



The Society for Cardiovascular Angiography and Interventions

SCAI President's Page

Occupational Hazards for Interventional Cardiologists

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Members of the Joint Inter-Society Task Force on Occupational Hazards in the Catheterization Laboratory

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As I have done several times in the past, this month I invited a member of the Society, Dr. James Goldstein, to participate in the development of this President's Page. For the past several years, Jim has been one of the key individuals involved in an effort to define better the occupational risks associated with working in a cardiac catheterization laboratory. This effort has steadily gained momentum, now involves several other professional societies, and has led to the formation of the Joint Inter-Society Task Force on Occupational Hazards in the Catheterization Laboratory. If you work in a cardiac catheterization laboratory, and would like to continue for your entire career, the efforts of this task force are of considerable importance to you. For this reason, I am highlighting their activity in this President's Page.

The intense and demanding work environment of an interventional cardiologist imposes several potential

risks to our health. The hazards of accumulated radiation exposure have been known for years, but the other potential risks have been ill-defined and under-appreciated [1–3]. The physical stresses inherent in this career choice also appear to be associated with a predilection to orthopedic injuries, attributable in great part to the

[†]Dr. Goldstein discloses a relationship with a company working on radiation protection systems, thereby constituting a potential conflict of interest.

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cumulative adverse effects of bearing the weight of leaded apparel [4]. All of us likely know of a colleague with chronic back or neck problems who had to “retire” from wearing lead, but the prevalence of such health problems was never clearly defined. In 2004, Goldstein et al. published the results of a survey conducted by the Interventional Committee of the Society [5]. The results should be disturbing, especially for those young in the field.

The Epidemic of Orthopedic Complications

Although one often walks out of the catheterization laboratory after a busy day feeling internal satisfaction over a job well done, standing for long hours bearing the weight of a heavy lead apron is a strain, especially on the spine, back, and neck. Not uncommonly such injuries cause considerable pain, missed days of work, surgery, or in some cases, curtailed careers. Observational studies indicate the occupational risk involved in the practice of interventional medicine, particularly with regard to orthopedic problems [6,7]. Prior authors have called attention to a distinct occupational hazard labeled “interventionalists disc disease” [4], attributing these spinal orthopedic injuries to the cumulative effects of wearing leaded aprons and poorly designed catheterization laboratory environments that promote awkward ergonomic postures (e.g., monitors placed in awkward viewing positions and not in the natural line of sight).

In the 2004 SCAI survey, nearly half of the 424 respondents reported spine problems [5], an incidence dramatically higher than the 2.3% incidence of chronic back conditions in standard populations [8]. Of those reporting spine problems, 70% were in the lumbosacral and 30% in the cervical area. Over one third indicated their spine problems had caused them to miss work. One fourth of the respondents reported problems related to their hips, knees, or ankles. The survey also found a significant relationship between the number of years worked in the cardiac catheterization laboratory and the incidence of spine problems. Physicians who had logged ≥ 21 years in the lab after fellowship reported an alarming 60% incidence of spine problems compared with 26% who were working < 5 years after completing fellowship. Although these data could be subject to reporting bias in that those affected by orthopedic problems are more likely to respond to such a survey, other survey data collected from radiologists suggest we are not alone [6,7]. Furthermore, compared with orthopedic surgeons who occasionally wear a leaded apron and rheumatologists who do not wear lead, invasive cardiologists have a greater incidence of spine problems [4].

Radiation-Related Health Illnesses: Implicit but Poorly Defined Risks

Also of great concern to physicians performing invasive procedures requiring X-ray exposure are the potential adverse effects of occupational radiation exposure, which may over time be associated with an increased incidence of cataracts and cancers [1,2,9]. Extrapolating from basic principles of radiation safety that link the likelihood of disease to the extent of cumulative radiation exposure, it might be expected that physicians exposed to radiation in their work environment in the present era would be at substantially higher risk of such illnesses. Compared with diagnostic catheterization alone, coronary interventions last longer, frequently require the use of imaging views that are unfavorable for operator exposure, and thus require the use of more radiation. Concerns over radiation exposure to the modern interventional cardiologist were elegantly articulated by Dr. David Clark [10], who wrote: “There is ongoing concern about how experienced interventionalists and younger ones with long careers ahead of them can avoid the potential ravages of X-ray exposure. On a monthly, yearly, and lifetime basis, how much radiation exposure is acceptable, and how much radiation exposure puts an individual at increased risk of which complications?” Most important, he asked the following question: “At what lifetime level of exposure should one consider retiring from laboratory practice in order to diminish the chance of radiation illness?”

