Occupational Health Hazards in the Interventional Laboratory: Progress Report of the Multispecialty Occupational Health Group

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The Multispecialty Occupational Health Group (MSOHG), formed in 2005, is an informal coalition of societies representing professionals who work in, or are concerned with, interventional fluoroscopy. The group's long-term goals are to improve occupational health and operator and staff safety in the interventional laboratory while maintaining quality patient care and optimal use of the laboratory. MSOHG has conducted a dialogue with equipment manufacturers and has developed a list of specific objectives for research and development. The group has also represented the member societies in educating regulators, in educating interventionalists, and in fostering and collaborating on research into occupational health issues affecting interventionalists. Not least of the group's accomplishments, as a result of their collaboration in MSOHG, the group's members have developed a mutual respect that can serve as a basis for joint efforts in the future among interventionalists of different medical specialties.

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Abbreviations: IAEA = International Atomic Energy Agency, MITA = Medical Imaging and Technology Alliance, MSOHG = Multispecialty Occupational Health Group

THE Multispecialty Occupational Health Group (MSOHG) is an informal coalition of societies representing professionals who work in, or are concerned with, interventional fluoroscopy laboratories.

The MSOHG was formed in 2005 to address the occupational hazards of interventionalists, with particular emphasis on the radiation-related and orthopedic hazards. The genesis of the group was a meeting, suggested and facilitated by Stephen Balter, PhD, of representatives of the Society for Cardiac Angiography and Interventions, the Heart Rhythm Society, and the Society of Interventional Radiology (SIR) on May 27, 2005, in Bethesda, MD. The purpose was to discuss occupational health issues common to interventional cardiologists and interventional radiologists.

The participants at the initial meeting concluded that a combined effort by multiple professional societies was more likely to succeed than individual efforts, and that common ground existed among the various groups of medical professionals. Subsequently, other professional societies were invited to join the group. At present, the member societies are the American Association of Physicists in Medicine, the American College of Radiology, Heart Rhythm Society, Society for Cardiac Angiography and Interventions, SIR, the Society of Invasive Cardiac Professionals, and the Society of NeuroInterventional Surgery. The long-

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None of the authors have identified a conflict of interest.

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Table
Occupational Health and Safety Issues and Goals for the Design of Interventional Fluoroscopy Equipment and Suites

1. **Occupational Radiation Dose**
   a. Reduce or eliminate scatter from the patient.
2. **Ergonomic Design Issues**
   a. The interventionalist's spine needs to be maintained in a neutral position.
   b. Ceiling-mounted shields/other equipment-mounted shields are intrusive and inconvenient.
   c. The need for protective eyeglasses should be eliminated.
   d. The need for protective thyroid collar should be eliminated.
   e. Minimize the weight of, or eliminate, lead aprons.
   f. Minimize head rotation for viewing monitors.
   g. Greater range of adjustment of table height needed to allow for variability in physical characteristics of the physician.
   h. Need to be able to get closer to the patient's side at all points along the patient.
   i. The design of fluoroscopic equipment needs to permit reaching supplies and equipment in a manner that minimizes stress on the physician and assistant (eg, twisting backward or to the side).
   j. Manual aspect of panning the table needs to be improved; the manual effort of moving the table needs to be minimized.
   k. Equipment controls need to be ergonomically placed for physicians of differing arm lengths.
   l. Designs that allow physicians to work from a sitting position with no increase in occupational radiation dose need to be considered.
   m. Improved methods for patient transfer onto and off of the procedure table need to be worked out.
3. **Safety Hazards**
   a. Eliminate tripping hazards.
   b. Concern about hitting ceiling-mounted or ceiling-suspended objects.
4. **System Design Issues**
   a. Minimize the number of pieces of equipment that need to be individually positioned (eg, radiation protection shielding, surgical lights, ceiling shield, monitor); ideally, these should move automatically with system-preprogrammed angles of the C-arm and all other equipment.
   b. Ergonomic design of, number of, and difficulty in distinguishing among foot pedals.
   c. Most equipment is designed for optimal use from only one side of the patient-support table; need to be able to work from both sides of the table with equal ease.
   d. Architectural design of room layouts should improve ergonomics and address issues listed above.

term goals of the group are to allow operators and staff to work a full career with minimal occupational radiation exposure and without incurring orthopedic injuries, and to improve operator and staff safety while maintaining optimal use of the interventional laboratory and quality patient care.

A position paper on occupational health issues in interventional medicine was published in 2009 in cardiology and radiology journals (1). This article reviewed available data on the prevalence of occupational health risks and concluded that sufficient data existed to demonstrate that the interventional laboratory presents workplace hazards that must be acknowledged, better understood, and mitigated to the greatest extent possible.

WORK WITH MANUFACTURERS

The MSOHG cannot specify particular modifications in equipment or laboratory design, as we do not have the expertise or authority to do so. Because achieving the MSOHG's goals requires changes in the ways interventional laboratories are configured and improvements in the fluoroscopic equipment used in these laboratories, it was clear to us that direct conversations with the manufacturers of this equipment were essential. To avoid the possible appearance of favoritism, and to make sure that a consistent message was delivered to all manufacturers of this equipment, MSOHG representatives met with the Medical Imaging and Technology Alliance (MITA), a division of the National Electrical Manufacturers Association, in October 2008. MITA represents medical imaging equipment manufacturers, innovators, and product developers whose sales comprise more than 90% of the global market for medical imaging technology. The meeting was attended by representatives from MITA, General Electric, Philips, Siemens, and Toshiba. At this meeting, it became clear that the manufacturers needed a prioritized list of specific objectives, more details about the issues involved, and some assurance that, as a group, interventionalists would support the effort by recommending purchase of equipment that met these objectives. As a representative from one manufacturer put it, "If we develop technologies that reduce dose to the patient and the operator, but nobody buys it, does it matter?"

MSOHG representatives met with MITA again at National Electrical Manufacturers Association headquarters in January 2009 to develop a list of specific objectives. MITA distributed the list (**Table**) to the relevant manufacturers. At a subsequent meeting in November 2009, the MITA representative reaffirmed his organization's commitment to working with the MSOHG. A representative from one manufacturer reported that his company had used information from earlier meetings, and specifically the list in the **Table**, to prioritize its research and development initiatives. A representative from another manufacturer made the same statement to an MSOHG representative after the meeting. Because of sales, marketing, and regulatory concerns, none of the manufacturers could discuss