MEDICAL FLUOROSCOPY – ALASKA (2008)
Approved 10 Hour Course

The requirements for fluoroscopy-specific training for all operators of medical fluoroscopes in Alaska may be met in a variety of ways, as long as the entire contents of this course outline are included, and the instruction is conducted by a qualified individual. A person qualified to conduct this course may include a physician Board Certified by the American College of Radiology, a physicist "qualified expert", or a fluoroscopy credentialed Radiologic Technologist. There are approved on-line courses that meet the ten hour training requirement without requiring travel out of the local community. There are on-site courses available in various locations throughout the U.S. for those with a desire to travel, or for whom travel outside Alaska may be advantageous. In addition, the Department of Health and Social Services may offer the training on an on-demand basis at limited sites within the state of Alaska, particularly in Anchorage, Fairbanks, Juneau and on the Kenai Peninsula if suitable alternatives become unavailable. The course may be completed in one and a half days over a single weekend, or in shorter units of time extended over several days or weeks.

MINIMUM COURSE CONTENTS

- Introduction, rationale, justification for fluoroscopic specific training
- Definition of medical fluoroscopy
- Medical applications of fluoroscopy
- National[FDA]/state fluoroscopy standards
- Kinds of medical fluoroscopes
- Radiation physics principles
- Units of measurement, and methods for measuring exposures
- Radiation output characteristics of medical fluoroscopes, with and without a patient
- Machine calibrations and iso-exposure curve measurements
- Review of the [specific state] regulations for operation of a medical fluoroscope
- Acquisition of knowledge of fundamental radiation safety principles
- Demonstration of the practice of radiation safety principles specifically applicable to the fluoroscope
- Fluoroscopic techniques for performing diagnostic examinations using a medical fluoroscope
- Radiation monitoring during fluoroscopy
- Documentation of radiation exposures / exposure calculations
- Radiobiological effects of ionizing radiation
- Long term and short term biological radiation effects
- Radiation incident reporting requirements
- Relative radiation exposures to patients, operators and the public during fluoroscopy
- Methods for minimizing radiation exposure during medical fluoroscopy
- Operational health concerns beyond radiation exposure
- C arm fluoroscopy – high dose and low dose radiation characteristics
- Machine specific characteristics of safety considerations
- Radioprotective gear for operators of medical fluoroscopes
- Quality assurance and maintenance of medical fluoroscopes
- Final written examination
- Practical examination additional assessment
- Documentation of completion of the fluoroscopy requirement

Resources for further study (FDA, JCAHO, NCRP, CRCPD, ACR, ACC, AAPM)

A portion of the course requirements may be met by hands-on operation of a fluoroscope under the direct supervision of a *fully qualified* individual, on a case-by-case basis if all the theoretical concepts are included in the instruction. A prospective provider may submit an application to offer the ten hour fluoroscopy course if the planned presentation meets all criteria of 7 AAC 18 and has been reviewed by the Department.

The major publication that should be used as a reference for insuring the minimum information is obtained is AAPM Report No. 58, Managing the Use of Fluoroscopy in Medical Institutions.

MEDICAL FLUOROSCOPY – MINIMUM SUGGESTED COURSE OUTLINE
10 hours minimum

I. Introduction, rationale, justification for fluoroscopic specific training, course goals
   a. Physics of radiology
      i. Periodic table - Chemical properties, isotopes
      i. Structure of the atom – Energy, particulate, shell structure, binding energy, K edge
      ii. Electromagnetic radiation – spectrum, wavelength, frequency relationships
      iii. Nuclear transformations, radioactive decay, comparing x-rays, gamma rays, others
      iv. Interactions of radiation with matter – Photoelectric, Compton scattering
      v. Quantifying radiation - Radiation units – classical, international (metric)
      vi. Methods for measuring exposures
   b. Definition of medical fluoroscopy
   c. Kinds of medical fluoroscopes
   d. Terminology definitions pertinent to medical fluoroscopy - *

