incorporated into the clinical competency requirements will reflect the activities and levels of supervision listed in this document.

Role Delineation Development
ARRT developed a draft role delineation based upon a survey of radiologists and radiology practitioner assistants (R.P.A.s) conducted in early 2004. Radiologists were asked to rate each of 80 possible clinical activities as to whether the activity should be considered as an R.A. responsibility and, if so, under what level of radiologist supervision the activity should be performed. R.P.A.s were asked to indicate if they performed the activities and, if so, what level of supervision they received. Approximately 30% of the 1,000 radiologists contacted responded to the survey. About 56% of the R.P.A.s responded.

1ACR ASRT Joint Statement: Radiologist Assistant Roles and Responsibilities (2001)
Survey responses were reviewed by an ARRT advisory committee. The committee was composed of four radiologists, two R.A. educational program directors, two R.P.A.s, one physicist and organizational liaisons. The radiologist data was used as the primary source of information and the R.P.A. data provided further input. Some tasks were deleted based upon the data, other tasks were clarified and some were combined. Each retained activity was assigned a level of supervision based upon the survey responses. This resulted in a list of activities each with an associated level of supervision that served as a draft description of the role of an R.A.

In developing the draft, the committee followed the approach of including clinical activities that could be considered as possible R.A. responsibilities and assigning an appropriate level of supervision. It was felt that excluding activities from the document could lead to confusion as to whether activities excluded had been overlooked or just assumed to be included within the role of the R.A. The document is intended to definitively identify those activities that ARRT will include within its R.A. certification standards. To serve this purpose, ARRT felt that keeping an activity in the role delineation and revising its level of supervision would be more helpful than deleting the activity.

The draft role delineation was placed on the ARRT’s web site (www.arrt.org) along with an invitation for the professional community to submit comments. The feedback received from professional organizations and individuals was presented to ARRT’s advisory committee in September 2004. Revisions were made to the document based upon that input resulting in an advanced draft. Further refinements were subsequently made based upon organizational feedback. The ARRT Board of Trustees adopted this final version of the R.A. Role Delineation in January 2005.

Conclusion

Inclusion of activities in the R.A. Role Delineation should not be interpreted as authorizing the performance of the activities by the R.A. Neither should inclusion suggest that the activities may be legally performed by an R.A. in all states nor that the activities, if performed by an R.A., are eligible for reimbursement under current CMS or private insurance regulations. Individual state, insuer, and institutional regulations should be consulted to determine the specific role allowed for an R.A. in a specific situation.

This R.A. Role Delineation should be considered as a vision of what will be created through the establishment of structured educational programs, selection of appropriately qualified and experienced radiographers, implementation of a certification mechanism, modification of existing regulations, and acceptance by the professional community. The outcome of efforts to establish a new level of imaging technologist supervised by radiologists will be enhanced access for patients to high-quality radiology services.

Definitions of Levels of Supervision:

- **Personal Supervision** means the radiologist must be in attendance in the room with the R.A. during the performance of the procedure.

- **Direct Supervision** means the radiologist must be present in the office suite and immediately available to furnish assistance and direction throughout the performance of the procedure. The radiologist is not required to be present in the room when the procedure is performed.

- **General Supervision** means the procedure is furnished under the radiologist’s overall direction and control, but the radiologist’s presence is not required during the performance of the procedure.

