STANDARDS OF PRACTICE

# Society of Interventional Radiology Position Statement: Staffing Guidelines for the Interventional Radiology Suite

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## ABBREVIATIONS

ASA = American Society of Anesthesiologists, CQI = continuous quality improvement, FTE = full-time equivalent, RN = registered nurse

## INTRODUCTION

Although the risk of adverse events from image-guided and interventional radiologic procedures is low, adverse events do occur, and there is evidence that inadequate resources and staffing can be associated with poorer outcomes (1–4).

There is a paucity of guidelines on the necessary components of a successful IR program (5). The intent of the present document is to provide reference guidelines for the requirements for safe operation of IR suites* in terms of appropriate staffing from patient intake to discharge (including pre-, peri-, and postprocedure requirements). In centers with a greater proportion of higher-complexity cases and/or patients at higher risk (eg, American Society of Anesthesiologists [ASA] status 3/4), there may be a need for additional staffing resources.

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*Note that "interventional radiology suite" is used throughout rather than "angio suite," as it more accurately reflects the greater breadth of procedures performed in these suites; however, the equipment, including use of a power injector, is equivalent.



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These guidelines are based on the best available literature, including societal guidelines. When information is unavailable, the document relies on expert consensus. Site-specific variations may depend on case complexity, volume, local expertise, and realistic availability of resources. Nevertheless, four guiding principles should be respected:

a) The primary consideration is patient safety. The staffing resource requirements must first serve the goal of safety.

b) Resources and protocols for the management of unanticipated escalations in case complexity (or complications) must be in place. Sites should have the capability to manage an acute, unexpected escalation in the complexity of a given case, as well as a sudden increase in emergent referrals, or have developed a process (including a transfer agreement) to have these cases transferred emergently to a facility that can more appropriately manage the patient. Policies and benchmarks should be established to define and measure expected response times for accessing required resources for patient care and routinely assessed as part of a regular quality improvement program. Referral relationships to larger and better-equipped facilities should be also defined and established as necessary to manage the potential need for escalation of patient care needs beyond the scope of the institution.

c) Budgetary expense considerations should not be the only factor that dictates the decision to provide funding for appropriate staff resources to provide a consistent and appropriate level of care in the IR suite (6). Rather, patient and staff safety and satisfaction should always be the top priorities, and factors such as prevention of patient harm, cost savings associated with a reduction in adverse events, more timely access to needed acute therapies, reductions in hospital lengths of stay, and improvement in professional staff engagement and gratification should also be strongly considered.

d) There should be a clear plan for volume growth and expansion of the IR program as the breadth of types of IR procedures (eg, ref. 7) and volume of existing procedures grow.

IR physician and staff training and competency are an integral component of any successful IR program. Consistent, trained staff familiar with the standards of practice and particular care of patients undergoing a spectrum of IR procedures is crucial. IR staff members work as a team and are not interchangeable with nurses from other floors in the hospital or technologists from other areas in radiology. The majority of the issues relevant to these topics will not be addressed

by the present document, as they have been discussed elsewhere (eg, ref. 8). However, quality improvement and quality assurance programs examining patient safety and outcomes should be incorporated into a continuous quality improvement (CQI) program (9,10).

At the end of each section of this document, specific recommendations are provided based on the consensus of the authors.

## PREPROCEDURE AND RECOVERY

Staffing in the preprocedure and recovery rooms requires sufficient clerical, nursing, and ancillary staff. Clerical staff facilitate timely patient preparation, transfer, and discharge, as well as communication with clinical staff (within and outside of the department). A clinical coordinator/scheduler should have a level of content expertise, ie, familiarity with IR procedure care and related patient issues, so that patients, families, and referring clinicians' questions and procedure requests can be efficiently handled. Centralized operative or radiologic scheduling is typically a poor solution for IR settings because of the complexity and variety of IR interventions and add-on volumes. The coordinator can also offer other benefits such as staff timekeeping and scheduling and quality improvement initiatives.

Nursing staff are crucial in the care of critically ill patients, and may include registered nurses (RNs), nurse practitioners, licensed practical nurses, registered practical nurses, and/or medical assistants. Nursing staff must meet jurisdictional regulatory requirements, including those of moderate sedation and basic and advanced life support. Precise nurse-to-bed ratios are difficult to prescribe to assure the primary consideration of patient safety (6). Joint Commission standards must be complied with, particularly regarding moderate sedation and the provision of anesthetic agents.

