Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

NATIONAL RADIATION PROTECTION COMMITTEE

END OF YEAR REPORT

2021

NATIONAL RADIATION PROTECTION OFFICE
HEALTH SERVICE EXECUTIVE
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National Radiation Protection Committee

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Introduction

The emergency pandemic measures introduced in 2020 continued throughout 2021 and had a considerable impact on the provision of diagnostic and therapeutic services nationally. In addition, the Health Service Executive (HSE) suffered a major international cyber attack in 2021 which compounded the detrimental impact of the pandemic on radiological services. Despite these difficulties, the HSE continued to prioritise patient safety and regulatory compliance in radiation protection.

This report details the work undertaken in 2021 by the National Radiation Protection Committee (NRPC) and the National Radiation Protection Office (NRPO) in this regard.

The NRPC is a multidisciplinary committee established in 2019 by the HSE to promote safe practice and regulatory compliance in radiation protection across all public radiological services. The committee is co-chaired by a representative from the Acute Hospital Services and Community Services respectively. NRPC membership is detailed in the appendix.

Four NRPC meetings were convened in 2021 with secretariat support provided by the NRPO.

The NRPO is an administrative office based in the Acute Hospital Division, established to promote best practice in radiation protection nationally, under the guidance of the NRPC. The office acts as a central point of communication between the regulators and the HSE; a conduit for sharing radiation safety information nationally; and an avenue for frontline staff to communicate with the NRPC.

HSE radiation protection information can be accessed on the Acute Hospital Division webpage at the following link: https://www.hse.ie/eng/about/who/acute-hospitals-division/radiation-protection

Radiation protection in 2021

The main radiation protection initiatives undertaken in 2021 are presented herein:

- Analysis of incidents reported on the National Incident Management System (NIMS)
- Inspections and issues of non compliance with regulations
- Audit of radiation protection practices in interventional cardiology
- Radiation protection training programme
- Guidance for the assessment and management of Category A workers.

Radiation incidents reported on the National Incident Management System

It is a requirement that all radiation safety incidents are reported locally on the NIMS and managed in accordance with the National Incident Management Framework. In addition, there is a statutory requirement to report radiation incidents involving patients to HIQA and those involving staff or members of the public to the Environmental Protection Agency. Incidents which relate to equipment failure should also be reported to the Health Products Regulatory Authority.

Reporting failures in care is fundamental to promoting safe practice and it is the ethos of the HSE to support both staff and patients when an adverse event occurs. Promoting a transparent, non-punitive approach to reporting and managing incidents will support the identification of emergent trends and enable the sharing of learning nationally, thereby helping to mitigate the risks associated with radiation exposure. The considerable number of radiation incidents reported on the NIMS in 2021 which were categorised as near miss events or having a negligible impact is testament to this non punitive, supportive culture.

The main themes identified from the analysis were as follows:

1. **Incorrect patient identification**

Incorrect patient identification was a recurrent factor, despite the fact that local policies exist to mitigate this risk. Issues with the wrong patient presenting for a diagnostic procedure occurred at many stages in the patient journey, including at the point of referral, when an inpatient was collected from a ward, at registration in the imaging department and at the point of performing the procedure. It is imperative that identification is checked at all stages in the patient's pathway.

2. **Incomplete or inaccurate clinical referrals**

The HSE has made available the UK Royal College of Radiologists *iRefer Guidelines* to all referrers in order to support the justification process. Despite this, incidents related to incomplete or inaccurate referrals were common, as were referrals for unjustified procedures. Issues included for example, the omission of important clinical information from the referral, the identification of an incorrect body part to be imaged, failure to check the patient's diagnostic imaging history prior to justifying a procedure and referrals for a radiation procedure when a non-radiation modality would have been more appropriate.

3. **Inadvertent exposure of staff to radiation**

Incidents of this nature typically involved staff erroneously entering a room mid-procedure, an imaging procedure commencing before the staff member accompanying the patient had left the room, spillage of a radiopharmaceutical and failure to inform ward staff of a radioactive patient.

There were also incidents where practitioners declined to wear personal protective equipment such as visors designed to shield the eyes. An individual radiation exposure during a diagnostic procedure is unlikely to cause damage however multiple inadvertent exposures over the course of a career may have a more serious impact on health.

In addition to the above, in late 2021, concerns were raised with the NRPC in relation to personal dosimetry services, in particular, the potential for unreliable dosimetry results due to the exposure of badges during transit. These exposures resulted in control dosimeters failing validation during readout and led to unreliable readings of personal dosimeters for many staff. The NRPC informed the regulator and convened a meeting with HSE Estates to raise the issue. The matter was ongoing at the time of writing this report.

4. Incidents related to equipment failure

Unfortunately, equipment failure was a common theme across the majority of locations and incidents often had an impact on the safety of both patients and staff.

