

DRAFT REGULATIONS

33 **TITLE 42--PUBLIC HEALTH**

34 **CHAPTER I--PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH
AND**

35 **HUMAN SERVICES**

36 **PART 75--STANDARDS FOR THE ACCREDITATION OF EDUCATIONAL
AND**

37 **CREDENTIALING PROGRAMS FOR AND THE CREDENTIALING OF
MEDICAL**

38 **IMAGING AND RADIATION THERAPY PERSONNEL**

39

40 Sec.75.1 Background and purpose.

41 Sec.75.2 Definitions.

42 Sec.75.3 Applicability.

43 Sec.75.4 Standards for the accreditation of educational programs.

44 Sec.75.5 Standards for credentialing organizations.

45 Sec.75.6 Standards for licensing medical imaging and radiation therapy personnel.

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1 Sec.75.8 Standards for bone densitometry equipment operators.

2

3 Authority: Sec. 979 of the Consumer-Patient Radiation Health and Safety Act of 1981,
Pub. L.

4 97-35, 95 Stat. 599-600 (42 U.S.C. 10004).

5 Source: 50 FR 50717, Dec. 11, 1985, unless otherwise noted.

6

7 **Sec. 75.1 Background and purpose.**

8 (A) The purpose of these regulations is to implement the provisions of section XXX of
the

9 Consumer Assurance of Radiologic Excellence Act, U.S.C. 10004, which requires the
10 establishment by the Secretary of Health and Human Services of standards for the
accreditation

11 of programs for the education of certain persons who perform, administer, plan,
evaluate and

12 verify medical imaging and radiation therapy procedures and for the credentialing of
such

13 persons.

14 (B) Section XXX requires the Secretary, after consultation with specified Federal
agencies,

15 appropriate agencies of States, and appropriate professional organizations, to
promulgate by

16 regulation the minimum standards described above. These standards distinguish
17 between the
18 occupations of (1) radiographer and cardiovascular, cardiac and vascular
19 interventional
20 radiographer, (2) nuclear medicine technologist, (3) radiation therapist, (4) magnetic
21 resonance
22 technologist, (5) cardiovascular invasive specialist, (6) medical dosimetrist, (7)
23 medical
24 physicist, (8) radiologist assistant, (9) diagnostic medical sonographer (10) limited x-
25 ray
26 machine operator and (11) bone densitometry equipment operator. In the interest of
27 patient and
28 public health and safety, and to assure quality medical imaging and radiation therapy
29 procedures
30 as identified by Congress in its determination of the need for standards, the Secretary
31 is also
32 authorized to prepare standards for other occupational groups utilizing ionizing or
33 nonionizing
34 radiation or magnetic fields as he/she finds appropriate. However, the standards set
35 out below are
36 limited to the eleven occupational groups listed above, utilizing ionizing or
37 nonionizing radiation
38 or magnetic fields.

39 (C) Due to the ever-evolving nature of medicine it is not possible to predict future
40 medical
41 imaging or radiation therapy professions. As new modalities utilizing magnetic
42 resonance or
43 ionizing or nonionizing radiation for medical purposes are developed and are merged
44 with
45 existing modalities, the Secretary shall establish standards for the education and
46 credentialing of
47 persons performing medical imaging, planning and delivering radiation therapy after
48 consulting
49 with the appropriate medical imaging and radiation therapy organizations. This is to
50 ensure the
51 health and safety of the public, medical imaging and radiation therapy professionals,
52 and
53 patients.

36

37 **Sec. 75.2 Definitions.**

38 All terms not defined herein shall have the meaning given them in the Act. As used in
39 this part:

40 *Accreditation*, as applied to an educational program, means recognition by a national
41 or
42 regional nongovernmental agency or association, of a specialized program of study as
43 meeting or

41 exceeding certain established qualifications and educational standards. As applied to a health

42 care or educational institution, accreditation means recognition by a national or regional

43 nongovernmental agency or association, of the institution as meeting or exceeding certain

44 established standards or criteria for that type of institution.

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1 *Act* means the Consumer Assurance of Radiologic Excellence Act, 42 U.S.C. 10001-10008.1

2 *Authorized user* means a physician, dentist, or podiatrist who meets the requirements as defined in Title 10 Code of Federal Regulations (C.F.R.) Part 35 or equivalent Agreement State

4 regulations as defined by Section 274 (i) of the Atomic Energy Act.2

5 *Board credentialed*3 means recognition by a national credentialing board as meeting or 6 exceeding all established standards in its credentialing process.

7 *Bone densitometry equipment operator* means an individual other than a licensed practitioner

8 whose performance of bone densitometry procedures under the supervision of a licensed

9 practitioner using equipment that emits ionizing and nonionizing radiation resulting in 10 measurement of bone density is limited to select body anatomical sites, and who has met and

11 continues to meet the permit standard in Sec. 75.8.

12 *Cardiovascular, cardiac and vascular interventional radiographer* means an individual other

13 than a licensed practitioner who performs a comprehensive scope of invasive cardiac and/or

14 neurologic, peripheral and visceral cardiovascular and non-vascular diagnostic, therapeutic and

15 interventional procedures under the supervision of a licensed practitioner through the use of

16 equipment that emits ionizing radiation, resulting in radiographic or digital images or for the use

17 of fluoroscopy, and who has met and continues to meet the standard in Sec. 75.6(A)(4).

18 *Cardiovascular invasive specialist* means an individual other than a licensed practitioner who

19 performs a comprehensive scope of invasive cardiovascular and peripheral vascular diagnostic,

20 therapeutic and interventional procedures under the supervision of a licensed practitioner through

21 the use of fluoroscopy or utilizing equipment, which emits ionizing radiation, and who has met

22 and continues to meet the standard in 75.6(E)(2).

23 *Continuing competence* means the maintenance of knowledge and skills and/or
demonstrated
24 performance that are adequate and relevant to professional practice needs.
25 *Credentialing* means any process whereby a nongovernmental agency or association
grants
26 recognition to an individual who has met or continues to meet certain predetermined
27 qualifications.
28 *Diagnostic medical sonographer* means a person other than a licensed practitioner
who is
29 qualified by professional credentialing and academic and clinical experience to
provide
30 diagnostic patient care services using ultrasound for abdominal, obstetric,
gynecologic, cardiac,
31 vascular sonography and technology, and any subspecialties or related diagnostic
procedures and
32 who meets the Standards in Sec 75.6. This person also may be referred to as vascular
33 sonographer, vascular technologist, ultrasound technician, echocardiographers, or
echo
34 technician.⁴

35 ***Direction* means...**⁵

36 ***Dosimetric plan* means...**⁶

1 This will apply to either the CARE or RadCARE bill.

2 Submitted by AAPM on 8/17/06.

3 At the Fall Alliance meeting we will discuss the differences between “certified” and “credentialed”.

4 Submitted by SDMS on 8/1/06.

5 According to Webster’s New World College Dictionary, 3rd Ed. “direction” means 1. the act of directing, management; supervision. 2. instructions for doing, operating, using, preparing, etc. 3. an authoritative order or command.

6 A definition is requested by AAPM. Upon review of previous versions of the regulations there has not been a consensus definition of “dosimetric plan.”

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1 *Educational program* means a set of formally structured activities designed to provide
2 students with the knowledge and skills necessary to enter an occupation, with
evaluation of
3 student performance according to predetermined objectives.

4 *Ionizing radiation* means alpha particles, beta particles, gamma rays, x-rays, neutrons,
high

speed electrons, high-speed protons, and other particles capable of producing ions.

Ionizing

6 radiation, as used in this part, does not include non-ionizing radiation, such as radio- or
7 microwaves, or visible, infrared, or ultraviolet light.

8 *Licensed practitioner* means a licensed doctor of medicine, osteopathy, dentistry,
podiatry, or

9 chiropractic.

10 *Licensure* means the process by which an agency of State government grants
permission to

11 persons meeting predetermined qualifications to engage in an occupation.

12 *Limited x-ray machine operator* means a person other than a licensed practitioner whose

13 performance of diagnostic x-ray procedures under the supervision of a licensed practitioner using

14 equipment that emits external ionizing radiation resulting in diagnostic radiographic images is

15 limited to select body anatomical sites, and who has met and continues to meet the permit

16 standard in Sec. 75.7.

17 *Magnetic resonance technologist* means a person other than a licensed practitioner who

18 performs magnetic resonance procedures under the supervision of a licensed practitioner using

19 magnetic fields and radiofrequency signals, and who has met and continues to meet the standard

20 in 75.6(D)(2).

21 *Medical dosimetrist* means a person other than a licensed practitioner who participates in,

22 performs, and/or assists under the supervision of a licensed practitioner or and⁷ medical physicist

23 in the procedures required in the design, preparation, and evaluation processes for the use of

24 ionizing radiation for therapeutic purposes, and who has met and continues to meet the standard

25 in 75.6(F)(2).

26 *Medical physicist* means a person other than a licensed practitioner who practices

27 independently one or more of the subfields of medical physics, and who has met and continues to

28 meet the standard in 75.6(G)(2).

29 *Nonionizing radiation* means the optical radiations (ultraviolet, visible and infrared - and

30 lasers), static and time-varying electric and magnetic fields and radiofrequency (including

31 microwave) radiation, and ultrasound.⁸

32 *Nonionizing radiation* means radiation which does not have the capability of ionizing the

33 medium through which it is passing.⁹

34 *Nonionizing radiation producing source or source* means, for the purposes of this

35 subchapter, any equipment, machine or device capable of emitting nonionizing radiation between

36 the frequencies of 300 kHz and 100 GHz.¹⁰

37 *Nuclear medicine technologist* means a person other than a licensed practitioner who

38 compounds, calibrates, dispenses and administers radiopharmaceuticals, pharmaceuticals, and

39 radionuclides under the direction of an authorized user for benefit of performing a

40 comprehensive scope of nuclear medicine procedures, and who has met and continues to meet

41 the standard in Sec. 75.6(B)(2).

