



NATIONAL RADIATION PROTECTION COMMITTEE

END OF YEAR REPORT

2022

NATIONAL RADIATION PROTECTION OFFICE

HEALTH SERVICE EXECUTIVE

PUBLISHED: APRIL 2023

National Radiation Protection Committee

End of Year Report 2022

Introduction

This report presents the work undertaken by the National Radiation Protection Committee (NRPC) in 2022.

The NRPC was established in 2019 to promote safe practice and regulatory compliance across all radiological services that operate under the patronage of the Health Service Executive (HSE). The committee is co-chaired by a representative from the Acute Operations and Community Services respectively, with secretariat support provided by the National Radiation Protection Office. Four meetings of the NRPC were convened in 2022.

Membership of the NRPC is multidisciplinary and detailed in Appendix 1; the legal framework for radiation protection in Ireland is presented in Appendix 2; and the HSE governance framework for radiation protection is listed in Appendix 3.

Radiation protection information can be accessed through the following link:

<https://www.hse.ie/eng/about/who/acute-hospitals-division/radiation-protection>

Radiation protection in 2022

The NRPC undertook a substantial amount of work in 2022 to promote radiation safety nationally and to ensure that safe practice was prioritized. The committee actively engaged with both regulators in this sphere, namely the Environmental Protection Agency (EPA) and the Health Information and Quality Authority (HIQA); supported the Department of Health with the development of the statutory professional register for Medical Physics Experts (MPE); began the development of a national radiation protection training programme for all healthcare staff; answered queries about radiation safety from other HSE departments and external agencies; monitored the radiation safety incidents reported on the National Incident Management System (NIMS) and to HIQA; and maintained communication with frontline workers in radiation safety in order to support safe practice and address any issues raised.

This report focussed on the main initiatives undertaken by the committee listed hereunder.

- Analysis of radiation safety incidents reported in 2022
- Regulatory compliance
- Radiation protection training programme
- Occupational exposure to medical ionising radiation

Analysis of radiation safety incidents reported in 2022

Reporting failures in care, no matter how trivial, is fundamental to identifying potential risks and promoting safe practice. It is the philosophy of the HSE to support both staff and patients when an adverse event occurs. All failures in care shall be reported on the NIMS and managed locally in accordance with the HSE National Incident Management Framework. There is also a statutory requirement to report radiation safety incidents involving patients to HIQA and those involving staff or members of the public to the EPA. In addition to the above, any incident involving equipment failure should also be reported to the Health Products Regulatory Authority.

The NRPC reviews incident data to identify emergent trends, inform national programmes of work and support local initiatives aimed at promoting safe practice. The data collected does not include personal information that could identify an individual patient or staff member.

Radiation safety incidents reported on the NIMS in 2022.

In total, there were 850 radiation safety incidents reported by radiology services and of these, 316 were near miss events. The incidents typically occurred in areas such as radiology departments, theatre, cardiac catheterisation laboratories, dental services, mammography units and general wards where mobile x-ray units were used or radioactive patients were cared for.

In radiotherapy services, there were 222 incidents reported and of these, 158 were categorised as near miss events.

The high number of near miss events reported in 2022 is indicative of a strong safety culture where the analysis of potential failures in care is considered an opportunity for learning and a means to mitigate emergent risk.

The figures presented in the tables herein pertain to radiation safety incidents reported on the NIMS from January to December 2022 and exclude events related to ultrasound, magnetic resonance imaging and issues with extravasation of contrast from peripheral vascular catheters.

Table 1: Category of person affected by the radiation safety incident

Category of person	Radiology	Radiotherapy
Adult patient / service user	809	221
New born	5	
Staff member	33	1
Member of the public	3	

Inadvertent staff exposure to radiation

The health damage sustained from occupational radiation exposure is often cumulative and all staff are required to take the necessary precautions to limit their exposure to radiation.

Incidents resulting in the inadvertent exposure of staff typically occurred when they entered a room mid procedure or the procedure had commenced before they left the room; when a staff member was unaware that the patient they were caring for was radioactive from a nuclear medicine scan; or when a staff member was exposed to spillage in the preparation of a radiopharmaceutical. In addition, there were instances where staff declined to wear personal protective equipment such as visors designed to protect the eyes from exposure.