The NRPO *Equipment Review* 2020 outlined the status of radiation equipment used to treat patients nationally and the risks associated with operating old units were acknowledged in both local and national risk registers. It was evident from the analysis that many issues raised in that report continued to have an impact on service delivery and safe practice.

The HSE Capital Plan 2021 includes both large scale and individual projects to replace old equipment and mitigate the associated risks. The NRPC engaged with HSE Estates to address the recommendations made in the report and highlight the importance of radiation safety and regulatory compliance in relation to procurement and the re-deployment of equipment.

Radiotherapy

The cross-site collaboration initiated in 2020 continued successfully throughout 2021 and ensured that service continuity was maintained, however it was not without some problems. These were evident in the incidents reported on the NIMS which included, for example, failures to meet appropriate treatment timeframes, incomplete medical records accompanying the patient to the point of treatment, communication issues between multidisciplinary teams at different sites and administrative failures pertaining to scheduling appointments for procedures and follow up care.

It is worth noting that although equipment failures in radiotherapy were infrequent, it is imperative that a strict quality assurance programme is observed. Radiotherapy treatment has become more dependent on software applications for safe delivery. In 2020, a considerable amount of radiotherapy equipment was found to be categorised as very old and therefore the potential for software incompatibility issues cannot be ignored.

This year, NRPC set about addressing the recommendations made in the NRPO Radiotherapy Survey 2020. A review of the NIMS reporting framework for radiotherapy incidents was undertaken and a template was developed which presented new criteria that were specific to radiotherapy. This revised template was submitted to the HSE NIMS Team and State Claims Agency for consideration. It is anticipated that incorporating the template into the NIMS reporting framework will support radiotherapy incident reporting and improve the analysis of trends from a national perspective. The project was ongoing at the time of writing this report.

The continued promotion of an open, transparent and supportive culture in which staff are encouraged and enabled to report failures in care, no matter how trivial, will ensure that radiological services are optimised and most importantly, that patients and staff are safe.

Inspections and issues of non compliance with regulations

HIQA inspections of hospital diagnostic services continued throughout the year and numerous issues of non compliance were identified and addressed locally. These included, for example, increasing clinical audit practices, updating policies to align with the new regulations, correcting documentation issues and clarifying local governance arrangements, particularly in relation to the sharing of technical resources across different sites.

Non compliance issues pertaining to radiation protection training and the need to increase resources to support the Medical Physics Expert service nationally were highlighted as risks and efforts to resolve these issues are ongoing.

In addition, measures were taken to address the following issues of non compliance:

- **Governance of radiation protection**

It is a legal requirement that all locations have in place a robust governance framework which is documented and clearly understood by the staff working in the area. These arrangements must explain the roles and responsibilities, delegated levels of authority, reporting relationships and accountability arrangements within the location. Staff must also be clear on what to do in the event of a radiation safety incident.

Clear governance arrangements are especially important in situations where the radiological service may be provided in one location, for example a community facility and the technical resources are sourced from another location, such as a hospital.

- **Non compliance with statutory instrument (SI) 256 (2018)(8) and (13)(2)**

The HIQA inspections found that most locations were non compliant with SI (SI) 256 (2018) Article 8 – Justification of Medical Exposures and Article 13 (2) – Radiological Procedures. To address these issues, the NRPC in collaboration with the HSE NIMIS[1] Programme Team developed a plan which involved changes to the local RIS/PACS system[2].

These changes are being introduced on a phased basis, as follows:

- **Phase 1 - '*Justified in advance*' tick box**

Manual justification via a 'tick box' stating '*Justified in advance*' was incorporated into the RIS/PACS at the point of the triple identification check to enable the practitioner to verify that they had

[1] The National Integrated Medical Imaging System (NIMIS) facilitates the requesting of medical imaging procedures and the storage and viewing of the associated images and reports. It also allows the secure electronic sharing of data between specialists to promote a speedier diagnosis.
[2] The local radiology information platform that supports NIMIS.

justified the procedure in advance of the exposure taking place. This modification was implemented nationally in 2021 and for the limited areas where NIMIS was not available the practitioner was required to document the information manually on the patient record.

These measures successfully resolved the issue of non compliance with Article 8.

- **Phase 2 - Recording dose on the medical report**

Ensuring that the radiation dose delivered to the patient informed the medical report necessitated a two stage implementation plan.

Initially, an auto-text workflow, in drop-down menu format, will be introduced into the clinical dictation system to enable the clinician record the appropriate dose range on the medical report, based on international values, which is most applicable to the imaging procedure performed. This information then automatically transfers to the medical report and will provide the reader with an indication of the general exposure risk to the patient during the procedure. Any examination which exceeds typical values must be individually recorded and explained by the clinician on the medical report. Guidance to support the new process will be circulated in early 2022 when the new measures are introduced.