7 Submitted by AAPM on 8/17/06.

8 Submitted by SDMS on 8/1/06.

9 Submitted by AAPM on 8/17/06.

10 Submitted by AAPM on 8/17/06. Since “source” is not referenced elsewhere in the document is this necessary?

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1 *Permit* means an authorization issued by a State for specific tasks or practices rather than the

2 entire scope of practice in an occupation.

3 **Plan means...**¹¹

4 *Radiation therapist* means a person other than a licensed practitioner who utilizes ionizing

5 radiation under the supervision of a licensed practitioner for the planning and delivery of

6 therapeutic procedures, and who has met and continues to meet the standard in Sec. 75.6(C)(2).

7 *Radiographer* means a person other than a licensed practitioner who performs a

8 comprehensive scope of diagnostic radiologic procedures under the supervision of a licensed

9 practitioner using external ionizing radiation, resulting in radiographic or digital images, and

10 who has met and continues to meet the licensure standard in Sec. 75.6(A)(3).

11 *Radiologist* means a physician specializing in radiology certified by, or board eligible to be

12 certified by, the American Board of Radiology, American Osteopathic Board of Radiology,

13 British Royal College of Radiology or the Canadian College of Physicians and Surgeons.

14 *Radiologist assistant* means an individual other than a licensed practitioner who performs

15 advanced radiologic procedures under the supervision of a radiologist, and who has met and

16 continues to meet the standard in Sec. 75.6(H)(2).

17 **Supervision means ...**¹²

18 *Treatment plan* means the identification of a radiation treatment strategy and course of action

19 for an individual and is performed by a licensed practitioner.¹³

20

21 **Sec. 75.3 Applicability.**

22 (A) *Federal Government.* Except as provided in section XXX of the Act, the credentialing

23 standards set out in the Appendices to this part apply to those individuals who perform,

24 administer, plan, evaluate and verify medical imaging and radiation therapy
procedures, in each
25 department, agency and instrumentality of the Federal government as follows:
26 (1) *Radiographer Standards* apply to all individuals who are radiographers as defined
in Sec.
27 75.6 and who are not licensed practitioners excepted by the Act.
28 (2) *Cardiovascular, Cardiac and/or Vascular Interventional Radiographer Standards*
apply to
29 all cardiovascular interventional radiographers defined in Sec. 75.6 and who are not
licensed
30 practitioners excepted by the Act.
31 (3) *Nuclear Medicine Technologist Standards* apply to all individuals who are nuclear
medicine
32 technologists as defined in Sec. 75.6, and who are not licensed practitioners excepted
by the Act.
33 (4) *Radiation Therapist Standards* apply to all individuals who are radiation therapists
as defined
34 in Sec. 75.6 and who are not licensed practitioners excepted by the Act.
35 (5) *Magnetic Resonance Technologist Standards* apply to all magnetic resonance
technologists
36 as defined in Sec. 75.6 and who are not licensed practitioners excepted by the Act.
37 (6) *Cardiovascular Invasive Specialist Standards* apply to all cardiovascular invasive
specialists
38 defined in Sec. 75.6 and who are not licensed practitioners excepted by the Act.
39 (7) *Medical Dosimetrist Standards* apply to all medical dosimetrists defined in Sec.
75.6 and
40 who are not licensed practitioners excepted by the Act.
11 According to Webster's New World College Dictionary, 3rd Ed. "plan" means a scheme or program for
making,
doing, or arranging something. Syn. Plan refers to any detailed method, formulated beforehand, for doing
or
making something.
12 According to Webster's New World College Dictionary, 3rd Ed. "supervision" means to oversee, direct
or
manage (work, workers, a project, etc.).
13 Submitted by AAPM on 8/17/06.
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1 (8) *Medical Physicist Standards* apply to all medical physicists defined in Sec. 75.6 and
who are
2 not licensed practitioners excepted by the Act.
3 (9) *Radiologist Assistant Standards* apply to all radiologist assistants defined in Sec.
75.6 and
4 who are not licensed practitioners excepted by the Act.
5 (10) *Diagnostic Medical Sonographer Standards* apply to all individuals who are
diagnostic
6 medical sonographers as defined in Sec. 75.6 and who are not licensed practitioners
excepted by
7 the Act.

8 (11) *Limited X-ray Machine Operator Standards* apply to all limited x-ray machine
9 operators
10 defined in Sec. 75.7 and who are not licensed practitioners excepted by the Act.
11 (12) *Bone Densitometry Equipment Operator Standards* apply to all bone
12 densitometry
13 equipment operators defined in Sec. 75.8 and who are not licensed practitioners
14 excepted by the
15 Act.
16 (13) The following persons are deemed to have met the requirements of these
17 standards when
18 performing services in Federal facilities:
19 (a) Persons employed by the Federal government and working in a Federal facility as
20 medical imaging and radiation therapy personnel prior to the effective date of this
21 regulation and
22 who show evidence of current or fully satisfactory performance or verification of such
23 from a
24 licensed practitioner;
25 (b) Uniformed military personnel who receive medical imaging and radiation therapy
26 training from or through the Armed Forces of the United States and who meet
27 standards
28 established by the Department of Defense or components thereof, provided that those
29 standards
30 are determined by such Department or component to offer equivalent protection of
31 patient and
32 public health and safety;
33 (c) Foreign nationals employed by the Federal government in positions outside of the
34 United
35 States who show evidence of training, experience, and competence determined by the
employing
agency to be equally protective of patient and public health and safety; or
27 (d) Persons employed by the Federal government as medical imaging and radiation
therapy
28 personnel after the effective date of this regulation who (a) received training from
institutions in
29 a State or foreign jurisdiction that did not accredit training in that particular field at the
time of
30 graduation, or (b) practiced in a State or foreign jurisdiction that did not license that
particular
31 field or which did not allow special eligibility to take a licensure examination for
those who did
32 not graduate from an accredited educational program; provided that such persons
show evidence
33 of training, experience, and competence determined by the Office of Personnel
Management or
34 the employing agency to be equally protective of patient and public health and safety.
35 (14) The following persons are exempted from these standards:

36 (a) Licensed practitioners as defined in Sec. 75.2.

37 (b) Persons who perform medical imaging and radiation therapy procedures in emergency

38 situations that preclude use of fully qualified personnel; or

39 (c) Students performing medical imaging and radiation therapy under the auspices of
40 accredited educational programs.

41 (15) A department, agency, or instrumentality of the Federal government may, after consultation

42 with the Secretary, use alternative criteria that it determines would offer equivalent protection of

43 patient and public health and safety.

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1 (B) *States*. The States are required to adopt standards for accreditation of educational programs

2 and credentialing that are consistent with the standards set out in the appendices to this part.¹⁴

3

4 **Sec.75.4 Standards for the accreditation of medical imaging and radiation therapy** 5 **educational programs.**

6 (A) Organizations accrediting educational programs must meet and maintain the following:

7 (1) Recognition as an specialized accrediting agency by the United States Department of

8 Education (USDE); or

9 (2) Recognition as an accrediting agency by the Council for Higher Education (CHEA);
or

10 (3) Recognition as an accrediting agency by the Commission on Accreditation of Allied Health

11 Education Programs (CAAHEP); or¹⁵

12 (4) Commission on Accreditation of Medical Physics Educational Programs, Inc.¹⁶

13 (B) Organizations accrediting educational programs must:

14 (1) Accredite only those programs that are legally authorized under applicable state law to provide

15 a program of education beyond the secondary level.¹⁷

16 (2) Affirm its continuing commitment to achieve and maintain compliance with all relevant

17 amendments and reauthorizations to the Higher Education Act of 1965 and to the USDE

18 Secretary's Procedures and Criteria for Recognition of Accrediting Agencies.¹⁸

19 (C) Educational content. Educational programs must contain content specific to each area of

20 education:¹⁹

21 (1) Radiography

22 (a) The radiography didactic content must include, but is not limited to the following:

23 1. Introduction to radiography;

24 2. Medical ethics, law and regulation;

- 25 3. Patient care;
- 26 4. Pharmacology and drug administration;
- 27 5. Medical terminology;
- 28 6. Human structure and function;
- 29 7. Imaging and processing;
- 30 8. Radiographic technique;
- 31 9 Radiographic procedures;
- 32 10. Image analysis;

14 This section is deleted since the bill (either S. 2322 or HR 1426) will determine if states are required to license personnel or if standards will be enforced as a condition of participation in Federal programs. Noted by the AAMA

that this provision may be redundant.

15 Does CAMPEP meet this criteria?

16 Submitted by AAPM on 8/17/06.

17 Is this provision redundant since accreditation organization must meet provisions in (A)?

18 There is no USDE Secretary's Procedures and Criteria for Recognition of "Specialized" Accrediting Agencies,

just the encompassing general procedures/criteria.

19 Since the educational programs need to meet the standards specified in (A) and (B) of this section, is it necessary

to list curriculum content for each specialty? Can we substitute criteria requiring that educational content at a

minimum should meet that of a nationally recognized curriculum? AAMA submits that it is necessary to list the

curriculum content for each specialty because it is conceivable that an accrediting agency could be recognized as a

specialized accreditor by the USDE without having a curriculum that adequately protects the public. It is my

understanding that the USDE process for recognizing specialized accrediting bodies is not as stringent or scrutinous

as that of CAAHEP, and perhaps that of CHEA.