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<table>
<thead>
<tr>
<th>Clinical Activities</th>
<th>Levels of Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Review the patient's medical record to verify the appropriateness of a specific exam or procedure and report significant findings to radiologist.</td>
<td>General</td>
</tr>
<tr>
<td>2. Interview patient to obtain, verify, or update medical history.</td>
<td>General</td>
</tr>
<tr>
<td>3. Explain procedure to patient or significant others, including a description of risks, benefits, alternatives, and follow-up. Patient must be able to communicate with the radiologist if he/she requests or if any questions arise that cannot be appropriately answered by R.A.</td>
<td>General</td>
</tr>
<tr>
<td>4. Obtain informed consent. Patient must be able to communicate with the radiologist if he/she requests or if any questions arise that cannot be appropriately answered by R.A.</td>
<td>General</td>
</tr>
<tr>
<td>5. Determine if patient has followed instructions in preparation for the exam (e.g., diet, premedications).</td>
<td>General</td>
</tr>
<tr>
<td>6. Assess risk factors that may contraindicate the procedure (e.g., health history, medications, pregnancy, psychological indicators, alternative medicines). (Note: Must be reviewed by radiologist.)</td>
<td>General</td>
</tr>
<tr>
<td>7. Obtain and evaluate vital signs.</td>
<td>General</td>
</tr>
<tr>
<td>8. Perform physical examination and analysis of data (e.g., signs and symptoms, laboratory values, and significant abnormalities) and report findings to the supervising radiologist for the following:</td>
<td>General</td>
</tr>
<tr>
<td>a. abdomen</td>
<td>General</td>
</tr>
<tr>
<td>b. thorax, lung, and respiratory function</td>
<td>General</td>
</tr>
<tr>
<td>c. cardiovascular function</td>
<td>General</td>
</tr>
<tr>
<td>d. musculoskeletal (muscles, bones, and joints of extremities)</td>
<td>General</td>
</tr>
<tr>
<td>e. spine</td>
<td>General</td>
</tr>
<tr>
<td>f. peripheral vascular system</td>
<td>General</td>
</tr>
<tr>
<td>g. neurological function</td>
<td>General</td>
</tr>
<tr>
<td>h. breasts and axillae (clinical breast exam)</td>
<td>General</td>
</tr>
<tr>
<td>9. Apply ECG leads and recognize life threatening abnormalities.</td>
<td>General</td>
</tr>
<tr>
<td>10. Perform urinary catheterization. Catheterization can be performed by appropriately trained R.A. under general supervision. If the patient is known to have an anatomic anomaly, recent surgery in the area, etc. direct supervision would be needed.</td>
<td>General</td>
</tr>
<tr>
<td>11. Perform venipuncture.</td>
<td>General</td>
</tr>
<tr>
<td>12. Monitor IV for flow rate and complications in compliance with facility and regulatory rules.</td>
<td>General</td>
</tr>
<tr>
<td>13. Monitor IV therapy for flow rate and complications in compliance with facility and regulatory rules.</td>
<td>Direct</td>
</tr>
<tr>
<td>14. Position patient to perform required procedure, using immobilization devices and modifying technique as necessary. Application of restraints should be in compliance with departmental rules and regulations.</td>
<td>General</td>
</tr>
<tr>
<td>15. Administer moderate (conscious) sedation in compliance with facility and regulatory rules.</td>
<td>Personal</td>
</tr>
<tr>
<td>16. Observe and assess patient who has received moderate (conscious) sedation in compliance with facility and regulatory rules.</td>
<td>Direct</td>
</tr>
</tbody>
</table>
Clinical Activities

17. Assess patient’s vital signs and level of anxiety/pain and inform radiologist when appropriate.

18. Recognize and respond to medical emergencies (e.g., drug reactions, cardiac arrest, hypoglycemia) and activate emergency response systems, including notification of the radiologist.

19. Administer oxygen as prescribed.

20. Operate a fixed/mobile fluoroscopic unit.


22. Explain effects and potential side effects to the patient of the pharmaceutical required for the examination.

23. Administer contrast agents and radiopharmaceuticals as prescribed by the radiologist.

24. Administer general medications as prescribed by the radiologist. (Note for purposes of this document, the term medications excludes contrast media and radiopharmaceuticals.)

25. Monitor patient for side effects or complications of the pharmaceutical.

26. Perform the following fluoroscopic examinations and procedures including contrast media administration and operation of fluoroscopic unit:
   a. upper GI
   b. esophagus
   c. small bowel studies
   d. barium enema
   e. cystogram
   f. t-tube cholangiogram
   g. hysterosalpingogram (imaging only) (Personal by radiologist if obstetrician/gynecologist not in the room; Direct by radiologist if obstetrician/gynecologist present in room)
   h. retrograde pyelogram
   i. nasointestinal and orenteric feeding tube placement
   j. port injection
   k. fistulogram
   l. loopogram
   m. swallowing study

27. Perform the following procedures including contrast media administration and needle or catheter placement:
   a. lumbar puncture under fluoroscopic guidance
   b. lumbar myelogram
   c. thoracic or cervical myelogram