It was acknowledged that this approach had inherent risks, being dependent on manual input by the practitioner. Also, it did not allow for the recording of an actual dose delivered to an individual patient but instead took a risk stratification approach to the recording of dose. This first stage was considered a short term pragmatic approach to address the issue of non compliance and will be superseded by the implementation of an automated dose monitoring resolution. The NIMIS Programme Team will introduce the technical changes on a phased basis throughout 2022 and will engage with the relevant experts in each location to facilitate the process.

In tandem with the above measure, the second phase of the plan which will involve a project to implement dose monitoring software nationally is currently being developed. This initiative will be led by the NIMIS Programme Team and once the dose tracking solution has been implemented, data collection and ownership will fall under the remit of the Acute Hospital Division. A risk based approach will be taken where high dose modalities, such as computed tomography and interventional radiology, will be targeted initially, with low dose modalities being incorporated into the project at a later date.

It is anticipated that once completed, this project will provide a single national automated solution to collecting and reporting on patient and population dosages across the majority of public radiological services.

- **Inspection of HSE dental and orthodontic services**

HIQA commenced the inspection of dental and orthodontic services in 2021 and took a risk based approach which was based on the information provided in self assessment questionnaires and the perceived level of risk associated with the radiation service provided at the site.

The NRPC and HSE National Oral Health Office collaborated to develop guidance to support practitioners with preparing for the HIQA inspections. They also delivered several webinars to

provide information and answer any queries from practitioners. These webinars can be accessed on the HSE radiation protection website listed earlier in the report.

In addition, several Community Organisations collaborated to develop comprehensive radiation protection guidance to support locations in meeting the regulatory requirements. The NRPC is reviewing these documents with the view to producing a single, standardised, national guidance which can be made available to all HSE dental and orthodontic services.

Audit of radiation protection practices in interventional cardiology

This audit was commissioned by the NRPC and undertaken by the HSE Internal Audit Healthcare Team with the support of Mr Tom Heary, Medical Physics Expert.

The aim of this endeavour was to provide assurance that radiation protection practices in interventional cardiology met the requirements of SI 256 (2018) and that the safety of staff and patients was prioritised.

The objectives were to determine local governance arrangements for radiation protection in cardiac catheterisation laboratories (CV labs); to review local cardiac policies and procedures pertaining to radiation protection, including diagnostic reference levels, information provided to patients and staff training initiatives; and to identify if the radiation dose delivered to the patient during a cardiac procedure informed the medical report and influenced the aftercare of the patient.

Beaumont Hospital kindly facilitated a pilot study which allowed the auditors to gain an understanding of practices in the CV lab and to develop the appropriate tools to meet the audit objectives.

Sites chosen for audit were based on the level of service provided. They included the Mater Misericordiae University Hospital, Cork University Hospital and University Hospital Limerick which provided an interventional cardiology service 24 hours a day, seven days a week; St. Vincent's University Hospital and Tallaght University Hospital which provided a service Monday to Friday from 9am to 5pm; and Letterkenny University Hospital which provided a mobile service one day a week.

The overall findings of the audit are summarised below:

- **Governance of radiation protection**

Governance of radiation protection was not explicit across all sites. For example, there was often a lack of clarity regarding the delegated responsibilities for radiation protection from the Designated Manager to the practitioner; undefined roles and responsibilities of staff involved in the radiation exposure; and limited practitioner engagement with the local Radiation Safety Committee which often resulted in poor cardiac representation on that committee.

- **Local policies and procedures, including incident management**

It was evident that incidents were reported on the NIMS and to the regulator as required. Policies and guidelines for radiation protection were typically found to be out of date with SI 256 (2018) and

not standardised across the various locations. However, protocols were available in all locations for operating the radiation equipment and the associated quality assurance programmes were appropriately managed and up to date. It was observed that dose monitoring software was available in all locations however the dose delivered to the patient did not typically inform the medical report or feature in the postoperative care of the patient. Diagnostic reference levels were available in most cases and there was evidence of regular audits of staff exposures.

- **Radiation protection training**

Evidence to support practitioner compliance with the requirement to demonstrate up to date radiation protection training was limited. Training was not standardised and provided locally on an ad hoc basis with poor attendance by clinicians, limited evidence of continuous professional development and the programme was usually dependent on the availability of medical physics expert resources. Also, there was typically no central database recording the attendance of staff at initial or refresher training programmes.