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- 1 11. Radiographic pathology;
- 2 12. Radiation biology;
- 3 13. Radiation production and characteristics;
- 4 14. Radiation protection;
- 5 15. Computers in radiologic sciences; and
- 6 16. Clinical education.

7 (b) The radiography clinical education phase of the content shall provide for supervised,

8 competency-based clinical education and experience that includes a sufficient and balanced

9 variety of radiographic examinations and equipment.

10 (2) Cardiovascular, cardiac and/or vascular radiography

11 (a) The cardiovascular, cardiac and/or vascular interventional radiography didactic content

12 must require the radiography content ((C)(1)(a) and (C)(1)(b)) as prerequisite education and must

13 include, but is not limited to, the following:

- 14 1. Introduction to diagnostic, therapeutic and interventional cardiovascular and non-vascular
- 15 radiography;
- 16 2. Advanced patient care;
- 17 3. Advanced pharmacology and drug administration;
- 18 4. Advanced human cardiovascular structure and function;
- 19 5. Advanced imaging equipment;
- 20 6. Advanced cardiovascular imaging;
- 21 7. Performance of diagnostic, therapeutic and interventional cardiac, neurologic, peripheral
- 22 and visceral cardiovascular procedures;
- 23 8. Performance of diagnostic, therapeutic and interventional non-vascular procedures;
- 24 9. Advanced cardiovascular image analysis;
- 25 10. Advanced cardiovascular pathology;
- 26 11. Hemodynamic monitoring;
- 27 12. Cardiovascular and non-vascular non-imaging medical equipment;
- 28 13. Advanced infection control, aseptic and sterile technique; and
- 29 14. Clinical education.
- 30 (b) The cardiac and/or vascular interventional radiography clinical education phase of the
- 31 content shall provide supervised, competency-based clinical education and experience that
- 32 includes a sufficient number and variety of diagnostic, therapeutic and interventional cardiac
- 33 and/or vascular and non-vascular examinations and equipment.
- 34 (3) Nuclear Medicine Technology
- 35 (a) Academic instruction for the professional nuclear medicine technology content shall
- 36 include, but is not limited to, the following content areas:
- 37 1. Methods of patient care;
- 38 2. Medical ethics, law and regulation;
- 39 3. Radiation safety and protection;
- 40 4. Nuclear medicine physics and radiation physics;
- 41 5. Nuclear instrumentation;
- 42 6. Statistics;
- 43 7. Medical terminology;
- 44 8. Radionuclide chemistry and radiopharmacy;
- 45 9. Radiation biology;
- 46 10. Diagnostic nuclear medicine imaging and non-imaging, *in vivo* and *in vitro* procedures;
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- 1 11. Radionuclide therapy;
- 2 12. Computer applications for nuclear medicine;
- 3 13. Immunology as related to nuclear medicine;
- 4 14. Quality control and quality assurance;
- 5 15. Positron emission tomography.

6 (b) Supervised clinical education and experience shall include the following:

7 1. Patient care and recordkeeping;

8 2. Radiation safety techniques that will minimize radiation exposure to the patient,
public,

9 fellow workers and self;

10 3. Participation in a quality control program;

11 4. Preparation, calculation, identification, administration (where permitted) of

12 radiopharmaceuticals, disposal of radioactive waste and performance of all
radionuclide quality

13 control procedures;

14 5. Performance of an appropriate number and variety of imaging and nonimaging

15 procedures to achieve desired clinical competencies; and

16 6. Clinical correlation of nuclear medicine procedures.

17 (4) Radiation therapy

18 (a) The content must include, but is not limited to, the following:

19 1. Orientation to radiation therapy;

20 2. Medical ethics, law and regulation;

21 3. Patient care;

22 4. Medical terminology;

23 5. Human structure and function;

24 6. Pathology;

25 7. Radiation biology;

26 8. Radiation physics;

27 9. Radiation therapy physics;

28 10. Radiation protection;

29 11. Principles and practice of radiation therapy;

30 12. Treatment planning;

31 13. Medical imaging and processing;

32 14. Radiation therapy quality management;

33 15. Clinical education.

34 (b) Clinical practice assignments must be an integral part of the content so that
radiation

35 therapists have the opportunity to develop competence in radiation therapy
procedures.

36 (5) Magnetic resonance technology

37 (a) The content must include, but is not limited to the following:

38 1. Methods of patient care;

39 2. Medical ethics, law and regulation;

40 3. Medical terminology;

41 4. Magnetic resonance safety and bioeffects;

42 5. Principles of magnetic resonance physics;

43 6. Magnetic resonance instrumentation;

44 7. Sectional anatomy;

45 8. Magnetic resonance pathology;

46 9. Magnetic resonance pulse sequence techniques;

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- 1 10. Magnetic resonance contrast agents;
- 2 11. Computer applications for magnetic resonance;
- 3 12. Quality control and quality assurance;
- 4 13. Supervised competency based clinical education in
 - 5 a. Patient care;
 - 6 b. Clinical documentation;
 - 7 c. Magnetic resonance procedures; and
 - 8 d. Quality control procedures;
- 9 (b) Clinical practice assignments must be an integral part of the curriculum so that magnetic
10 resonance technologists have the opportunity to develop competence in magnetic
11 resonance
12 procedures.
- 12 (6) Cardiovascular invasive specialist.
- 13 (a) The curriculum must ensure the achievement of program goals and learning
14 domains.
15 Instruction must be an appropriate sequence of classroom, laboratory, and clinical
16 activities.
- 17 Instruction must be based on clearly written course syllabi describing learning goals,
18 course
19 objectives, and competencies required for graduation. The cardiovascular invasive
20 specialist
21 didactic content must include, but is not limited to the following:
 - 22 1. Invasive cardiovascular methodologies;
 - 23 2. Cardiovascular anatomy and physiology;
 - 24 3. Patient care and assessment;
 - 25 4. Cardiovascular hemodynamic monitoring and interpretation;
 - 26 5. Cardiovascular pathophysiology;
 - 27 6. Principles of imaging and radiation:
 - 28 7. Angiography - standard techniques and projections;
 - 29 8. Ventriculography;
 - 30 9. Coronary arteriography;
 - 31 10. Aortography;
 - 32 11. Peripheral arteriography;
 - 33 12. Pulmonary angiography;
 - 34 13. IVUS- intravascular ultrasound;
 - 35 14. Intracardiac ultrasound;
 - 36 15. Manipulation of imaging equipment;
 - 37 16. Digital imaging and picture archiving and communication (PACS);
 - 38 17. Image processing and quality control;
 - 39 18. Aseptic and sterile technique;
 - 40 19. Invasive cardiac and vascular diagnostic procedures;
 - 20 20. Percutaneous cardiac and vascular intervention;
 - 21 21. Cardiovascular pharmacology;
 - 22 22. Cardiac and vascular surgical procedures; and
 - 23 23. Management of complications and emergencies

41 (b) The cardiovascular invasive specialist clinical education phase of the content shall
42 provide supervised, competency-based clinical education and experience that includes
43 diagnostic, therapeutic and interventional cardiac and vascular procedures and
equipment.

44 (7) Medical dosimetry.

45 (a) The content must include, but is not limited to the following:

46 1. Medical ethics, law and regulation;

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1 2. Radiation oncology;

2 3. Radiation physics;

3 4. Radiation biology;

4 5. Radiation protection;

5 6. Dose calculation methods;

6 7. Human function and structure;

7 8. Tumor localization, including cross-sectional anatomy;

8 9. External beam treatment planning techniques and isodose distributions;

9 10. Quality assurance;

10 11. Brachytherapy; and

11 12. Clinical education.

12 (b) The clinical component of the educational program shall provide an environment
for

13 supervised competency-based clinical education and experience and offer a sufficient
and well14

balanced variety of procedures, techniques, methodologies and equipment.

15 (8) Medical physics

16 (a) The content must include, but is not limited to, the following:

17 1. Radiological physics and dosimetry;

18 2. Health physics/radiation safety;

19 3. Radiation biology;

20 4. Anatomy and physiology;

21 5. Medical ethics, law, and regulation;

22 6. Computational skills;

23 7. Conflict of interest and scientific misconduct;

24 8. Statistical methods in medical sciences; and

25 9. Safety: electrical, chemical, biological, and elementary radiation.

26 (b) The content for imaging science must also include, but is not limited to, the
following:

27 1. Conventional planar imaging;

28 2. Digital imaging;

29 3. Nuclear medicine;

30 4. Inverse problem: computed tomography, magnetic resonance and positron emission
31 tomography;

32 5. Magnetic resonance imaging; and

33 6. Advanced topics: signal processing, receptors, etc.

34 (c) The content for radiation therapy must also include, but is not limited to, the
following:

35 1. Radiation oncology;
36 2. External beam radiation therapy;
37 3. Brachytherapy;
38 4. Treatment planning;
39 5. Radiation therapy devices
40 6. Special techniques in radiotherapy;
41 7. Radiation therapy with neutrons, protons, heavy ions and pions; and
42 8. Radiation protection in radiotherapy
43 (d) Appropriate clinical practice assignments in the relevant sub-specialty must be an
integral
44 part of the content so that the medical physicists have the opportunity to develop
competence in
45 clinical procedures.