Levels of Supervision

- General
- Direct
- Personal
- Medications administered parenterally always
- Personal and medications administered orally usually Direct
- General or Direct depending on medication administered
<table>
<thead>
<tr>
<th>Clinical Activities</th>
<th>Levels of Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>d. joint injection and aspiration</td>
<td>Direct</td>
</tr>
<tr>
<td>e. arthrogram (conventional, CT, and MR)</td>
<td>Direct</td>
</tr>
<tr>
<td>f. PICC placement (Level of supervision dependent upon complexity of examination)</td>
<td>Direct/General</td>
</tr>
<tr>
<td>g. non-tunneled venous central line placement</td>
<td>Personal</td>
</tr>
<tr>
<td>h. paracentesis with appropriate image guidance</td>
<td>Direct</td>
</tr>
<tr>
<td>i. thoracentesis with appropriate image guidance</td>
<td>Direct</td>
</tr>
<tr>
<td>j. venous catheter placement for dialysis</td>
<td>Personal</td>
</tr>
<tr>
<td>k. lower extremity venography</td>
<td>Direct</td>
</tr>
<tr>
<td>l. breast needle localization</td>
<td>Personal</td>
</tr>
<tr>
<td>m. ductogram (galliumgram)</td>
<td>Personal</td>
</tr>
<tr>
<td>26. Perform additional procedures the radiologist deems appropriate.</td>
<td>Personal</td>
</tr>
<tr>
<td>27. Perform routine CT post-processing (e.g., 3D reconstruction, modifications to FOV, slice spacing, algorithm)</td>
<td>General</td>
</tr>
<tr>
<td>28. Perform specialized CT post-processing (e.g., cardiac scoring, shunt graft measurements)</td>
<td>General</td>
</tr>
<tr>
<td>29. Perform MR post processing data analysis (e.g., 3D reconstructions, MIP, 3D surface rendering, volume rendering)</td>
<td>General</td>
</tr>
<tr>
<td>30. 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.)</td>
<td>General</td>
</tr>
<tr>
<td>31. Evaluate images for diagnostic utility and report clinical observations to the radiologist. (Note: Applies to general radiography, CT, and MR).</td>
<td>General</td>
</tr>
<tr>
<td>32. Review imaging procedures, make initial observations, and communicate observations only to the radiologist.</td>
<td>General</td>
</tr>
<tr>
<td>33. Record previously communicated initial observations of imaging procedures according to approved protocols.</td>
<td>General</td>
</tr>
<tr>
<td>34. Communicate radiologist's report to referring physician consistent with ACR Communication Guideline.</td>
<td>General</td>
</tr>
<tr>
<td>35. Provide physician-prescribed post care instructions to patients.</td>
<td>General</td>
</tr>
<tr>
<td>36. Perform follow-up patient evaluation and communicate findings to the radiologist.</td>
<td>General</td>
</tr>
<tr>
<td>37. Document procedure in appropriate record and document exceptions from established protocol or procedure.</td>
<td>General</td>
</tr>
<tr>
<td>38. Write patient discharge summary for review and co-signature by radiologist.</td>
<td>General</td>
</tr>
<tr>
<td>39. Participate in quality improvement activities within radiology practice (e.g., quality of care, patient flow, reject-repeat analysis, patient satisfaction).</td>
<td>General</td>
</tr>
<tr>
<td>40. Assist with data collection and review for clinical trials or other research.</td>
<td>General</td>
</tr>
</tbody>
</table>
Appendix III: ARRT Content Specifications for the Radiologist Assistant Examination
Content Specifications for the Radiologist Assistant Examination

Content Specifications Effective with the Fall 2005 Examination

The American Registry of Radiologic Technologists (ARRT) administers the national certifying examination for Radiologist Assistants (RAs). To establish certification requirements for this area of advanced practice, the ARRT sponsored a practice analysis project. That study was completed in 2004 under the direction of the RA Advisory Committee, which consisted of 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 radiology practitioner assistants. The project culminated in the RA Role Delineation which identifies activities and clinical procedures performed by RAs, as well as the level of supervision required.

The RA Role Delineation 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 Role Delineation.

The table below presents the six major content categories, along with the number of questions appearing in each category. The examination consists primarily of multiple-choice test questions. In addition, case studies will be presented that require a short essay response to several questions. Some questions may require that you select multiple responses from a list of choices. Candidates are allowed 3½ hours to complete the multiple-choice section, and 1½ 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>Multiple Choice Questions</th>
<th>Case Study Questions¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Patient Communication, Assessment, and Management</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>B. Drugs and Contrast Materials</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>C. Anatomy, Physiology, and Pathophysiology</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>D. Radiologic Procedures</td>
<td>25</td>
<td>17 – 25</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></td>
<td>2 – 5</td>
</tr>
<tr>
<td>Total Number of Questions²</td>
<td>203</td>
<td>20 – 30</td>
</tr>
<tr>
<td>Testing Time Allowed</td>
<td>3.5 hours</td>
<td>1.5 hours</td>
</tr>
</tbody>
</table>

¹ Notes: (1) Case studies may consist of multiple questions, the range presented in the table refers to the number of test questions, not the number of case studies. (2) Test content in sections C or D may refer to images produced by fluoroscopy, radiography, CT, or MRI. (3) The exam also consists of an additional 20 unscored pilot questions.
A. PATIENT COMMUNICATION, ASSESSMENT, AND MANAGEMENT (58)

I. PATIENT COMMUNICATION (5)
   A. Patient Education
      1. explanation of procedure
      2. alternatives to current procedure
      3. risk versus benefit
   B. Psychosocial Support
      1. communication skills and issues
      2. cultural awareness
      3. social support structures
   C. Post-Procedural Care Instructions