Table 2: Details of the process involved in the incidents reported in 2022

Details of the process involved in the incidents reported in 2022		
Process	Radiology	Radiotherapy
Checking patient identification	86	1
Clinical details on referral	278	1
Documentation / records	113	132
Communication / consent issues	21	5
Equipment failure	104	20
Performing procedure	169	62
Pregnancy status	7	
Not applicable / unknown*	72	1

*The 73 reports categorised as *not applicable / unknown* refer mainly to incidents which resulted from delays in performing procedures, administrative errors, failures in communication and inadvertent staff exposures.

The main themes to emerge from the analysis are presented hereunder:

Poor clinical referral practices

Issues related to inaccurate, incomplete or indeed inappropriate clinical referrals were the most common failures in care for diagnostic services. This is a recurrent theme every year, despite the national availability of the UK Royal College of Radiologists *iRefer Guidelines* to support the justification process. Similar to previous years, incidents typically involved a failure to take account of all of the patient's relevant medical history, including previous diagnostic imaging procedures, in the referral; identification of an incorrect body part for imaging; and a failure to consider non-ionising imaging modalities as an appropriate alternative to radiation exposure.

Documentation and record keeping

Poor documentation and record keeping was also prevalent, particularly where services were delivered across different sites. Typical incidents included for example, failures to ensure appointments were scheduled on time or follow up care was arranged; poor communication between multidisciplinary teams; incomplete medical records accompanying the patient to the point of treatment; and failures to meet treatment timeframes.

These issues were evident in both radiology and radiotherapy services.

Equipment failure

Incidents attributed to the failure of equipment were reported across the majority of radiological services in 2022 and undoubtedly had a detrimental impact on safe practice and service delivery. The status of radiation equipment, together with the risks posed by the use of aged machines, was highlighted in a national review of equipment undertaken by the National Radiation Protection Office in 2020.

This risk is particularly important in radiotherapy services where the radiation dose delivered to a patient is typically very high compared to diagnostic services and the mode of delivery is often based on computer software applications. The review in 2020 found that a large number of radiotherapy units were categorised as very old, indicating that there is a potential risk of software incompatibility issues. Therefore staff must remain vigilant and maintain a strict quality assurance programme.

The HSE Capital Plan includes dedicated resources to mitigate the risks posed by old equipment, with particular focus on radiotherapy services.

Patient identification

Failure to identify the correct patient for treatment is a recurrent theme in radiation safety and can occur at any point in the patient's journey. For example, the clinician can record incorrect patient details on the referral; the wrong patient can be registered at the imaging department or collected from the ward as an inpatient; and at the point of performing the procedure, the practitioner can identify the wrong patient on the IT system.

It is fundamental to patient safety that the identification check is performed by staff at every stage in the patient's journey, thereby ensuring that only the correct patient is exposed to radiation. The NRPC would encourage all staff to pause at each interaction and reaffirm that they have engaged the correct patient for the procedure.

Regulatory compliance

Mobile diagnostic Imaging Services

The NRPC considered the risks associated with the provision of mobile diagnostic imaging services to vulnerable adults in the community. The NRPC supported this practice as it reduces the burden of transferring vulnerable service users to local hospitals for relatively routine x-rays, thereby benefiting both the service and the service users. However, in providing this service, it is imperative that all regulatory requirements are complied with. For example, the undertaking shall provide the regulator with documentary evidence of local governance arrangements; local risk assessments undertaken by a Radiation Protection Adviser; engagement of a MPE; local diagnostic reference levels; and evidence that local radiation safety procedures are up to date and reflect daily practices. The NRPC has sought assurance that the provision of these mobile diagnostic imaging services is safe for both service users and staff; and that it meets the legal requirements of both statutory instruments (SI) 30 (2019) and 256 (2018).

HIQA inspections

The NRPC would like to remind all Designated Managers to regularly review the HIQA portal registration details for their service and the personnel to whom they have granted access privileges, to ensure that the information recorded is accurate and up to date¹.