46 (9) Radiologist assistant
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1 (a) The content must include, but is not limited to the following:

2 1. Clinical knowledge and activities associated with patient assessment, management
and

3 education;

4 2. Pharmacology and clinical decision-making in radiology;

5 3. Contrast media;

6 4. Pathophysiology;

7 5. Radiologic procedures;

8 6. Radiologist mentored clinical experience;

9 7. Clinical knowledge and activities associated with radiologic procedures;

10 8. Clinical knowledge and activities associated with image and procedure observation
and

11 communication;

12 9. Fluoroscopic unit operation and safety;

13 10. Radiation safety, radiobiology and health physics;

14 11. Image correlation to anatomy, physiology and pathology;

15 12. Clinical pathways related to radiology;

16 13. Quality of care review and audit;

17 14. Directed readings and research;

18 15. Medicolegal, professional and governmental standards; and

19 16. Implementation strategies for mentored clinical experience.

20 (b) The clinical component of the educational program shall provide an environment
for

21 supervised competency-based clinical education and experience, a radiologist-directed
clinical

22 preceptorship and offer a sufficient and well-balanced variety of procedures,
techniques,

23 methodologies and equipment.

24 (10) Diagnostic medical sonography

25 (a) The content for all diagnostic medical sonography programs must include but is
not

26 limited to the following:

- 27 1. Utilize oral and written communication;
- 28 2. Provide basic patient care and comfort;
- 29 3. Demonstrate knowledge and understanding of human gross and sectional anatomy;
- 30 4. Demonstrate knowledge and understanding of physiology, pathology, and
- 31 pathophysiology;
- 32 5. Demonstrate knowledge and understanding of acoustical physics, Doppler
- 33 ultrasound
- 34 6. Demonstrate knowledge and understanding of the interaction between ultrasound
- 35 tissue and the probability of biological effects in clinical examinations;
- 36 7. Employ professional judgment and discretion;
- 37 8. Understand the fundamental elements for implementing a quality assurance and
- 38 improvement program, and the policies, protocols, and procedures for the general
- 39 function of the
- 40 9. Recognize the importance of continuing education.

41 (b) The content for general (abdominal and obstetric-gynecological) sonography

42 programs

- 42 must include but is not limited to the following:
- 43 1. Demonstrate the ability to perform sonographic examinations of the abdomen,
 - 44 superficial
 - 45 structures, non-cardiac chest, and the gravid and nongravid pelvis according to
 - 46 protocol
 - 47 guidelines established by national professional organizations and the protocol of the
 - 48 employing

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- 1 institution utilizing real-time equipment with both transabdominal and endocavitary
- 2 transducers,
- 3 Doppler, and color Doppler display;
- 4 2. Recognize and identify the sonographic appearance of normal anatomic structures,
- 5 including anatomic;
- 6 3. Recognize, identify, and appropriately document the abnormal sonographic and
- 7 Doppler
- 8 patterns of disease processes, pathology, and pathophysiology of the structures listed
- 9 above.
- 10 4. Modify the scanning protocol based on the sonographic findings and the differential
- 11 diagnosis;
- 12 5. Recognize and identify the sonographic appearance of normal anatomic structures of
- 13 the
- 14 female pelvis, including anatomic variants and normal Doppler patterns;
- 15 6. Recognize and identify the sonographic appearance of normal maternal, embryonic,
- 16 and
- 17 fetal anatomic structures during the first, second, and third trimesters;
- 18 7. Recognize, identify, and appropriately document the sonographic appearance of

13 gynecologic disease ;
14 7. Recognize, identify, and appropriately document the sonographic appearance of
15 obstetric
16 abnormalities, disease, pathology, and pathophysiology; and
17 8. Demonstrate knowledge and understanding of the role of the sonographer in
18 performing
19 interventional/invasive procedures.
20 (c) The content for cardiac sonography programs must include but is not limited to the
21 following:
22 1. Demonstrate knowledge of normal and abnormal cardiac anatomy;
23 2. Demonstrate knowledge of normal cardiovascular physiology;
24 3. Demonstrate knowledge and understanding of cardiac pathology, pathophysiology,
25 and
26 hemodynamics in different types of cardiac disease;
27 4. Demonstrate knowledge and understanding of clinical cardiology;
28 5. Demonstrate knowledge of other diagnostic cardiac procedures emphasizing
29 indications,
30 utility, and limitations of these procedures;
31 6. Demonstrate proficiency in the performance of M-mode, two-dimensional, and
32 Doppler
33 (pulsed wave, continuous wave and color flow) echocardiographic diagnostic
34 procedures;
35 7. Recognize, identify, and appropriately document the abnormal echocardiographic
36 and
37 Doppler patterns of disease, pathology, and pathophysiology for the disease categories
38 listed in
39 Section II.D.320;
40 8. Demonstrate knowledge and understanding of the indications, utility, limitations,
41 and
42 technical procedures for related echocardiographic diagnostic procedures;
43 9. Demonstrate knowledge and understanding of clinical pharmacology as it relates to
44 echocardiography and provocative maneuvers; and
45 10. Demonstrate knowledge, understanding, and proficiency in the use of quantitation
46 principles applied to echocardiographic images and flow data.
47 (d) The content for vascular sonography programs must include but is not limited to
48 the
49 following:
50 1. Demonstrate knowledge of normal and abnormal vascular anatomy;
51 2. Demonstrate knowledge of normal and abnormal vascular physiology;
52 3. Demonstrate knowledge and understanding of vascular physiology,
53 pathophysiology, and
54 hemodynamics in the different types of vascular disease/dysfunction;
55 4. Demonstrate knowledge and understanding of clinical vascular diagnostic
56 procedures;
57 Reference?
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1 5. Demonstrate knowledge of other diagnostic vascular procedures emphasizing
indications,
2 utility, and limitations of these procedures;
3 6. Knowledge of importance and impact of other laboratory values and modalities;
4 7. Demonstrate proficiency in the performance of plethysmography, ultrasound,
Doppler
5 (pulsed and continuous wave and color flow) vascular procedures, transcranial Doppler
6 insonation/visualization, pressure measurements, and vascular stress testing;
7 8. Demonstrate knowledge and understanding of clinical pharmacology as it relates to
non8
invasive vascular evaluation and stress testing; and
9 9. Demonstrate knowledge, understanding, and proficiency in the use of quantitation
10 principles applied to non-invasive vascular testing.²¹
11

12 **Sec. 75.5 Standards for credentialing medical imaging and radiation therapy
personnel.**

13 (A) Organizations credentialing medical imaging and radiation therapy personnel must
meet and

14 maintain the following:

15 (1) Policies and Procedures. An organization that seeks to be recognized for the
credentialing of
16 personnel must adopt and document policies to ensure reliability, validity, and fairness
of all

17 standards used in the credentialing process. Standards should address:

18 (a) The mechanism for determining appropriate examination content;

19 (b) Steps in construction of examinations;

20 (c) Examination administration procedures; and

21 (d) Fulfillment of responsibility to applicants.

22 One mechanism for a credentialing program to demonstrate compliance with these
standards

23 is through accreditation by the National Commission for Certifying Agencies (*NCCA
Standards*

24 *for the Accreditation of Certification Programs*) or the American National Standards
Institute

25 (*ISO/IEC-CD 17024 – General Requirements for Bodies Operating Certification
Systems of*

26 *Persons*).²²

27 (2) Examination. A criterion-referenced examination in radiography or cardiovascular,
cardiac

28 or vascular interventional radiography, nuclear medicine technology, radiation
therapy, magnetic

29 resonance imaging, cardiovascular invasive specialist, medical dosimetry, medical
physics,

30 radiologist assistant or diagnostic medical sonography shall be utilized to test the
knowledge that

31 underlies the performance of the tasks required of a radiographer or cardiovascular,
cardiac or
32 vascular interventional radiographer, nuclear medicine technologist, radiation therapist
or
33 magnetic resonance technologist, cardiovascular invasive specialist, medical
dosimetrist, medical
34 physicist, radiologist assistant or diagnostic medical sonographer respectively.
35 (3) Continuing Competence.²³ Credentialed medical imaging and radiation therapy
personnel
36 shall maintain continuing competency in the area in which he/she is practicing.
Continuing
37 education is one acceptable mechanism for documenting continuing competency.
Credentialed
38 medical imaging and radiation therapy personnel are expected to demonstrate
professionalism in
39 the performance of duties, demonstrate empathic and culturally competent patient
care, and
40 maintain patient confidentiality and privacy according to regulations. Continued
professional

²¹ Submitted by SDMS 8/1/06.

²² Lines 16-19 do define the criteria a testing/credentialing organization/agency would have to go through to qualify.

However, concerns have been raised that this language may leave imaging disciplines open to other testing/credentialing organizations to form and be included as long as they meet the criteria in lines 16-19 and who

have not sought NCCA or ISO recognition.

²³ Does this fit in with medical physics lifelong certification?

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1 growth and development is achieved through participation in medical and technical
education
2 and research to enhance the quality of patient care.
3 (4) Alternate eligibility to take the examination in radiography or cardiovascular,
cardiac or
4 vascular interventional radiography, nuclear medicine technology, radiation therapy,
magnetic
5 resonance technology, cardiovascular invasive specialist, medical dosimetry, medical
physics,
6 radiologist assistant or diagnostic medical sonography may be provided for applicants
whose
7 training and/or experience are equal to, or in excess of, those of a graduate of an
accredited
8 educational program in that specialty, or of an individual who is regularly eligible to
take the
9 examination.²⁴
10 (5) For a period of five years after the effective date of this rule, an individual who is
working as
11 a radiographer or cardiovascular, cardiac or vascular interventional radiographer,
nuclear

12 medicine technologist, radiation therapist, magnetic resonance technologist,
cardiovascular

13 invasive specialist, medical dosimetrist or sonographer on the effective date of this
rule, and who

14 has worked in that capacity for not less than three of the past five years, is eligible to
take the

15 examination to be licensed in that discipline.²⁵

16

17 **Sec.75.6 Standards for medical imaging and radiation therapy personnel.**

18 (A) Radiographer, cardiovascular interventional (CV), vascular interventional (VI) or
cardiac

19 interventional (CI) radiographer.