II. PATIENT ASSESSMENT (30): Includes adaptations for pediatric, geriatric, and special needs populations
   A. Medical Data Review
      1. indications for procedure (ACR appropriateness guide)
      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. Examination Techniques (i.e., inspection, palpation, percussion, auscultation)
   D. Common Laboratory Tests Analysis and Response
      1. complete blood count, red blood cells (RBC), white blood cells (WBC), hematocrit
      2. electrolytes (sodium, potassium, bicarbonate, chloride)
      3. enzymes (amylase, lipase)
      4. pancreatic enzymes
      5. calcium
      6. albumin and total protein
      7. coagulation factors (e.g., prothrombin time (PT), partial thromboplastin time (PTT), International Normalized Ratio (INR), platelets)
      8. liver function (e.g., total bilirubin)
      9. renal function (e.g., blood urea nitrogen (BUN), creatinine)
      10. glucose
      11. culture and sensitivity of fluids (microbiology)
      12. cytology (cell count) and histopathology (tissue diagnosis)
   E. Psychological Responsiveness (Status)
      1. cognitive abilities
      2. emotional stability
      3. speech and language skills
      4. disorders that affect communication
         a. dementia
         b. mental retardation
         c. drug and/or alcohol impairment
   F. Abdomen Assessment
      1. landmarks for examination
      2. assessment procedures
         a. bowel sounds
         b. percussion of spleen
         c. liver palpation
         d. visual inspection and palpation (e.g., surgical intervention, significant masses)

(Section A continues on the following page)
3. Signs and Symptoms
   a. Tenderness on palpation
   b. Diarrhea
   c. Flatulence
   d. Dysuria
   e. Pain
   f. Constipation
   g. Reflux

G. Thorax and Lung Assessment
   1. Landmarks for Examination
   2. Assessment Procedures
      a. Breath sounds
      b. Pulmonary function measurement
      c. Oxygen saturation
      d. Visual inspection and palpation (e.g., surgical intervention)
   3. Signs and Symptoms
      a. Cough
      b. Pain
      c. Breathing pattern

H. Cardiovascular Function
   1. Assessment Procedures
      a. Electrocardiogram (ECG)
      b. Vital signs
      c. Visual inspection and palpation (e.g., surgical intervention, abnormal color)
      d. Perfusion status (e.g., pulses)
   2. Signs and Symptoms
      a. Dilated veins
      b. Heart rate and rhythm
      c. Peripheral pulse

I. Musculoskeletal Assessment
   1. Assessment Procedures
      a. Body structure and habitus
      b. Range of motion
      c. Mobility
      d. Strength
      e. Visual inspection and palpation (e.g., significant mass, structures, and contours)
   2. Signs and Symptoms
      a. Redness
      b. Swelling
      c. Crepitation
      d. Pain
      e. Temperature
      f. Loss of function

J. Peripheral Vascular System
   1. Landmarks (vascular anatomy)
   2. Assessment Procedures (e.g., ABI-Ankle Brachial Index)
   3. Signs and Symptoms of Arterial Occlusion and Insufficiency
      a. Pain
      b. Pallor
      c. Weak pulse
      d. Venous hum
      e. Carotid artery bruits
   4. Signs and Symptoms of Venous Obstruction and Insufficiency
      a. Color change
      b. Swelling
      c. Generalized edema
      d. Localized swelling
      e. Varicose veins

K. Nervous System
   1. Assessment Procedures
      a. Pupil size and symmetry
      b. Superficial and deep tendon reflex examination
      c. Sensory evaluation
      d. Motor evaluation
   2. Signs and Symptoms
      a. Pain
      b. Weakness
      c. Sensory changes
      d. Motor changes

L. Breast and Axilla
   1. Landmarks
   2. Assessment Procedures
      a. Clinical breast examination (CBE)
      b. Visual inspection and palpation (e.g., mass, surgical intervention)
   3. Signs and Symptoms
      a. Mass
      b. Discharge
      c. Depression
      d. Discoloration
      e. Dermatologic changes
      f. Asymmetry
      g. Pain/tenderness

(Section A continues on the following page)
III. PATIENT MANAGEMENT (23)

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
E. Cardiac Monitoring
   1. lead application
   2. life threatening rhythm recognition
F. Intravenous (IV) Therapy
   1. venipuncture
   2. flow rate monitoring
   3. complications
G. Oxygen Therapy
   1. level (flow rate)
   2. indications and contraindications
H. Urinary Catheterization
   1. technique
   2. complications
   3. contraindications
I. Medical Emergencies
   1. adverse reactions
   2. cardiac arrest
   3. hypoglycemia
   4. seizure
   5. respiratory arrest
   6. shock
J. Radiological Procedure Complications
   1. infection
   2. bleeding
   3. pneumothorax
   4. perforation (gastrointestinal (GI) and genitourinary (GU))
   5. respiratory distress
   6. aspiration
   7. vasovagal reaction
   8. pulmonary edema or congestive heart failure (CHF)
   9. embolus
10. complications of catheterization (e.g., hematoma, pseudo aneurysms)
11. pain
12. stroke
13. radiation injury
14. death
K. Tubes and Lines
   1. identification
   2. indications
   3. contraindications
   4. radiographic appearance
   5. appropriate location
   6. complications
B. DRUGS AND CONTRAST MATERIAL (34)