II. Radiation output characteristics of medical fluoroscopes, with and without a patient
   a. mA, mAs, fluoro time, kVp, cumulative timing
   b. Machine calibrations and isoexposure/isodose curve measurements
   c. Presence of assistants, non-imaging staff, others in room during imaging
   d. Holding patients

III. Review of the Alaska regulations for operation of a medical fluoroscope
   a. Acquisition of knowledge of fundamental radiation safety principles
   b. Controlled/restricted/limited access areas, signs and labeling
   c. U.S. F.D.A. standards
   d. Safety rules provided in writing – Preparation, distribution, documentation
   e. Exclusions/exemptions
   f. Radiation incident reporting requirements
   g. Penalties for operation by unqualified persons
   h. Other national and state fluoroscopy related standards

IV. Fluoroscopic techniques for performing diagnostic examinations using a medical Fluoroscope in Patient applications
   a. Generator types, last image hold, ABC, AEC, HLC, vignetting
   b. Eye physiology, formation of image on monitor, resolution vs. detail, integration time
   c. Cine – framing techniques, stepping, pulsed fluoroscopy
   d. Digital fluoroscopy
   e. Image quality and quantum mottle
   f. Radiographic grids
   g. CT angiography
   h. Motion/mobility studies
   i. Ambient lighting, viewing factors
   j. Demonstration of the practice of radiation safety principles specifically applicable to the fluoroscope
   k. Magnification and dose

l. Contrast media

V. Radiation monitoring during fluoroscopy
   a. Documentation of radiation exposures / exposure calculations
   b. Inverse Square Law (ISL) – applications and limitations
   c. Personnel monitoring devices and record keeping requirements
      i. Declared pregnant woman
      ii. Fetal exposure
   d. Cumulative timer operation and recording exposures
   e. ALARA

VI. Radiobiological effects of ionizing radiation
   a. Bergonié and Tribondeau, Law
   b. Linear and non-linear hypotheses, regulatory framework
   c. Long term and short term biological radiation effects
      i. Stochastic (probabilistic) , non-stochastic (deterministic)
   d. Relative risks
   e. Latent effects
   f. Population size, individual idiosyncrasies, genetic effects

VII. Relative radiation exposures to patients, operators and the public during fluoroscopy
   a. Methods for minimizing radiation exposure during medical fluoroscopy
   b. Operational concerns beyond radiation exposure
   c. Where to stand relative to x-ray tube and fluoroscope
   d. List comparative exposures in medical imaging, comparative non-radiation risks

VIII. "C" arm fluoroscopy – high dose and low dose radiation characteristics
   a. Machine specific characteristics of safety considerations
   b. FDA exception and limitations of exception
   c. "Non" radiation workers in operation area
   d. Shielding
   e. Cone removal

IX. Radiation Protection during fluoroscopy
   a. Public health perspective, personal perspective, genetically significant exposures
   a. Radioprotective gear for operators of medical fluoroscopes – Selection, use, care
   f. Shielding – structural, mobile, aprons/drapes, gloves, thyroid collar, goggles
   g. Gonad shielding, bucky slot cover, spot device apron,
   h. Air kerma design factors
   i. Low absorption table top
   j. Source-panel- distances
   k. Exposure limits
   l. Testing protective apparel

X. Quality assurance and maintenance of medical fluoroscopes
   a. Filtration and Half value layer measurement

b. Collimation, shutter alignment
c. Image intensifier/screen linkage
d. Radiation output measurement
e. Spot devices and overhead filming, Positive Beam Limitation
f. Fluoro timer operation
g. Tube leakage
h. Dead man switch

Documentation of completion of the fluoroscopy requirement
Resources for further study (FDA, JCAHO, NCRP, CRCPD, ACR, AAPM, ACC)

RECOMMENDED

Final written examination - (Pass/Fail)
Practical examination additional assessment