20 (1) Responsibilities of the radiographer include, but are not limited to, patient
assessment and

21 instruction; accurate demonstration of anatomical structures through application of
knowledge of

22 anatomy, positioning and medical imaging techniques; determination of exposure
factors to

23 achieve optimum images; examination of anatomical images to evaluate technique,
positioning,

24 and other technical qualities; and radiation safety. The radiographer applies
knowledge of

25 radiation physics and safety practices and applicable regulations to limit radiation
exposure of

26 the general public, patient, fellow workers, and self to as low as reasonably achievable

27 (ALARA), and exercises discretion and judgment in the performance of radiographic
procedures.

28 Radiographers are distinguished from personnel whose use of diagnostic procedures
are limited

29 to a few specific body sites and from those limited x-ray machine operators or
assistants whose

30 activities do not, to any significant degree, determine the site or dosage of external
ionizing

31 radiation to which a patient is exposed.²⁶

32 (2) Responsibilities of the CV, CI or VI radiographer include, but are not limited to,
patient

33 assessment, care and instruction; aseptic and sterile technique; invasive diagnostic,
therapeutic

34 and interventional cardiac, peripheral, neurologic and visceral cardiovascular and non-
vascular

35 procedures; cardiac, vascular and non-vascular non-imaging medical equipment;
advanced

36 pharmacology; hemodynamic monitoring; accurate demonstration of anatomical
structures

37 through application of knowledge of anatomy, positioning and medical imaging
techniques;

38 determination of exposure factors to achieve optimum images; examination of anatomical
39 images to evaluate technique, positioning, and other technical qualities; and radiation safety.

40 The CV, CI or VI radiographer applies knowledge of radiation physics and safety regulations to

41 limit radiation exposure of the general public, patient, fellow workers and self to as low as

42 reasonably achievable (ALARA), and exercises discretion and judgment in the performance of

24 Some specialties do not have alternate eligibility pathways.

25 The necessity of this subsection is dependent upon which version of the bill is enacted.

26 Is it necessary to continue to list a basic list of responsibilities of each specialty? Does it add anything?
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1 diagnostic, therapeutic and interventional cardiac, vascular and non-vascular procedures. The

2 scope of practice for the CV, CI or VI radiographer includes quality control of the ionizing

3 radiation equipment, determining and setting radiation parameters including radiation dose and

4 magnification factors, operating the x-ray tube and/or c-arm including positioning the patient for

5 the radiographic or digital image and/or fluoroscopy, panning the table, and positioning the c6

arm to reduce scatter radiation and operating the fluoroscopy pedal.

7 (3) A radiographer is an individual who is—

8 (a) A graduate of a program of radiography accredited by the Joint Review Committee on

9 Education in Radiologic Technology or an accreditation organization meeting the standards in

10 Sec. 75.4, and

11 (b) Credentialed as a radiographer by the American Registry of Radiologic Technologists; or

12 (c) Where applicable, licensed by the State in which the individual performing radiography

13 meets or exceeds (A)(3)(a) and (A)(3)(b) of this section.²⁷

14 (4) A cardiovascular interventional, vascular interventional or cardiac interventional
15 radiographer is an individual who—

16 (a) Meets the criteria in (A)(3)(a) and (A)(3)(b), or (A)(3)(c) of this section; and

17 (b) Is credentialed as a cardiovascular interventional, vascular interventional or cardiac

18 interventional radiographer by the American Registry of Radiologic Technologists; or

19 (c) Where applicable, is licensed by the State in which the individual performing

20 cardiovascular interventional, vascular interventional or cardiac interventional radiography meets

21 or exceeds (A)(4)(a) and (A)(4)(b) of this section.

22 (B) Nuclear medicine technologist

23 (1) Responsibilities of the nuclear medicine technologist include, but are not limited to, patient
24 interviews and instruction, preparation, quality control testing, compounding,
25 calibrating,
26 dispensing and administration of radiopharmaceuticals, pharmaceuticals and
27 radionuclides,
28 execution of patient imaging procedures including computer processing and image
29 enhancement,
30 laboratory testing, patient preparation for radioactive compounds and preparation and
31 administration of prescribed radioactive compounds for therapy, quality control, and
32 radiation
33 safety. The nuclear medicine technologist exhibits professionalism in the performance
34 of these
35 duties, demonstrates an empathetic and instructional approach to patient care, and
36 maintains
37 confidentiality of information as required. He/she applies knowledge of radiation
38 physics and
39 safety regulations to limit radiation exposure of the general public, patient, fellow
40 workers, and
41 self to as low as reasonably achievable (ALARA), and exercises discretion and
42 judgment in the
43 performance of nuclear medicine procedures.

35 (2) A nuclear medicine technologist is an individual who is—

36 (a) A graduate of a program of nuclear medicine technology accredited by the Joint
37 Review

38 Committee on Education in Nuclear Medicine Technology or an accreditation
39 organization

40 meeting the standards in Sec. 75.4, and

41 (b) Credentialed as a nuclear medicine technologist by the Nuclear Medicine
42 Technology

43 Certification Board or American Registry of Radiologic Technologists; or

44 (c) Where applicable, licensed by the State in which the individual performing nuclear
45 medicine technology meets or exceeds (B)(2)(a) and (B)(2)(b) of this section.

46 (C) Radiation therapist

47 Since these regulations set the federal minimum standard do we need to reference state licensure as
48 additional
49 criteria?

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1 (1) Responsibilities of the radiation therapist include, but are not limited to, patient
2 assessment

3 and instruction; treatment plan simulation; accurate administration of a prescribed dose
4 of

5 radiation; selection and utilization of appropriate immobilization and positioning aids;

6 participation in treatment decisions; record keeping; and radiation safety. The radiation
7 therapist

8 applies knowledge of the principles of radiation protection to minimize radiation
9 exposure to

6 patients, self and others to as low as reasonably achievable (ALARA). The radiation therapist
7 also exercises discretion and judgment in the performance of procedures, including the
8 monitoring of radiation therapy to patients and recommending treatment plan
adjustments as
9 needed.

10 (2) A radiation therapist is an individual who is—

11 (a) A graduate of a program of radiation therapy accredited by the Joint Review
Committee
12 on Education in Radiologic Technology or an accreditation organization meeting the
standards in
13 Sec. 75.4, and
14 (b) Credentialed as a radiation therapist by the American Registry of Radiologic
15 Technologists; or
16 (c) Where applicable, licensed by the State in which the individual performing
radiation
17 therapy meets or exceeds (C)(2)(a) and (C)(2)(b) of this section.

18 (D) Magnetic resonance technologist

19 (1) Responsibilities of the magnetic resonance technologist include, but are not limited
to,
20 patient assessment and instruction; accurate demonstration of anatomical structures
through
21 application of knowledge of anatomy, positioning, and magnetic resonance
techniques;
22 determination of protocol parameters to achieve optimum sequence results;
demonstration of
23 magnetic resonance safety and bioeffects; and quality control.

24 (2) A magnetic resonance technologist is an individual who is—

25 (a) A radiographer, nuclear medicine technologist or radiation therapist meeting the
criteria
26 in (A)(3), (B)(2) or (C)(2) of this section who is able to document suitable clinical
experience in
27 magnetic resonance technology; or
28 (b) A graduate of a program of magnetic resonance technology accredited by the Joint
29 Review Committee on Education in Radiologic Technology or an accreditation
organization
30 meeting the standards in Sec. 75.4, and
31 (c) Credentialed as a magnetic resonance technologist by the American Registry of
32 Radiologic Technologists; or
33 (d) Where applicable, licensed by the State in which the individual performing
magnetic
34 resonance technology meets or exceeds (D)(2)(a) and (D)(2)(c) or (D)(2)(b) and
(D)(2)(c) of this
35 section.

36 (E) Cardiovascular invasive specialist

37 (1) Responsibilities of the cardiovascular invasive specialist include, but are not limited to,
38 patient assessment, care and instruction; aseptic and sterile technique; invasive diagnostic,
39 therapeutic and interventional cardiac, peripheral, electrophysiological procedures;
40 cardiovascular non-imaging medical equipment; cardiovascular pharmacology; hemodynamic
41 monitoring; accurate demonstration of anatomical structures through application of knowledge of
42 anatomy, positioning and medical imaging techniques; examination of anatomical images to
43 evaluate technique, positioning, and other technical qualities; and radiation safety. The
44 cardiovascular invasive specialist applies knowledge of radiation physics and safety regulations
45 to limit radiation exposure of the general public, patient, fellow workers and self to as low as
46 reasonably achievable (ALARA), and exercises discretion and judgment in the performance of
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1 diagnostic, therapeutic and interventional cardiovascular procedures. The scope of practice for
2 the cardiovascular invasive specialist includes quality control of the ionizing radiation
3 equipment, setting magnification factors, operating the x-ray tube and/or c-arm including
4 positioning the patient for the radiographic or digital image and/or fluoroscopy, panning the
5 table, and positioning the c-arm to reduce scatter radiation. The cardiovascular invasive specialist
6 exhibits professionalism and ethics in the performance of these duties, demonstrates an
7 empathetic and instructional approach to patient care, and maintains confidentiality of
8 information as required.
9 (2) A cardiovascular invasive specialist is an individual who is—
10 (a) A graduate of a cardiovascular invasive specialist educational program accredited by the
11 Joint Review Committee on Education in Cardiovascular Technology or an accreditation
12 organization meeting the standards in Sec. 75.4, or
13 (b) Able to document suitable work/clinical experience in cardiovascular invasive specialist;
14 and
15 (c) Credentialed as a cardiovascular invasive specialist by Cardiovascular Credentialing
16 International; or
17 (d) Where applicable, licensed by the State in which the individual performing as a
18 cardiovascular invasive specialist meets or exceeds (E)(2)(a) and (E)(2)(c) or (E)(2)(b) and

19 (E)(2)(c) of this section.