I. TERMINOLOGY (10)
   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

II. ANESTHETICS (6)
   A. Local Anesthetics
      1. short acting
      2. long acting
      3. injectables
      4. cutaneous
   B. Moderate Sedation
      1. definitions (American Society of Anesthesiologists)
      2. guidelines
      a. pre-procedure
      b. intra-procedure
      c. post-procedure
      d. dismissal
      3. equipment
      a. oxygen
      b. pulse oximetry
      c. suction
      d. blood pressure
      e. basic airway management
      4. discharge scoring system
      a. motor activity
      b. respiration
      c. standing blood pressure
      d. consciousness
      e. oxygen saturation
      5. types of drugs (indications, contraindications, dosing guidelines)
      a. fentanyl
      b. morphine
      c. meperidine
      d. diazepam
      e. midazolam
      f. lorazepam
      g. pentobarbital
      h. enflurane
      i. naloxone
      j. thiopental
      k. epinephrine
      l. atropine
   C. General Anesthesia (indications, contraindications)

(Section B continues on the following page)
III. GENERAL MEDICATIONS (3):
classifications, indications, contraindications
A. Anti-Infective Drugs
   1. antibiotics
   2. antivirals
   3. antifungals
B. Cardiac Drugs
   1. antihypertensives
   2. beta-blockers
   3. vasoconstrictors
   4. vasodilators
C. Gastrointestinal Drugs
   1. anti-reflux agents
   2. glucagon
   3. cholecystokinin
D. Vascular Drugs
   1. platelet inhibitors
   2. tissue plasminogen activator (TPA)
E. Anti-Inflammatory Drugs
   1. aspirin
   2. Non Steroidal Anti-Inflammatory Drugs (NSAIDs)
   3. corticosteroids
F. Endocrine Drugs
   1. insulin
   2. glucagon
   3. levothyroxine thyroid hormone replacement

IV. CONTRAST MEDIA (5):
A. Agents (e.g., indications, contraindications, adverse reactions, dosage, routes of administration, excretion process)
   1. barium sulfate
   2. iodinated contrast media
      a. osmolality (high versus low)
      b. molecular structure
      c. advantages
   3. MR agents
   4. negative contrast agents
   5. special considerations
      a. hydration status
      b. renal status
      c. diseases of concern (e.g., multiple myeloma, diabetes)
      d. incompatible medications
         1. metformin (Glucophage)
         2. acetylcysteine (Mucomyst)
B. Allergies
   1. types of reactions (mild to severe)
   2. 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 (59)

I. ANATOMY (20): 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

II. PHYSIOLOGY (16): 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

III. PATHOPHYSIOLOGY (23)
   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
            i. abdominal calcifications
            ii. abdominal aortic aneurysm
            iii. normal and abnormal gas patterns – (e.g. ileus, obstruction, volvulus)
         iv. pneumatosis intestinalis
         v. portal venous gas
         vi. peritonitis
         vii. pneumoperitoneum
         viii. abscess
         ix. free fluid
   b. gastrointestinal
      i. esophagus
         a) dysphagia
         b) achalasia
         c) scleroderma
         d) fistulae
         e) esophagitis
         f) varices
         g) Crohn’s disease
         h) presbyesophagus
         i) webs
         j) diverticuli
         k) primary muscular and neural disorders
         l) malignant and benign masses

(Section C continues on the following page)
ii. stomach
   a) hiatal hernias
   b) gastric outlet obstruction
   c) malignant and benign masses
   d) gastritis
   e) volvulus
   f) pyloric stenosis
   g) bezoar
   h) ulcers
   i) gastritis

iii. small intestine
   a) diverticul
   b) non and malrotated bowel
   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

iv. 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

v. 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) Gaster's disease
   m) splenomegaly
   n) pancreatic insufficiency

vi. renal
   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/thrombois
   g) nephrocalcinosis
   h) renal papillary necrosis

vii. reproductive
   a) female
      1. endometriosis
      2. malignant and benign masses
      3. pelvic inflammatory disease
      4. polycystic ovary disease
      5. pregnancy
   b) male
      1. benign prostatic hypertrophy
      2. malignant and benign masses
      3. inflammatory processes

