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GUIDELINES & RECOMMENDATIONS

UK guidance on the management of personal dosimetry systems for healthcare staff working at multiple organizations

¹ANDY ROGERS on behalf of the British Institute of Radiology, ²CLAIRE-LOUISE CHAPPLE, ³MARIA MURRAY, ⁴DAVID PLATTON and ^{5,6}JOHN SAUNDERSON

¹Medical Physics & Clinical Engineering, Nottingham University Hospitals, Nottingham, UK

²Department of Imaging Physics & Radiation Safety, Northern Medical Physics & Clinical Engineering, Newcastle upon Tyne Hospitals Trust, Newcastle upon Tyne, UK

³Professional Officer (Radiation Protection), The Society and College of Radiographers, London, UK

⁴United Lincolnshire Hospitals NHS Trust, Radiation Protection and Radiology Physics, Lincoln County Hospital, Lincoln, UK

⁵Radiation Physics Department, Queen's Centre for Oncology and Haematology, Hull & East Yorkshire, Hospitals NHS Trust, Castle Hill Hospital, Hull, UK

⁶Faculty of Science and Engineering, University of Hull, Hull, UK

Address correspondence to: Mr Andy Rogers

E-mail: andy.rogers@nuh.nhs.uk

ABSTRACT

There has been concern expressed by the UK regulator, the Health & Safety Executive, regarding the management of occupation dose for healthcare radiation workers who work across multiple organizations. In response to this concern, the British Institute of Radiology led a working group of relevant professional bodies to develop guidance in this area. The guidance addresses issues of general system management that would apply to all personal dosimetry systems, regardless of whether or not the workers within that system work across organizational boundaries, along with exploring efficient strategies to comply with legislation where those workers do indeed work across organizational boundaries. For those specific instances, the guidance discusses both system requirements to enable organizations to co-operate (Ionising Radiation Regulations 1999 Regulation 15), as well as specific instances of staff exposure. This is broken down into three categories—low, medium and high risk. A suggested approach to each is given to guide employers and their radiation advisers in adopting sensible strategies for the monitoring of their staff and the subsequent sharing of dosimetry data to ensure overall compliance with both dose limits and optimization requirements.

INTRODUCTION

Past inspections at NHS hospitals by Health & Safety Executive (HSE) Specialist Inspectors (Radiation) have brought to light failings in the management of staff radiation exposure, specifically regarding staff who work at more than one employer's premises.¹ Subsequent discussions regarding interpretation of requirements for employers in this area have highlighted the need for guidance to be published. This guidance has been developed through consultation with all relevant professional bodies, with support from the HSE Specialist Inspectors (Radiation), and should be viewed as a guide to best practice.

GENERAL MANAGEMENT RESPONSIBILITIES

The Ionising Radiations Regulations 1999 (IRR99) state (Regulation 8) that "Every radiation employer shall ... take all necessary steps to restrict ... the extent to which his

employees and other persons are exposed to ionising radiation."² In order to ensure doses are restricted, employers may undertake monitoring of their employees. IRR99 Regulation 18 states that employers are expected to monitor staff who enter Controlled Areas regularly to show that dose limits are not exceeded and that written arrangements for staff dose control are adequate (unless they are able "by other suitable means" such as environmental dose-rate monitoring to show employee dose levels are satisfactory).³ Regulation 21 describes the monitoring arrangements required for classified staff.⁴ It is, therefore, clear that employers must develop systems that assess the doses of their staff. Where such a system involves the use of personal dosimeters issued to staff it should have the following aspects:

- Written procedures that describe the system, including the development of performance indices.

- Training records to show staff have been trained in the appropriate aspects, especially in their responsibilities under the system.
- Robust management of the issuing to and collecting back from staff of their personal dosimeters to ensure all dosimeters are returned in a timely fashion.
- Records to show that staff have been informed how to wear their dosimeter(s) and what to do if something untoward occurs.
- Systems to ensure dosimeter results are promptly reviewed and that clear actions are taken when Investigation Levels are breached [IRR99 Regulation 8 (7)]².
- Management supervision of compliance with the system by staff, with clear actions when compliance is not achieved.
- Records of staff doses received.

It is essential that management are able to show active management of their system, with a clear line of assurance to those with responsibilities for the system as described by the organization's radiation safety policy.

CO-OPERATION OF EMPLOYERS

Where work with ionizing radiation undertaken by one employer is likely to give rise to the exposure of the employee of another employer, then the IRR99 Regulation 15 require that "... the employers concerned shall co-operate by the exchange of information or otherwise to the extent necessary to ensure that **each such employer is enabled to comply with the requirements of these Regulations ...**"⁵

The statement above quotes the legal requirement from the IRR99. The required system and its attendant management responsibilities described in the preceding section (Section 2. Management Responsibilities) are fairly straightforward when all the activities undertaken by staff fall solely within the control/remit of a single employer. However, where staff from one employer undertakes duties resulting in their exposure at another employer, there is a need for those employers to co-operate to achieve the objectives stated in Section 2. There are subtly different versions of this; there is an employee conducting their employers business at another employer, an employee with multiple employers and those who have one employer but work as a self-employed person at other organizations. However, the following guide should be useful for all such employers and it would be expected that they all have considered the following issues, with appropriate documented systems in place to ensure satisfactory systems are in place:

- How will the multiple employers co-operate over their individual radiation risk assessments and share relevant information from their radiation risk assessment?
- Will staff who works across organizational boundaries wear a single set of radiation dosimeters, or will a set for each employer be issued? The issue to consider is whether the source of any likely significant exposure is able to be determined.
- If a single set of dosimeters is used, how will dose results be shared?
- If multiple sets of dosimeters are used, how will the results be collated?
- How will results be acted upon?