20 (F) Medical dosimetry

21 (1) Responsibilities of the medical dosimetrist include, but are not limited to, obtaining and

22 synthesizing pertinent patient-specific clinical data to facilitate the radiation oncology process;

23 participating in the development of optimal treatment strategies, which includes the design of

24 external beam and brachytherapy treatment plans by means of computer and/or manual

25 computation to deliver a prescribed radiation dose, performing calculations for the accurate

26 delivery of the prescribed dose, verifying the arithmetical accuracy of all calculations; and

27 documenting treatment parameters associated with the radiation therapy process; participating in

28 implementation and quality assurance of the prescribed treatment course(s); evaluating,

29 critiquing and recommending changes to the radiation therapy process as necessary; and

30 providing patient and public education and promoting principles of good health.

He/she applies

31 knowledge of radiation physics and safety regulations to limit radiation exposure to the general

32 public, patient, fellow workers, and self to as low as reasonably achievable (ALARA), and

33 exercises discretion and judgment in the performance of medical dosimetry procedures.

34 (2) A medical dosimetrist is an individual who is—

35 (a) A graduate of a program of medical dosimetry accredited by the Joint Review Committee

36 on Education in Radiologic Technology or an accreditation organization meeting the standards in

37 Sec. 75.4, or

38 (b) Who is able to document suitable work/clinical experience in medical dosimetry; and

39 (c) Credentialed as a medical dosimetry by the Medical Dosimetry Certification Board; or

40 (d) Where applicable, licensed by the State in which the individual performing medical

41 dosimetry meets or exceeds (F)(2)(a) and (F)(2)(c) or (F)(2)(b) and (F)(2)(c) of this section.

42 (G) Medical physics

43 (1) Responsibilities of the medical physicist include, but are not limited to performing, planning,

44 evaluating, and verifying medical radiation dose delivered to patients based on
measurement and
45 verification of the radiation dose distributions, computer analysis, and/or direct
measurement of
46 dose; determination of adequate radiation shielding for medical facilities; equipment
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1 specification and acceptance testing; establishing quality assurance testing procedures;
and
2 consultation with a practitioner to assure accurate radiation dosage to a specific patient.
3 (2) A medical physicist is an individual who—
4 (a) Holds a master’s or doctoral degree from an accredited college or university in
physics,
5 medical physics, biophysics, radiological physics, medical health physics, or equivalent
courses;
6 and
7 (b) Has demonstrated completion of at least two (2) years of full-time clinical practice
under
8 the on-site supervision of medical physicist who is qualified in the subfield of practice,
in the
9 three (3) year period preceding the date of application²⁸; and
10 (c) Is board certified by the American Board of Radiology, American Board of
Medical
11 Physics, American Board of Health Physics,²⁹ American Board of Science in Nuclear
Medicine
12 or Canadian College of Physics in Medicine in the medical physics specialty in which
they are
13 applying; or
14 (d) Where applicable, licensed by the State in which the individual performing
medical
15 physics is licensed in the subspecialties for which they have been certified including
diagnostic
16 radiology physics, radiation oncology physics or medical nuclear physics meeting or
exceeding
17 (G)(2)(a), (G)(2)(b) and (G)(2)(c) of this section.
18 (H) Radiologist assistant
19 (1) The primary responsibilities of the radiologist assistant, all performed with the
supervision of
20 a radiologist are to: participate in patient assessment, patient management and patient
education;
21 perform selected radiology procedures including, but not limited to, fluoroscopy; and
participate
22 in the systematic analysis of the quality of patient care delivered within the radiology
23 environment. The radiologist assistant performs patient assessment, patient
management and
24 selected exams. The title “radiologist assistant” reflects the nature of the relationship
between the

25 radiologist and the radiographer working in an advanced clinical role. The radiologist
assistant

26 may not interpret images, make diagnoses or prescribe medications or therapies.

27 (2) A radiologist assistant is an individual who—

28 (a) Is a radiographer meeting the criteria in (A)(3) of this section;

29 (b) Holds a baccalaureate or graduate degree, or post-baccalaureate certificate from an
30 accredited college or university in radiologist assistant that incorporates a radiologist-
directed

31 clinical preceptorship;

32 (c) Is certified in advanced cardiac life support (ACLS); and

33 (d) Is credentialed by the American Registry of Radiologic Technologists as a
radiologist

34 assistant; or

35 (e) Where applicable, licensed by the State in which the individual performing as a
36 radiologist assistant meets or exceeds (H)(2)(a), (H)(2)(b), (H)(2)(c) and (H)(2)(d) of
this

37 section.

38 (I) Diagnostic medical sonography

39 (1) The responsibilities of the diagnostic medical sonographer include, but are not
limited to:

40 obtain, review, and integrate pertinent patient history and supporting clinical data to
facilitate

41 optimum diagnostic results; perform appropriate procedures and record anatomic,
pathologic,

42 and/or physiologic data for interpretation by a physician; record, analyze, and process
diagnostic

43 data and other pertinent observations made during the procedure for presentation to
the

28 Submitted by AAPM on 8/17/06.

29 Submitted by AAPM on 8/17/06.

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1 interpreting physician; exercise discretion and judgment in the performance of
sonographic

2 and/or other non-invasive diagnostic services; demonstrate appropriate communication
skills

3 with patients and colleagues; act in a professional and ethical manner; and provide
patient

4 education related to medical ultrasound and/or other non-invasive diagnostic vascular
5 techniques, and promote principles of good health.

6 (2) A diagnostic medical sonographer is an individual who—

7 (a) Is a graduate of a diagnostic medical sonography program accredited by the Joint
Review

8 Committee on Education in Diagnostic Medical Sonography or Joint Review
Committee in

9 Education in Cardiovascular Technology or a specialized accreditation agency meeting
the

10 standards in Sec 75.4; and/or 30

11 (b) Is credentialed as a diagnostic medical sonographer by the American Registry of
12 Diagnostic Medical Sonography or American Registry of Radiologic Technologists or
13 Cardiovascular Credentialing International or an agency meeting the standards in Sec.
75.5.31

14

15 **75.7 Standards for Limited X-ray Machine Operators.** This section describes basic
elements

16 to be incorporated in credentialing programs of States that allow persons to perform
limited x-ray

17 procedures.

18 (A) Description of the Profession. The limited x-ray machine operator is qualified by
education

19 to perform x-ray examinations of specific anatomic regions through the administration
of

20 external ionizing radiation.

21 (B) Responsibilities of Limited X-ray Machine Operators. Responsibilities include,
but are not

22 limited to, patient assessment and instruction; accurate demonstration of select
anatomical

23 structures through application of knowledge of anatomy, positioning and medical
imaging

24 techniques; selection of exposure factors to achieve optimum images; examination of
anatomical

25 images to evaluate technique, positioning, and other technical qualities; and radiation
safety.

26 He/she applies knowledge of radiation physics and safety regulations to limit radiation
exposure

27 of the general public, patient, fellow workers, and self to as low as reasonably
achievable

28 (ALARA). The limited x-ray machine operator does not exercise independent
discretion and

29 judgment in the performance of medical imaging procedures.

30 (C) Educational standards

31 (1) Sponsorship. Sponsorship must be by an entity that assumes primary responsibility
for the

32 planning and conduct of competency-based didactic and clinical training in limited x-
ray

33 machine operation.

34 (a) This responsibility must include: defining the content in terms of program goals,
35 instructional objectives, learning experiences designed to achieve goals and
objectives, and

36 evaluation procedures to assess attainment of goals and objectives; coordinating

classroom

37 teaching and supervised clinical experiences; appointing faculty; receiving and
processing

38 applications for admission; and granting documents of successful program completion.

39 (b) The formal training in limited x-ray machine operation may be a part of a medical
40 assistant educational program accredited by an organization recognized by the United
States

41 Department of Education or Council for Higher Education Accreditation or a program
for limited

42 x-ray machine operators accredited by the State entity responsible for approving such
programs.

30 Education plus certification or are there other pathways that should be referenced?

31 Submitted by SDMS on 8/1/2006.

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1 (c) The sponsoring entity and the limited x-ray machine operator training must be
approved

2 by the State entity responsible for credentialing limited x-ray machine operators.

3 (2) Content. Limited x-ray machine operator training must provide content, clinical and
didactic

4 instructional time to assure competent performance, as provided in this section.

5 (a) The limited x-ray machine operator content and learning experiences must include
the

6 theoretical aspects of the subject as well as practical application of techniques. The
theoretical

7 aspects should provide content necessary for limited permit x-ray machine operators to
8 understand the critical nature of the radiological procedures they perform and of the
judgments

9 they make as related to patient and operator radiation safety.