(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
      i. gout
      ii. osteoarthritis
      iii. rheumatoid arthritis
      iv. ankylosing spondylitis
      v. psoriatic arthritis
   b. trauma (fractures, dislocations, and associated soft tissue injuries)
   c. tumors
      i. osteochondroma
      ii. Ewing's sarcoma
      iii. osteosarcoma
      iv. enchondroma
      v. chondrosarcoma
      vi. osteoid osteoma
      vii. metastatic disease
   d. infection
      a. acute and chronic osteomyelitis
      b. soft tissue infection
   e. diseases
      i. osteomalacia
      ii. osteoporosis
      iii. Paget's disease
      iv. fibrous dysplasia
      v. osteogenesis imperfecta
      vi. renal osteodystrophy

(Section C continues on the following page)
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
         i. cerebrovascular accident (CVA)
         ii. malignant and benign masses
         iii. Parkinson's disease
         iv. amyotrophic lateral sclerosis (ALS)
         v. multiple sclerosis (MS)
         vi. hydrocephalus
         vii. increased cranial pressure
         viii. infection/inflammation
         ix. open and closed head injuries
         x. spinal cord injury
         xi. seizures
         xii. myasthenia gravis
         xiii. Alzheimer's disease
         xiv. dementia
         xv. herniated disc
      b. endocrine
         i. osteoporosis
         ii. hyperparathyroidism
         iii. diabetes
         iv. pituitary disorder
         v. hypo and hyperthyroidism
         vi. Cushing's syndrome

E. Vascular and Lymphatic 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. blood clotting disorders
      b. anemias
      c. leukemias
      d. lymphomas
      e. multiple myeloma/plasma cell
      f. shock
      g. hypertension
      h. arterio and atherosclerosis
      i. aneurysm
      j. varicosities
      k. arterial venous malformations (AVM)
      l. lymphedema
D. RADIOLOGIC PROCEDURES (25)

This section addresses radiographic procedures for the categories that follow (I-IV). 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

I. FLUOROSCOPIC STUDIES (10)
   A. Upper GI
   B. Esophagus
   C. Small Bowel Studies
   D. Barium Enema
   E. Cystogram
   F. T-Tube Cholangiogram
   G. Hysterosalpingogram
   H. Retregrade Urethrogram
   I. Nasenteric and Oroenteric Feeding Tube Placement
   J. Port Injection
   K. Fistulogram/Sinogram
   L. Looogram
   M. Swallowing Study

II. CONTRAST MEDIA – NEEDLE – CATHETER PLACEMENT PROCEDURES (10)
   A. Lumbar Puncture under Fluoroscopic Guidance
   B. Myelogram (Lumbar, Thoracic, Cervical)
   C. Joint Injection and Joint Aspiration
   D. Arthrogram (Conventional, CT, and MR)
   E. Peripherally Inserted Central Catheter (PICC) Line Placement
   F. Non Tunneled Venous Central Line Placement
   G. Paracentesis with Appropriate Image Guidance
   H. Thoracentesis with Appropriate Image Guidance
   I. Venous Catheter Placement for Dialysis
   J. Lower Extremity Venography
   K. Breast Needle Localization
   L. Ductogram (Galactogram)

III. IMAGE POST-PROCESSING (3)
   A. Routine CT
      1. 3D reconstruction
      2. modifications to field of view (FOV)
      3. slice spacing
      4. algorithm
      5. maximum intensity projection (MIP)
      6. multplanar reconstruction
      7. quantitative measurements (volume, distance, diameter)
   B. Specialized CT
      1. cardiac scoring
      2. shunt graft measurements
   C. Routine MR
      1. 3D reconstructions
      2. maximum intensity projection (MIP)
      3. 3D surface rendering
      4. volume rendering
      5. multplanar reconstruction
      6. quantitative measurements (volume, distance, diameter)

IV. QUALITY IMPROVEMENT PROCEDURES (2)
   A. Patient Centered, Outcomes Based, Quality Improvement Procedures
      1. quality of care
      2. patient flow
      3. patient satisfaction
E. RADIATION SAFETY, RADIATION BIOLOGY, AND FLUOROSCOPIC OPERATION (16)

I. RADIATION SAFETY (6)
   A. Exposure and Dose
      1. exposure
      2. absorbed dose, equivalent dose, effective dose
      3. measurement and calculation of quantities
   B. Radiation Safety Standards
      1. organizations and their roles
         a. National Council on Radiation Protection and
             Protection (NCRP)
         b. Nuclear Regulatory Commission (NRC)
         c. Occupational Safety and Health Administration (OSHA)
         d. Environmental Protection Agency (EPA)
         e. Food and Drug Administration (FDA)
         f. state health departments
      2. principles of dose limitation (time, distance, shielding, ALARA)
      3. monitoring and measuring devices
      4. effective dose limits
   C. Methods to Reduce Patient Exposure
      1. intermittent fluoroscopy
      2. limitation of field size
      3. technique factors
      4. filtration of the x-ray beam
      5. protective shielding
      6. immobilization
   D. High Dose Exams
   E. Methods to Reduce Occupational Exposure
      1. variation of exposure from scatter at different locations
      2. shielding devices in x-ray rooms
      3. personal shielding devices