In some practices, preprocedure and recovery room nurses are the same nurses caring for patients during their procedures. Therefore, case mix will impact the number of full-time equivalents (FTEs) of nurses required. Practices with a greater proportion of critical- or intensive-care patients or pediatric patients may require a higher nurse-to-patient ratio (11). In the example of pediatric patients, there should be at least one, and preferably two, nurses trained in postsedation or postanesthetic recovery per patient (12). Pediatric Advanced Life Support certification is required for nurses providing pediatric sedation and postanesthesia care. General guidelines recommend a nurse-to-patient ratio in the preprocedure/recovery area in an adult-based practice of one nurse to three patients. This number is in addition to those needed to provide patient care in the IR procedural suites. When the adequate number has been determined, it can be multiplied by a factor of 1.2–1.8 FTEs per staff position to account for staff vacations, sick time, and educational leaves (11). The nursing FTE staffing should also be sufficient to provide on-call coverage as specified by the clinical service.

Nurses should receive specific training in the full spectrum of IR procedures offered by the respective practice, including indications for procedures, expected postprocedural signs and symptoms, and potential adverse events. The nurses should maintain basic life support and Advanced Cardiac Life Support certification, similar as required in cardiac catheterization suites (13).

Staff burnout and overworking are related issues that are associated with increased medical errors (14–18). There should be attention to ensuring appropriate staffing levels and adequate time off between working days. For example, the Association of periOperative Registered Nurses states that perioperative RNs should not work in direct patient care for greater than 12 consecutive hours in a 24-hour period, and not greater than 60 hours in a 7-day workweek (6). Although similar guidelines may be difficult to follow for IR physicians, primary consideration must be made to ensuring patient safety.

Required ancillary staff includes environmental-services staff and transportation porters. Room turnover time is a key component of patient safety as well as operational efficiency. Efficient, dedicated cleaning staff and transportation staff are required to manage the patient flow within the IR section. Complex IR equipment will typically require cleaning by the technologists. If these ancillary services are not staffed appropriately, additional FTEs for staff to support these functions should be allotted. These types of functions are often overlooked, and the responsibilities are too often required of technologists, nurses, and physicians without consideration for the added time necessary. Adequate support for environmental services and transportation impacts patient safety and infection control (19). Although prescribing specific staffing quotas is difficult given the heterogeneity of programs and recognition that nurses and technologists may also serve non-IR areas, as well as the conditions of patients and acuity of cases, adequate staffing is essential for providing the safest patient-care environment and optimizing the use of valuable resources such as the staff, physicians, expensive technology, and space. Research has demonstrated that staffing levels can be optimized by incorporation of staffing needs into a CQI program (9). Use of lean methods (20) may equally prove of value.

### Recommendations

1. A general guideline of required nursing complement in the preprocedure/recovery areas is one nurse to three patients, in addition to the nursing staff complement required in the IR suites.
2. When a nurse-to-bed ratio has been determined, this number should be multiplied by a factor of 1.2–1.8 FTEs per staff position to account for staff vacations, sick time, and educational leaves.
3. Staffing levels should ideally be optimized by incorporation of staffing needs into a CQI program.

## IR SUITE

Staffing of the IR suite itself requires one or more interventional radiologists, nurses, radiology technologists, and ancillary staff. Staffing is guided by patient safety and resource efficiencies. A recent survey of interventional radiologists (5) revealed dissatisfaction with the availability of nonphysician staff in the IR suite. Ten percent and 15% indicated dissatisfaction with staffing during on-call times and weekends, respectively. Sixty-nine percent of interventional radiologists believed anesthesia availability was poor at their centers.

Generally, in addition to the interventional radiologist, at least three nonphysician health care practitioners must be available per IR suite in use. This usually includes one nurse for assisting with moderate sedation or anesthesia services, at least one radiology technologist to operate equipment or to obtain supplies (eg, medications, devices, and blood products), and a third individual (a nurse, radiology technologist, or licensed independent or advanced practitioner) who is skilled and available to "scrub into" the procedure and assist the operator directly. In 2010, the Society of Invasive Cardiovascular Professionals proposed guidelines for minimal staffing requirements (21). The guidelines stated that each procedure required three personnel in addition to the physician: one to be scrubbed into the procedure along with the physician, one to circulate, and one to monitor the patient. In certain situations, four nonphysician health care practitioners may be needed per case (one to assist with and monitor moderate sedation, one to scrub in with the physician, one to operate the equipment and get supplies in the room, and one to be a "runner or circulator" to send laboratory samples for analyses, obtain blood supplies, or retrieve supplies not immediately available in the suite). At least one member of the clinical team should be an RN with credentials to administer moderate sedation and provide care throughout the procedure. Guidelines from the Association of periOperative Registered Nurses (6) note that procedure complexity, case acuity, monitoring requirements, and the requirement for complex technology may require more than the minimal number of staff members. Depending on case complexity and patient stability, additional staff (eg, respiratory therapist) may be necessary for safe care to be provided (21,22).

Personnel should be certified in Advanced Cardiac Life Support and, if pediatric patients are treated, Pediatric Advanced Life Support, similar to requirements in cardiac catheterization settings (13). IR