10 (b) The limited x-ray machine operator content must include, but is not limited to,
content in

11 the following eight areas: fundamentals, ethics and law of health care; medical
terminology;

12 human structure and function; radiation protection and radiobiology; equipment
operation and

13 radiation production; imaging production and evaluation; patient care, and specific
radiographic

14 procedures.

15 1. Fundamentals, Ethics and Law of Health Care. Didactic instruction shall be a
minimum

16 of ten (10) hours. Content shall include an overview of the health care environment,
facility

17 organization, professional development, ethics in health care, legal responsibilities of
limited x18

ray machine operators and patient consent.

19 2. Medical Terminology. Didactic instruction shall be a minimum of ten (10) hours.

20 Content shall include medical abbreviations and symbols, radiological procedures and
21 terminology and understanding orders, requests and diagnostic reports.

22 3. Human Structure and Function. Didactic instruction shall be a minimum of ten (10)

23 hours. Content shall include anatomical nomenclature, landmarks and underlying anatomy and

24 an overview of the human skeletal, cardiovascular, respiratory, abdominal, muscular and nervous

25 systems.

26 4. Radiation Protection and Radiobiology. Didactic instruction shall be a minimum of forty

27 (40) hours. Content shall include:

28 a. Patient protection including biological effects of radiation (dose-effect relationships,

29 long-term effects, somatic effects, genetic effects, relative tissue radiosensitivities), minimizing

30 patient exposure (exposure factors, shielding, beam restriction, filtration, film, screens and film³¹

screen combinations, and precautions regarding fetal exposure);

32 b. Personnel protection including sources of radiation exposure (exposure to primary x³³

ray beam, secondary radiation), basic methods of protection (time, distance, shielding); and

34 c. Radiation exposure and monitoring including basic properties of radiation, units of

35 measurement, dosimeters (types, proper use), and principles of “as low as reasonably

36 achievable” (ALARA), dose equivalent limits, maintenance of occupational dose records.

37 5. Equipment Operation and Radiation Production. Didactic instruction shall be a minimum

38 of fifty (50) hours. Content shall include:

39 a. Components of radiographic unit including operating console, x-ray tube (tube

40 construction and warm-up procedures), x-ray generator, rectifier, and transformer, exposure

41 controls, electronic imaging and beam restriction devices;

42 b. Basic principles of x-ray production; and

43 c. Recognition of malfunctions including light field to radiation field alignment, central

44 ray alignment, timer, milliamperage (mA) display, exposure switch, collimator light, source to

45 image receptor distance (SID) indicator, and electrical hazards.

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1 6. Imaging Production and Evaluation. Didactic instruction shall be a minimum of sixty

2 (60) hours. Content shall include:

3 a. Selection of technical factors including density (milliamperage seconds (mAs),

4 kilovolt peak (kVp), source to image receptor distance (SID), film-screen combinations, beam

5 restriction, anatomic and pathologic factors, and anode heel effect); contrast (kilovolt peak

6 (kVp), beam restriction, and anatomic and pathologic factors); recorded detail (object to image

7 recorder distance (OID), source to image receptor distance (SID), focal spot size, film-screen
8 combinations, and motion), distortion (size and shape); film and screen selection (film
9 characteristics and film-screen combination) and technique charts (caliper
10 measurement, fixed
11 vs. variable kilovolt peak (kVp), and other factors);
11 b. Image processing and quality assurance including film storage (pressure artifacts
12 and
13 fog), screens and cassettes (matching film and screens, film handling artifacts,
14 handling and
15 maintenance), image identification (methods and legal considerations), image
16 acquisition, film
17 processing (processing chemistry, components and systems, maintenance, and
18 malfunctions),
19 digital processing; and
20 c. Evaluation of images including criteria for diagnostic quality images (radiographic
21 density, radiographic contrast, recorded detail, distortion, artifacts, proper
22 demonstration of
23 anatomical structure, identification markers) and improving image quality (technical
24 factors,
25 positioning, patient considerations, processing, and artifacts).
26 7. Patient Care. Didactic instruction shall be a minimum of thirty (30) hours. Content
27 shall
28 include:
29 a. Legal and professional responsibilities including legal aspects of radiology (request
30 to
31 perform examination, patient rights, and professional liability), patient identification,
32 verification
33 of requested examination (clarification of terminology, comparison of request to
34 clinical
35 indications, and modification of routine projection);
36 b. Patient education, safety and comfort including communication with patient (review
37 patient history and explanation of procedure), assessment of patient condition (motor
38 control and
39 need for support equipment), proper body mechanics for patient transfer, and patient
40 privacy,
41 safety and comfort; and
42 c. Infection control and prevention including disinfection and cleaning (medical
43 asepsis
44 and sterile technique), Centers for Disease Control and Prevention isolation
45 precautions
46 (transmission of infection and types of precautions), and handling and disposal of
47 biohazardous
48 materials; and patient monitoring including basic monitoring of equipment, vital signs,
49 physical
50 signs and symptoms, and support equipment, and recognition of medical emergencies.

35 8. Specific Radiographic Procedures. Didactic instruction hours shall be a minimum of ten
36 (10) hours for podiatric permit, twenty (20) hours for vertebral permit, twenty (20)
37 hours for
38 cranium permit, twenty (20) hours for chest and thorax permit and forty (40) hours for
39 extremity
40 permit. Content shall include positioning (positions for specific imaging studies and
41 path of
42 central ray), patient instructions (removal of radiopaque objects, breathing
43 instructions), anatomy
44 and pathology (name and location of anatomical structures and terminology for
45 common medical
46 disorders), and technical factors (exposure factors, collimation, grids, automatic
47 exposure
48 control) for each of the following anatomic regions, depending upon the type of
49 limited permit:
50 a. Chest and thorax including routine posteroanterior (PA), anteroposterior (AP),
51 lateral, and apical lordotic;
52 b. Cranium including skull, paranasal sinuses, facial bones and nasal bones;
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54 1 c. Extremities including upper extremities (fingers, hand, wrist, radius/ulna, elbow and
55 2 humerus), lower extremities (toes, foot, ankle, calcaneus, tibia/fibula, knee/patella,
56 distal femur,
57 3 sacroiliac joints, sacrum and coccyx) and pectoral girdle (acromioclavicular joint,
58 scapula and
59 4 clavicle);
60 5 d. Podiatric including foot and ankle;
61 6 e. Vertebral column including cervical spine, thoracic spine, lumbar spine and scoliosis
62 7 series.
63 8 (c) The content shall include clinical practice assignments for which the applicable
64 permit
65 9 classification is sought. Minimum hours of clinical experience shall be a minimum of
66 one
67 10 hundred sixty (160) hours for chest and thorax permit, one hundred sixty (160) for
68 podiatric
69 11 permit, two hundred forty (240) hours for cranium and vertebral column permit, and
70 four
71 12 hundred eighty (480) hours for extremity permit.
72 13 (d) Clinical practice assignments must be an integral part of the content so that limited
73 x-ray
74 14 machine operators have the opportunity to develop competence in producing
75 radiographs.
76 15 Faculty supervision must be provided during a student's radiographic technique
77 experience.
78 16 Students must demonstrate competence in making diagnostically acceptable
79 radiographs prior to

17 their clinical practice where there is not direct supervision by faculty.
18 (e) Limited x-ray machine operators must demonstrate knowledge of radiation safety
19 measures before making radiographs and should demonstrate competence on
20 mannequins or
21 phantoms before making radiographs on patients. Radiographs on people must be
22 exposed for
23 diagnostic purposes and not solely to demonstrate techniques or obtain experience.
24 (f) The clinical experience should provide opportunity to produce a variety of
25 radiographs
26 within the appropriate anatomic region.
27 (3) Student Evaluation. Evaluation procedures must be developed to assess
28 performance and
29 achievement of didactic and clinical limited x-ray machine operator program
30 objectives.
31 (4) Faculty. All faculty conducting limited x-ray machine operator training must be
32 qualified
33 through experience and academic preparation in their respective subject matter. An
34 acceptable
35 faculty-to-student ratio shall be maintained in the clinical teaching environment to
36 achieve the
37 stated objectives of the content. Five years from the effective date of this act, all
38 faculty
39 conducting limited x-ray machine operator training must be a radiographer as defined
40 in Sec.
41 75.2.
42 (5) Facilities. Adequate radiographic facilities must be available to permit
43 achievement of the
44 limited permit x-ray machine operator training objectives. Educational laboratories
45 must meet
46 federal and/or state radiation and safety regulations. Equipment shall meet State and
47 Federal
48 laws related to radiation. Limited permit x-ray machine operators and students shall
49 wear
50 monitoring devices. Lead aprons must be placed to protect patients. Safe storage for
51 films must
52 be provided. Darkroom facilities and equipment must be available and of a quality that
53 assures
54 that films will not be damaged or lost.
55 (a) Learning resources related to the content and the profession shall be readily
56 available to
57 students.
58 (b) Financial resources for operation of the educational program shall be assured.
59 (D) Licensure/Permit
60 (1) Only eligible applicants who have passed the licensure examination shall be
61 licensed as
62 limited x-ray machine operators.

45 (a) Eligibility

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1 1. An individual shall have graduated from an accredited medical assistant program that
2 includes all of the requirements of Sec. 75.7(C) or an accredited or state-approved
3 limited x-ray

4 machine operator educational program.

5 2. An individual must meet such other requirements relating to limited permit x-ray
6 machine operation as the Secretary may prescribe.

7 (2) Licenses or permits shall be renewed at periodic intervals.