II. RADIATION BIOLOGY (5)
   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

III. FLUOROSCOPIC OPERATION (6)
   A. Fluoroscopy
      1. components
         a. x-ray tube
         b. image intensifier
         c. collimators
         d. recording devices
            i. digital cameras
            ii. cine
            iii. spot films
            iv. photo spot
         e. generator
         f. controls (e.g., control panel, foot switches)
         g. display
         h. recording
      2. static image storage
      3. dynamic image storage
      4. pulsed fluoroscopy
      5. high-level or boost mode
      6. technical factors
      7. cumulative timer
   B. Equipment Failures
      1. colimation
      2. exposure limitation
      3. dose monitoring
      4. interlocks
   C. Dose Monitoring Equipment (e.g., dose area
      product meters)
F. MEDICAL-LEGAL, PROFESSIONAL, AND GOVERNMENTAL STANDARDS (8)

I. MEDICAL RECORDS (2)
   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. radiologist report to referring physician
      7. direct communication with referring physician
      8. discharge summary for radiologists' patient
   D. Informed Consent
      1. patient's competence
         a. mental impairment
            i. competence-assessment
            ii. mental status
            iii. medication
         b. surrogate consent
            i. power of attorney
            ii. family
         c. patient education
            i. explain procedure
            ii. risk versus benefit
            iii. alternatives and options
            iv. refusal of procedure and implications

II. REGULATORY REQUIREMENTS (2)
   A. Quality Assurance Management
      1. facility rules
      2. Joint Commission on Accreditation of Healthcare Organizations (JCAHO) 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. public health considerations

III. MALPRACTICE CONSIDERATIONS (2)
   A. Definitions
      1. negligence
      2. standard of care
      3. assault and battery
   B. Legal Doctrine
      1. respondeat superior
      2. res iaps locutur
      3. foreseeability
      4. personal liability

IV. ETHICS (2)
   A. Patient Rights
   B. Advocacy for Patients
   C. Professional Standards
   D. Medical Values
   E. ARRT Standards of Ethics
Appendix IV: RA Course Sequence Grid
<table>
<thead>
<tr>
<th>First Professional Year</th>
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<tbody>
<tr>
<td><strong>Spring Semester</strong></td>
<td><strong>Credit Hours</strong></td>
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<tr>
<td>Advanced Patient Assessment, Management, and Education</td>
<td>3</td>
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<tr>
<td>Abdominal Imaging and Procedures I</td>
<td>3</td>
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<tr>
<td>Pathophysiology</td>
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<tr>
<td><strong>Summer Session II</strong></td>
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<td>Pharmacology and Clinical Decision-Making in Radiology</td>
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<tr>
<td>Clinical Practicum III</td>
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<td>Musculoskeletal Imaging and Procedures</td>
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<td>Clinical Practicum IV</td>
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<tr>
<td><strong>Spring Semester</strong></td>
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<td>Neurological and Endocrine Imaging and Procedures</td>
<td>3</td>
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<tr>
<td>Vascular and Lymphatic Imaging and Procedures</td>
<td>3</td>
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<tr>
<td>Clinical Practicum V</td>
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<td><strong>Summer Session I</strong></td>
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<td>Practice Issues</td>
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<td>Clinical Practicum VI</td>
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<td><strong>Summer Session II</strong></td>
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|  |
|--------------------------|--|
| **Total Credit Hours-First and Second Professional Years** | 59 |
Appendix V: Course Descriptions
Course Descriptions


**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.

**Pathophysiology**

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.

**Abdominal Imaging and Procedures I**

This course provides the knowledge and skills necessary to perform abdominal radiographic procedures. 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. Fluoroscopic equipment operation and radiation safety are also included.

**Abdominal Imaging and Procedures II**

This course provides an in depth study of the abdomen and associated radiographic procedures. This course includes abdominal anatomy, physiology, and pathophysiology with clinical pathways.

**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.

**Thoracic Imaging and Procedures**
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.

**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.

**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.

**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.

**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.

**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. This course will also have a directed readings and a research component to aid in the development of inquiry and research skills.

