

How big an occupational problem is spinal disease among interventional cardiologists, and what steps has your institution implemented to deal with it?



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All individuals working within an interventional laboratory are exposed to unique occupational risks. Despite years of anecdotal reports of occupational health-related issues both from radiation and the protective measures required to work in this environment, better documentation of these risks is still needed. The Society for Cardiovascular Angiography and Interventions (SCAI) initiated a multispecialty occupational health group to assist in this effort. The initial survey published from this group in 2004 reported significant orthopedic issues, including 42% with spine problems (70% lumbosacral and 30% cervical) and hip, knee, or ankle problems in 28% of operators. A recently completed updated multispecialty occupational health group survey of SCAI members regarding orthopedic disease will be published in 2015.

Methods available to date to address these orthopedic injuries have been more operator/physician based than staff directed. These include robotic techniques and nonweight-bearing personal lead shielding; however, despite their availability, utilization has been limited. The expense of these newer modalities should be taken in the context of potential operator benefits. Expanded technologies for protection of the entire staff will also need further development.

Quality improvement programs, a prerequisite for any interventional laboratory, should include all aspects of radiation safety for the patients and the operator/staff.

Although government oversight has its limitations, workplace safety has seen advances with government involvement. The potential limitations of government oversight should encourage our profession to self-regulate.

In our facility, radiation safety is a component of our laboratory's quality improvement program. This follows the 2011 SCAI publication¹ on establishing a radiation safety program for the cardiac catheterization laboratory, for which I was lead author. Radiation dose management is practiced from the outset of the procedure, with best practices in radiation safety taught to operators and staff with annual updates; however, the emphasis on lessening orthopedic injury to operators and staff has been limited. The opportunity to write this guideline has allowed me to consider the following recommendations for best practices:

- Maximize personal protection with the best-fitting, lightest lead. Two-piece lead, 3/34 lead should be tailored to the operator and staff, as appropriate to one's role in the laboratory. Eye protection with lightest equivalent 0.25-mm lead with side shielding should be properly fitted.
- Encourage best practices for table height. Although the image receptor should be kept the closest to the patient, table height should ideally be at the orthopedically best height for the operator.
- Recognize the risk of orthopedic injury in our profession. Proactive measures, such as preventative exercises may decrease injury, with pain treated early on by appropriate physical therapy intervention.
- Available options to decrease radiation exposure without the orthopedic issues from protective gear should be made available to the operator and staff regardless of cost.

- Professional societies should lead efforts in this area directed to protect the operator and staff.
- Significant efforts over the past decade have produced a dramatic reduction in patient dose from invasive cardiac procedures. Similar efforts should now be focused on the reduction of physician and staff orthopedic injury from radiation protective attire.



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The occupational risks associated with radiation exposure and the protective gear that interventional cardiologists wear while performing procedures pose a significant health hazard.² Although new methods and techniques have emerged over the past few years to limit radiation exposure, less has been accomplished in ameliorating the orthopedic injuries consequent to wearing protective gear.

A study we conducted in 2004³ demonstrated a substantial incidence of orthopedic illnesses. There was a strong correlation between the frequency of orthopedic problems and years of practice, as well as between spinal complaints and annual procedural volume. Orthopedic injuries included spinal problems in 42% (70% lumbosacral and 30% cervical). Additionally, 60% of physicians with > 20 years of experience reported having spinal problems. More than one-third of the survey participants also reported that they missed work due to spinal injury.

A follow-up survey by SCAI was conducted this year, a decade after the initial study. The preliminary results, which are unpublished at this time, suggest that 49% of active interventional operators have at least one orthopedic injury, a finding that is annual case volume and age dependent.

The most important question concerning occupational hazards is whether enough is actually being done to protect interventionists. Despite advances in shielding, with table- and ceiling-mounted shielding standard in all procedure rooms, the latest survey demonstrates that the prevalence of orthopedic problems, particularly spinal problems, in interventionists today is even higher than a decade ago. The implications regarding cath lab staffing and training, as well as optimizing health care delivery to patients, is substantial.⁴

In my institutions, we are using very lightweight leaded “aprons” that take advantage of placing weight on the hips and not the shoulders. All operators must use leaded goggles. There are extra lead skirts attached to the C-arm to protect the operators. The use of table drapes and ceiling-hung barriers are mandatory, and the staff requests the operator to utilize them (loudly, if necessary). Some are using lead hats, but I have not personally. We are also looking into the financial viability of robotic-assisted intervention. ■

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3. Goldstein JA, Balter S, Cowley M, et al. Occupational hazards of interventional cardiologists: prevalence of orthopedic health problems in contemporary practice. *Catheter Cardiovasc Interv*. 2004;63:407-411.

4. Klein LW, Miller DL, Goldstein J, et al, on behalf of the members of the Multispecialty Occupational Health Group. The catheterization laboratory and interventional vascular suite of the future: anticipating innovations in design and function. *Catheter Cardiovasc Interv*. 2011;77:447-455.