Unfortunately, data on radiation health hazards and present policies regarding acceptable exposure levels are based on limited data predominantly accrued during the “low-volume, lesser-radiation exposure” era when only diagnostic catheterization was performed. At present, there are no data on the long-term health effects of cumulative radiation exposure in the higher-volume, increased-radiation exposure interventional era. SCAI’s survey of members was inconclusive on the risks related to radiation-associated problems [5]. Potential radiation-related illnesses reported in the survey included cataracts in 5% and any cancer in 6% of the respondents. A history of nephrolithiasis was reported in 8% of those responding to the survey. Further comparative and longitudinal studies will be necessary to determine whether there is an increased incidence of radiation-related complications in interventional proceduralists.

Future Directions: Defining the Problems and Designing Solutions

These findings, which indicate a significant occupational hazard that extracts a toll on physicians’ health,

have resulted in a "call to action" by specialty societies representing those working in cardiac catheterization laboratories and other areas with substantial levels of radiation exposure. These occupational health concerns pertain not only to those performing coronary interventions, but also to electrophysiologists, the other specialties working with fluoroscopy for peripheral and neurovascular interventions, pain management specialists performing nonvascular fluoroscopic procedures, and the many support personnel working with us in these environments. It was the recognition of these issues that led SCAI to be a cofounder of the Joint Inter-Society Task Force, whose main initial goal is to clarify the magnitude and impact of these occupational health concerns. Other member organizations include the Society of Interventional Radiology (SIR), Heart Rhythm Society (HRS), American College of Cardiology (ACC), the American Society of Interventional and Therapeutic Neuroradiology (ASITN), and the Society of Invasive Cardiac Professionals (SICP). The Inter-Society Task Force is collaborating with experts in occupational health from the National Institutes of Health and the Radiation Epidemiology Branch of the National Cancer Institute to perform epidemiologic studies addressing the fundamental questions that are important to all those working in such an environment. These include:

- What is the true incidence of orthopedic and radiation-associated problems?
- What are the mechanisms contributing to orthopedic problems (leaded aprons, working in an upright position, non-ergonomic equipment designs, etc.)?
- Are there individual operator factors associated with development of orthopedic and radiation-associated problems (number of cases per year over a career, laboratory risk factors such as shielding and lab designs)?

Making the Catheterization Laboratory a Safer Work Environment

The evolution of interventional cardiology has required industry to keep pace with substantial improvements in the imaging chain, many of which have the potential to lower our exposure to ionizing radiation. However, during the past 30 years, there have been few developments in the other aspects of cardiac catheterization laboratory design, particularly with regard to innovations focused on the safety and comfort of the operators and staff. Clearly, there is a substantial need for such innovations designed to minimize radia-

tion exposure and reduce the incidence and severity of orthopedic complications. If the same ingenuity has led to some of the incredible innovations that have transformed the practice of interventional medicine can be applied to enhancing workplace safety, then the daily job of an interventional cardiologist would undoubtedly be more comfortable and healthier.

In the coming months, you will likely hear more about the efforts of the Joint Inter-Society Task Force and may even be contacted to participate in the next round of data collection. Every day, I receive several requests for information or my opinion about some product. Like you, I suspect many of these last only until I locate the delete key or wad up the mailing and attempt a 3-pointer into the trash can. However, I urge you to watch carefully for material from this task force. Sadly, it may already be too late for some of our colleagues to avoid the occupational hazards we now appreciate. Let's all now commit to working together to make our working environment better for those who will follow us.

Please send your thoughts and ideas to me at president@scai.org. Dr. Goldstein and I would be grateful to hear from you on this important topic.

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