**Clinical Practicum I-VII**

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 of these procedures is essential to the clinical experience. Throughout the program, students will be required to complete competencies for imaging procedures.
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 experience, 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 I, 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 anytime 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 Definition 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 DIVISION OF RADIOLOGIC SCIENCE

THE PRACTICE
«Company»
«Address1»
«Address2»
«City», «State», «PostalCode»

Joy Remmers
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 Facility through the stimulus 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 experience. 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 students, 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 visitations shall be given. Each party will keep the other informed of
changes in curriculum programs 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
request the University to withdraw a student from his/her assigned clinical education experience, when his/her clinical performance
is unsatisfactory or his/her behavior is disruptive or detrimental to the Facility and/or its patients. The University 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» «PostalCodes»
and UNC-CH
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 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 reporting 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 Facility. 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, and 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 Facility 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.

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

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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

Please provide 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.

5. This agreement shall become effective on «EffectiveOnDate», and terminate on «TerminationOnDate» and shall be reviewed by the appropriate representatives of each institution by 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.

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

Page 3 of 6
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: ____________________________

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

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### EXHIBIT A-1

**ALLIED HEALTH SCIENCES PARTICIPATING DIVISIONS**

<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>
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 Ophthalmology 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
## Form CR-1
### Summary of Clinical Experience and Competence Assessments

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Experience Documentation</th>
<th>Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gastrointestinal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper GI (including esophagram)</td>
<td>direct mandatory</td>
<td></td>
</tr>
<tr>
<td>Small bowel study</td>
<td>direct mandatory</td>
<td>35</td>
</tr>
<tr>
<td>Barium enema</td>
<td>direct mandatory</td>
<td>30</td>
</tr>
<tr>
<td><strong>Genitourinary</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cystogram, including a minimum of 10 bladder catheterizations</td>
<td>direct mandatory</td>
<td>25</td>
</tr>
<tr>
<td>Hysterosalpingogram (imaging only)</td>
<td>direct elective</td>
<td>5</td>
</tr>
<tr>
<td>Retrograde urethrogram</td>
<td>direct elective</td>
<td>5</td>
</tr>
<tr>
<td><strong>Invasive Nonvascular</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthrogram/joint injection and aspiration (standard, CT or MR)</td>
<td>direct mandatory</td>
<td>30</td>
</tr>
<tr>
<td>Lumbar puncture under fluoroscopic guidance</td>
<td>personal mandatory</td>
<td>10</td>
</tr>
<tr>
<td>Nasoenteric and oroenteric tube placement or adjustment under fluoroscopic guidance</td>
<td>direct mandatory</td>
<td>30</td>
</tr>
<tr>
<td>Paracentesis/thoracentesis with image guidance</td>
<td>direct mandatory</td>
<td>20</td>
</tr>
<tr>
<td>Fistulogram/sonogram</td>
<td>direct elective</td>
<td>5</td>
</tr>
<tr>
<td>Loopogram</td>
<td>direct elective</td>
<td>5</td>
</tr>
<tr>
<td>Tube injections (cholangiogram, etc.)</td>
<td>direct elective</td>
<td>5</td>
</tr>
<tr>
<td>Ductogram (galactogram)</td>
<td>personal elective</td>
<td>5</td>
</tr>
<tr>
<td>Myelogram (standard, CT or MR)</td>
<td>personal elective</td>
<td>5</td>
</tr>
<tr>
<td>Breast needle localization</td>
<td>personal elective</td>
<td>5</td>
</tr>
</tbody>
</table>

* Indicates the minimum number of cases for each procedure. Certain procedures will need to exceed these minimums in order to complete 375 mandatory and 125 elective procedures. Refer to guidelines on page ___.

---

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# Form CR-1
## Summary of Clinical Experience and Competence Assessments (continued)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Required Level of Supervision</th>
<th>Mandatory or Elective</th>
<th>Minimum Number Required*</th>
<th>Actual Number Completed</th>
<th>Date of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Invasive Vascular</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PICC placement</td>
<td>direct/general</td>
<td>mandatory</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port injection</td>
<td>direct</td>
<td>elective</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower extremity venogram (incl. venipuncture)</td>
<td>personal</td>
<td>elective</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-tunneled venous catheter central line placement</td>
<td>personal</td>
<td>elective</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venous catheter placement for dialysis</td>
<td>direct</td>
<td>elective</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Post-Processing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routine CT (e.g., 3-D reconstruction, modifications to FOV, slice spacing, or algorithm)</td>
<td>general</td>
<td>elective</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialized CT (e.g., cardiac scoring, shunt graft measurements)</td>
<td>general</td>
<td>elective</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MR data analysis (e.g., 3-D reconstructions, MIP, 3-D surface rendering, volume rendering)</td>
<td>general</td>
<td>elective</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Number of Mandatory Cases: 375  
Total Number of Elective Cases: 125

Enter Total Number of Clinical Hours

R.A. Student Signature  
ARRT ID#

Chief Preceptor Signature  
Date

Program Director Signature  
Date