8 (3) A state may implement a temporary license program to allow individuals who have
9 met the

10 eligibility requirements, but have not yet obtained a license, to work for a reasonable
11 time.

12 (4) If no determination of the specific human anatomic areas that may be imaged by
13 limited x-ray

14 machine operators is made by the state issuing a license to perform limited x-ray
15 procedures,

16 limited x-ray machine operators will be permitted only to perform chest and thorax,
17 cranium,

18 extremity, podiatric and vertebral column radiography, excluding procedures
19 involving contrast

20 media, fluoroscopy and computed tomography.

21 (E) Examination

22 (1) A criterion-referenced examination in limited x-ray machine operation shall be
23 utilized to test

24 the knowledge and competencies of applicants; and

25 (2) The examination must include, but is not limited to, the following:

26 (a) Radiation protection

27 1. Patient protection;

28 2. Personnel protection;

29 3. Radiation exposure and monitoring;

30 (b) Equipment operation and maintenance

31 1. Components of radiographic unit;

32 2. Basic principles of x-ray production;

33 3. Recognition of malfunctions;

34 (c) Imaging production and evaluation

35 1. Selection of technical factors;

36 2. Imaging processing and quality assurance;

37 (d) Patient care

38 1. Legal and professional responsibilities;

39 2. Patient education, safety and comfort;

40 3. Infection control and prevention;

41 4. Patient monitoring;

42 (e) Specific radiographic procedures (positioning, patient instructions, anatomy and
43 pathology, and technical factors relevant to the permit being applied for)

44 1. Chest and thorax;

37 2. Cranium;
38 3. Extremities;
39 4. Podiatric; and
40 5. Vertebral column.

41

42 **Sec.75.8 Standards for bone densitometry equipment operators.** This section describes

43 basic elements to be incorporated in credentialing programs of States that allow persons to

44 perform bone densitometry procedures.

45 (A) Description of the Profession. The bone densitometry equipment operator is qualified by

46 education to perform examinations of spine, femur and forearm for the purpose of measuring

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1 bone mineral density and to perform vertebral fracture assessment for the purpose of assessing

2 vertebral fracture risk through the administration of external ionizing and nonionizing radiation

3 (B) Responsibilities of Personnel. Responsibilities include, but are not limited to, patient

4 assessment and instruction; equipment inspection; performance and interpretation of quality

5 control procedures; performance of lumbar spine, proximal femur and forearm bone

6 densitometry scans; analysis of scan results for accuracy; reproducing follow-up scan

7 positioning; and providing information related to bone health. He/she applies knowledge of

8 radiation safety regulations to limit radiation exposure of the general public, patient, fellow

9 workers, and self to as low as reasonably achievable (ALARA). The bone densitometry

10 equipment operator does not exercise independent discretion and judgment in the performance of

11 bone densitometry procedures.

12 (C) Educational standards

13 (1) Sponsorship. Sponsorship must be by an entity that assumes primary responsibility for the

14 planning and conduct of competency-based didactic and clinical training in bone densitometry

15 equipment operation.

16 (a) This responsibility must include: defining the content in terms of program goals,

17 instructional objectives, learning experiences designed to achieve goals and objectives, and

18 evaluation procedures to assess attainment of goals and objectives; coordinating classroom

19 teaching and supervised clinical experiences; appointing faculty; receiving and processing

20 applications for admission; and granting documents of successful program completion.

21 (b) The formal training in bone densitometry equipment operation should be a program for
22 bone densitometry equipment operators approved by the State entity responsible for approving
23 such programs.

24 (c) The sponsoring entity and the bone densitometry equipment operator training must be

25 approved by the State entity responsible for credentialing bone densitometry equipment

26 operators.

27 (2) Content. Bone densitometry equipment operator training must provide content, clinical and

28 didactic instructional time to assure competent performance, as provided in this section.

29 (a) The bone densitometry equipment operator content and learning experiences must
30 include the theoretical aspects of the subject as well as practical application of techniques. The

31 theoretical aspects should provide content necessary for bone densitometry equipment operators

32 to understand the critical nature of the radiological procedures they perform and of the judgments

33 they make as related to patient and operator radiation safety.

34 (b) The bone densitometry equipment operator content must include, but is not limited to,

35 content in the following four areas: osteoporosis and bone health; equipment operation and

36 quality control; patient preparation and safety; and scanning procedures of the lumbar spine,

37 proximal femur and forearm.

38 1. Osteoporosis and Bone Health. Didactic instruction shall be a minimum of one (1) hour.

39 Content shall include the definition and types of osteoporosis, bone physiology, risk factors,

40 bone mass measurement act, evaluation and diagnosis, prevention and treatment.

41 2. Equipment Operation and Quality Control. Didactic instruction shall be a minimum of

42 two (2) hours. Content shall include photon energies, types of equipment (e.g., single energy x43

ray absorptiometry (SXA), dual single energy x-ray absorptiometry (DXA), quantitative
44 computed tomography (QCT), and quantitative ultrasound (QUS)), pencil beam versus fan beam,

45 scan analysis algorithms, factors affecting accuracy and precision, equipment quality control,

46 maintenance and repair, and basic computer concepts.

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1 3. Patient Preparation and Safety. Didactic instruction shall be a minimum of one (1) hour.

2 Content shall include patient preparation and radiation safety.

3 4. DXA Scanning Procedures of the Lumbar Spine, Proximal Femur, and Forearm.

4 Didactic instruction shall be a minimum of four (4) hours. Content shall include: anatomy, scan

5 acquisition, analysis and printout, and problems related to positioning ROI (region of interest)

6 placement and analysis for each of the following anatomic regions:

7 a. Lumbar spine;

8 b. Proximal femur;

9 c. Forearm.

10 (c) The content shall include clinical practice assignments in bone densitometry.

Clinical

11 experience for a bone densitometry equipment operator permit shall include a minimum of 25

12 quality control phantom scans and 25 scans in each anatomic region identified in (C)(2)(b)4.

13 Forearm scans may be replaced with additional scans of the lumbar spine or proximal femur if

14 forearm software is not available.

15 (d) Clinical practice assignments must be an integral part of the content so that bone densitometry equipment operators have the opportunity to develop competence in producing

17 scans and reports. Faculty supervision must be provided during a student's bone densitometry

18 scanning experience. Students must demonstrate competence in producing diagnostically

19 acceptable scans prior to their clinical practice where there is not direct supervision by faculty.

20 (e) Bone densitometry equipment operators must demonstrate knowledge of radiation safety

21 measures before making scans on patients. Bone densitometry scans on people must be exposed

22 for diagnostic purposes and not solely to demonstrate techniques or obtain experience.

23 (f) The clinical experience should provide opportunity to produce scans within each 24 anatomic region.

25 (3) Student Evaluation. Evaluation procedures must be developed to assess performance and

26 achievement of didactic and clinical bone densitometry equipment operator program objectives.

27 (4) Faculty. All faculty conducting bone densitometry equipment operator training must be

28 qualified through experience and academic preparation in their respective subject matter. An

29 acceptable faculty-to-student ratio shall be maintained in the clinical teaching environment to

30 achieve the stated objectives of the content. **Faculty must be...**

31 (5) Facilities. Adequate radiographic facilities must be available to permit achievement of the

32 bone densitometry equipment operator training objectives. Energized laboratories must meet

33 federal and/or state radiation and safety regulations. Equipment shall meet State and Federal

34 laws related to radiation. Bone densitometry equipment operators and students shall wear

35 monitoring devices.

36 (a) Learning resources related to the content and the profession shall be readily available

37 to students.

38 (b) Financial resources for operation of the educational program shall be assured.

39 (D) Licensure/Permit

40 (1) Only eligible applicants who have passed the licensure examination shall be licensed as bone

41 densitometry equipment operators.

42 (2) Licenses or permits shall be renewed at periodic intervals.

43 (3) A state may implement a temporary license program to allow individuals who have met the

44 eligibility requirements, but have not yet obtained a license, to work for a reasonable time.

45 (E) Eligibility

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1 (1) An individual shall have successfully completed a bone densitometry equipment operator

2 educational program that includes all of the requirements of Sec. 75.8(C) and is a state-approved

3 bone densitometry equipment operator educational program.

4 (2) An individual must meet such other requirements relating to bone densitometry equipment

5 operation as the Secretary may prescribe.

6 (F) Examination

7 (1) A criterion-referenced examination in bone densitometry equipment operation shall be

8 utilized to test the knowledge and competencies of applicants; and

9 (2) The examination must include, but is not limited to, the following:

10 (a) Osteoporosis and bone health

11 1. Bone physiology;

12 2. Evaluation and diagnosis;

13 3. Risk factors, prevention and treatment;

14 (b) Equipment operation and quality control

15 1. Types of equipment (e.g., single energy x-ray absorptiometry (SXA), dual single energy
16 x-ray absorptiometry (DXA), quantitative computed tomography (QCT), and
quantitative
17 ultrasound (QUS);
18 2. X-ray production
19 3. Pencil beam versus fan beam;
20 4. Scan analysis algorithms;
21 5. Factors affecting accuracy and precision;
22 6. Equipment quality control and maintenance
23 7. Basic computer concepts
24 (c) Patient Preparation and Safety
25 1. Patient education, safety and comfort;
26 2. Patient history and documentation;
27 3. Radiation safety;
28 (d) Bone densitometry procedures (anatomy, scan parameters, positioning, region of
interest,
29 analysis and printout)
30 1. Lumbar spine;
31 2. Proximal Femur;
32 3. Forearm.
33
34 *END.*