- **Information provided to the patient regarding the radiation exposure**

It is a legal requirement to explain the risks of radiation exposure to the patient prior to undertaking a diagnostic or therapeutic procedure involving radiation. Practitioners said that they typically explained these risks at the time of gaining the patient's consent for the procedure however the information provided on the radiation exposure was not usually documented in the records. Also, the consent form for a cardiac procedure typically lacked information on the risks associated with the radiation exposure. In some locations, when a patient had been exposed to a high dose of radiation, they were given a post operative information leaflet upon discharge to advise what to do should they develop radiation skin burns several days after the procedure.

The NRPC welcomed the findings of the audit and subsequently engaged with the Clinical Advisory Board of the National Heart Programme to discuss the possibility of collaborating on a national campaign to strengthen radiation safety practices in interventional cardiology. This initiative will be prioritised in 2022.

Radiation protection training programme

It is a statutory requirement that all staff who work with medical ionising radiation are appropriately trained and competent to perform their duties. In addition, a repository of staff training records must be maintained locally and made available to the regulator upon request.

There is no national standardised training programme available but in every location, the radiation protection team develop and deliver in-house training which typically covers the principles of radiation protection (optimisation, justification, dose constraints) and the statutory requirements. These individual training initiatives vary in duration, style of delivery and are usually tailored to the needs of the particular cohort of staff in attendance. Also, when clinicians change employment between hospitals, they are often required to re-attend a similar training session in the new location which is perhaps an unnecessary burden on the clinician and on the staff delivering the training programme.

To address these issues, the NRPC is considering the provision of a national standardised training programme online which can be tailored to specific cohorts of staff and be recognised across all locations for a defined period of time. In addition to agreeing an appropriate syllabus, collaboration with various medical training bodies will be required to ensure that a competency assessment framework and the maintenance of continuous professional development is incorporated into the programme.

The project was ongoing at the time of writing this report.

Guidance for the assessment and management of Category A workers

There is a statutory requirement for staff who are routinely exposed to high levels of radiation and subsequently assigned Category A status based on personal dosimetry readings, to undergo periodic occupational health assessment. Currently, there is a lack of guidance available to support the implementation of an appropriate occupational health surveillance programme. Also, the issue is further complicated by the fact that many practitioners work across different locations, both public and private and therefore sustain different levels of personal exposure during the course of their work.

The NRPC is working with the HSE Health and Wellbeing Unit and the Office of the Chief Clinical Officer to address these issues by developing national guidance that will support locations in implementing the requirements of SI 30 (2019). It is anticipated that this guidance will include, for example, advice on identifying a Category A worker; what a surveillance programme should entail; what to do if a staff member exceeds the relevant dose limit; and what training the occupational health physician will be required to undertake in order to complete the medical assessments.

The project was ongoing at the time of writing this report.

In conclusion, 2021 was a tumultuous year in which radiological services were greatly impacted by measures taken to counteract both the pandemic and the international cyber attack. Despite these hurdles, the NRPC endeavoured to promote safe practice, regulatory compliance and to build on the radiation protection achievements of the previous year.

The NRPC would like to thank the management and staff working in the Acute Hospital and Community radiological services for their support and proactive engagement throughout 2021.

Appendix: Membership of the National Radiation Safety Committee 2021

MEMBERSHIP OF THE NATIONAL RADIATION PROTECTION COMMITTEE 2021	
CO-CHAIRS	
Dr. Ciaran Browne	Acute Hospital Operations, HSE
Mr. Jonathon Paul Nolan	Community Operations, HSE
MEMBERS	
Dr. Andrew Bolas	Principal Dental Surgeon, HSE
Mr. Dean Harper	Irish Institute of Radiographers and Radiation Therapists
Ms. Deirdre Groarke	Corporate Estates, HSE
Ms. Deirdre O'Keeffe	Hospital Groups Chief Executive Officers
Dr. Lena Murphy (January to August) Dr. Conor McDonnell (September to December)	National Office, Workplace Health and Wellbeing Unit, HSE
Ms. Louise Fahy	Radiotherapy Medical Physics Expert
Ms. Mandy Lewis (January to November) Dr. Geraldine O'Reilly (December)	Voluntary Healthcare Association Risk Management Forum
Dr. Mary T. O'Mahony	Consultant Public Health Medicine, HSE
Ms. Maureen Nolan	Director of Nursing, Office of the Nursing and Midwifery Services Director, HSE
Ms. Michele Monahan	Senior Radiography Services Manager, HSE
Dr. Gabrielle Colloran (January to November) Dr. Margot Brannigan (December)	Faculty of Radiology, Royal College of Physicians in Ireland
Dr. Naomi Lavan	Consultant Radiation Oncologist, St. Luke's Hospital Network
Mr. Niall Phelan	Chief Physicist, National Screening Service, HSE
Dr. Peter Kavanagh	National Clinical Programme for Radiology, HSE
Mr. Thomas Heary	Diagnostic Medical Physics Expert