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### Organisational Aspects of an Active IR Group

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#### Adapting the Environment for Optimal Healthcare

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**Interventional radiology is a continuously emerging field, recognised today by the entire spectrum of the medical community. Beyond political and strategic aspects of general radiological organisation, the specific nature of interventional radiology strictly regulates how it must be organised within a department of radiology, both for the quality of patient care and for optimal function of the whole department.**

#### Routine Interventions

When it comes to managing a daily IR practice, two levels of activity can be distinguished. The first level relates to simple invasive acts, diagnostic or therapeutic, not requiring specific equipment, but at the same time, requiring the whole "radiological armamentarium" for guidance. To name but a few, percutaneous guided biopsies, infiltrations of nervous roots, stereotaxic manage of breast lesions, etc. These techniques use ultrasound (US) guidance, x-rays, CT and even MR and are carried out using current equipment of a department of radiology under strict rules of asepsis. They have the disadvantage of demanding longer machine occupation times than diagnostic explorations, therefore raising the question of whether equipment should be exclusively dedicated to this type of activity.

Concerning MR, nowadays there are machines that allow easier access to the patient (open MR or broad opening) as well as MR-compatible material, but again the much longer times of machine occupation for these acts, can constitute an obstacle to the development and use of MRguided IR.

#### Special Interventions

The second level is related to more demanding interventions, requiring a specific, dedicated and well-equipped structure, that should be organised in an autonomous way to deal with the patient's and radiologist's needs. In this article, we will concentrate on the organisation of such specific structure; firstly, how to organise the activity of IR in an isolated area, and secondly, why we need an isolated area.

Although interventional radiology is qualified as minimally invasive, its increasing complexity in more and more fragile patients coupled with the frequency of combined interventions, entail a major infectious risk if they are not performed in optimal aseptic conditions. This risk must be minimised by appropriate adaptation of the physical environment and working practice. Moreover, if working conditions are not acceptable, most combined interventions such as aortic stent grafts will be carried out in the surgical room.

#### Finding the Best Location

What is the best location for an IR suite, from an organisational perspective? There are several options that can be proposed that vary according to the physical proximity between the department of radiology and the operating theatres, and also to the importance and the types of interventional activities carried out.

In my opinion, there are two options. The first is to install an interventional suite inside or close to the surgical operating room in order to benefit from access, circuits and the aseptic conditions of surgical suites. This solution implies a complete restructuring of the room to meet radiation protection requirements and to offer sufficient space to install several modalities. However, the use of mobile equipment cannot provide the same performance as angiography machines, and operating rooms are not designed for the safe use of x-rays. The second option is to create inside the radiology department, an isolated section that complies with all required radiological and surgical prerequisites.

#### **Why Have an Isolated Suite?**

The IR area must be physically autonomous and isolated from the rest of the department, but at the same time, closely connected to other diagnostic radiology facilities. Total isolation allows application of appropriate standards of asepsis and hygiene: controlled access, organisation of different and separate traffic (e.g., patient, staff, sterile and contaminated material), inside the section. All the rules of surgical hygiene must be applied. The advantage in terms of safety is obvious and the risk of nosocomial infection is reduced. The interventional section has to become a "no-microbe area". Permanent presence of surgical and anaesthetic equipment is required.

#### **External Communications**

The IR section should also allow a close link with external diagnostic radiology and clinical services. Connections relate to the communication between the professionals implied, radiological images and access to clinical patient information. A proper hospital network carrying clinical and biological information and images is essential.

#### **Other Factors**

The installation of this kind of specialised area, should take into account additional peripheral spaces:

- Rooms for preparation of the patients
- Boxes for ambulatory patients
- Post-intervention monitoring
- Rooms for radiologist and anaesthetist consultations

The direct assumption of responsibility of patient care by the interventional radiologist, implies the need for access to hospitalisation beds.

#### **Equipment**

Until the last few years, the basic equipment of an IR suite included angiography and later ultrasound equipment. The developments of core interventional technologies revealed the need for links in the same room of angiography equipment with a slice-imaging technique. The association of fluoroscopic real-time guidance with a CT imaging device allows targeting by a 3D-guided puncture, followed by deployment of any therapeutic device.

These type of interventions can be carried out in a CT room, aided by a portable fluoroscopy unit. Conversely, access to the patient is difficult, the irradiation dose to the patient and staff is not negligible, and moreover, the conditions of asepsis in such environments can be insufficient. Incorporating a CT scanner and angiography equipment in the same area has been proposed, but in addition to the high cost, this configuration requires extended space.

The expansion of flat-panel technology in angiography brings an attractive solution. Thanks to rotational angiography, it is possible to obtain 3D reconstructions, as well as CT-like images whose quality is sufficient for the majority of interventions requiring percutaneous guidance and/or immediate post-interventional checks. Access to ultrasound equipment is also essential, whether it comes from portable equipment or from a device fixed to the stand.

The increasing use of MR for guidance of interventions can lead to the association of MR-equipment for angiography. In addition to guidance, MR is in certain cases, the only method that allows an immediate evaluation of the therapeutic result. This option necessitates the specific installation requirements such as extended surface, specific Faraday screen room, possibility of transferring the patient between the two machines, machine dedicated or not, separated access, compatible material, etc. The recent proliferation of technologies that use certain physical agents for tissue destruction, has lead to a growing interest from the department of radiology, of acquiring diverse equipment to perform radiofrequency ablations, cryotherapy, focused ultrasounds, etc., posing once more, difficult financial challenges to be solved by the department.

#### **Conclusion**

The specific nature of interventional radiology, which necessitates specialised conditions, justifies a great professionalism on behalf of the radiological discipline. This includes creation of a specialised structure, its organisation, the choice of methods of guidance and the choice of

therapeutic agents. Those conditions can be only be created by collaboration between radiologists, industry, technicians, clinicians and hospital administration. A synergy inside the department between the diagnostic and interventional activities is the key to success, and the best way of preserving this activity within the house of radiology.

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