- Who will investigate any breaches of investigation levels and how will the conclusions be shared?
- How will employers ascertain, during any required investigation in to dose levels, at which site any dose was received?
- In all the above, who takes responsibility for any required actions?

PRACTICAL IMPLEMENTATION

In terms of developing a system to allow multiple employers to co-operate, then clearly having the correct staff from each employer communicate with one another is crucial, as is ensuring management commitment to any system to ensure it is both initially implemented and continually adhered to. It may be useful in this regard to insist on regular reports from key staff to relevant employer management. The exact nature of reporting lines will, of course, depend upon the system itself and existing radiation protection management lines of assurance.

The documentation required to support systems for co-operation of employers should be "appropriate". In this context, "appropriate" means describing the whole system in enough detail for staff to be trained in, and adhere to, the system. So, for a simple case of a few members of staff at an NHS hospital working at a single independent sector hospital undertaking simple fluoroscopy procedures it may be possible to describe such a system on a sheet of A4. Staff undertaking high-dose interventional procedures at a few hospitals will require closer scrutiny and probably a more complex system to ensure their doses can be determined and attributed and are suitably restricted.

Probably, the most difficult area to issue prescriptive advice is that of who wears which dosimeter when. The following advice attempts to guide responsible staff rather than provide prescriptive recommendations. The advice has been broken down in to three distinct risk levels, although within Level 2 there is a range of possible actions. These guiding principles are to be applied by all the relevant employers jointly, not unilaterally by any one employer—the key to success is "co-operation"!

Level 1—Low risk

Where risk assessments show that a person's radiation activities at each site would lead to a very low dose (<10% of any dose limit for instance) then it may be simpler to issue the member of staff with a single set of dosimeters. Clearly it is not expected that this member of staff will regularly receive doses above any dosimeter measurement threshold. Indeed, in this case, the issuing of multiple sets of dosimeters may actually underestimate a person's total dose. This level would apply, for instance, to radiographers performing general radiography or fluoroscopy at multiple sites.

Level 2—Medium risk

Where risk assessments at any site show that personal monitoring is required for the ongoing optimization of protection as low as reasonably practical for any member of staff then a careful choice regarding the personal dosimeters to be used must be made. Issues affecting the decision may be the following:

- Total dose likely to be received (approximately between 10 and 30% of any dose limit).

- Is most of the dose likely to be received at a few sites?
- Are any of the sites likely to give radiation doses below measurement thresholds?
- Which organs are at risk?

Guiding principles that may aid the decision on how to monitor such personnel are

- Do not monitor separately at sites where the dose is likely to be below relevant dose measurement thresholds.
- Where single sets of dosimeters are used, develop methods to periodically assure responsible staff that “low dose” sites are remaining so. In the case of whole-body dosimetry this may be achieved, e.g. by the use of electronic personal dosimeters.
- Where any investigation levels are breached, immediately change to a set of dosimeters for each site to seek to establish the source of the unexpected dose. Following the detailed investigation, review the risk assessments and system to ensure monitoring regime remains appropriate. Clearly, this will only be relevant for general increased dose levels or multiple events as no subsequent monitoring will explain a previous single event. However, this is no different to a single employer situation where, for instance, an interventionalist works between many interventional X-ray rooms for a single employer, often at different sites.
- Where risk assessments show that work at more than one employer will produce measureable doses and the total dose is at the high end of the range for this risk level, seriously consider separate sets of dosimeters for those sites. Review doses received regularly to ensure that the monitoring regime

remains appropriate and that the personnel in question do not require classification under the IRR99 Regulation 20.⁶ The ideal approach would be to start with multiple sets of dosimeters, review results then, if appropriate, revert to fewer sets of dosimeters.

Level 3—High risk

Where the radiation risk assessment at any site determines that a member of staff must be classified, that member of staff may also be an outside worker and may be issued with a pass-book. They must have separate sets of dosimeters at each of the organizations at which they undertake radiation activities, or as a minimum, they must be able to assess the dose from each employer to enter in their passbook. In addition, for these instances, a robust system of issuing and receipt of dosimeters must be in force to minimize the risks of mixing up dosimeters from different employers, ensuring dosimeters are not lost and that they are returned in a timely manner.

For these types of situation, care must be taken to ensure that the system, described in Section 3 is robust enough to ensure both as low as reasonably practical and that no overexposures occur.

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