The HIQA inspections of hospital diagnostic and therapeutic radiation services continued throughout the year and expanded to incorporate satellite community diagnostic services. A number of themes emerged from the inspections, the majority of which were addressed locally. These included for example, the requirement to update documentation to reflect local practices; the importance of local analysis of incident reports to identify emergent trends and support the sharing of any learning from investigations; and the need for regular review of local diagnostic reference levels. In addition, the importance of clarifying local governance arrangements and staff responsibilities were highlighted, particularly when duties of radiation protection staff traversed a number of sites.

The practice of clinical audit was not prioritised in many locations, often due to limited resources or time constraints. The forthcoming ratification of SI 528 (2022) will assign new responsibilities for clinical audit to HIQA and it is anticipated that clinical audit practices will be prioritised in inspections going forward.

Regulation 13 (2) of SI 256 (2018)

SI 256 (2018)(13)(2) states:

“An undertaking shall ensure that information relating to patient exposure forms part of the report of the medical radiological procedure. “

For many high dose radiological procedures, the amount of radiation delivered to the patient is automatically recorded and reported in the medical report. However, for the majority of routine imaging procedures, this is not the case. Here, the practitioner is required to seek out and manually record the dose for each individual exposure for every medical report generated. Given the throughput of patients in a typical radiological service and the volume of procedures done annually, it was anticipated that full compliance with this new statutory obligation would prove difficult.

The NRPC acknowledged this challenge and collaborated with the HSE NIMIS² Programme Team to address the issue nationally. It was agreed that the introduction of an automated, universally applied dose monitoring system across all sites was the ideal solution.

The vendor supporting the existing NIMIS platform gave the NRPC a demonstration of dose monitoring software which they provide in other jurisdictions and it was agreed to adopt this technology across all sites. A proposal was developed and presented to the NIMIS Project Board and Acute Operations for endorsement. The project will take a risk based approach, aim to address the high dose modalities first and then attend to the lower dose procedures. Approval was granted for the recruitment of a

¹ For HSE registrants, this will require engagement with the National Radiation Protection Office (radiation.protection@hse.ie).

² 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. The NIMIS Programme is managed by the Office of the Chief Information Officer.

project manager and medical physics expert to undertake the project and it was anticipated that the initiative would take two years to implement. However, it was acknowledged that incorporating some of the older equipment used in the low dose modalities may impact timelines.

The initiative is being led by the NIMIS Programme Team and once the dose tracking solution has been implemented across all sites, data collection and ownership will fall under the remit of Acute Operations.

Unfortunately, commencement of this project was dependent upon the successful completion of the NIMIS Phase 2 upgrade which had been delayed during 2022 due to technological difficulties. Those issues were eventually resolved and it is anticipated that the dose monitoring project will be given priority in 2023.

In the interim, to ensure regulatory compliance, a drop down menu of typical doses for routine procedures, based on international values, was introduced to the NIMIS platform which enabled the practitioner to record an indication of the radiation dose delivered to a patient. Individual procedures which exceeded the normal radiation dose were required to be explained by the practitioner in the report. The aim of this function was to give the patient or the clinician in receipt of the report an indication of the level of risk sustained from the radiation exposure.

This risk stratification approach to recording dose on the medical report was approved by the regulator and implemented as a temporary measure to address the matter of non compliance with regulation 13(2). It was not considered a panacea to recording dose but merely a short term measure to meet statutory requirements until the automated dose monitoring software package could be installed.

Non compliance with regulation 13(2) was categorised by the regulator as an enterprise risk and not a patient safety matter. Unfortunately, the interim measure developed by the NRPC was deemed unworkable by many practitioners and not adopted locally; and as a consequence, many locations were found to be non compliant when inspected by the regulator. Subsequently, in late 2022, the NRPC engaged with the Faculty of Radiology to consider the potential for developing additional initiatives which could run in tandem with the aforementioned interim solution. Collaboration was ongoing at the time of writing this report.

Meanwhile, the NRPC would advise all Designated Managers that full compliance with regulation 13(2) is mandatory and that if the existing interim solution is not adopted at their location, an alternative measure to recording dose in the medical report must be established locally.

Dental and orthodontic services

The NRPC provided extensive support to HIQA in the preparation and execution of their inaugural inspection programme for dental and orthodontic services. This help included for example, providing documentation to explain the governance and delivery of the dental and orthodontic services; engagement with practitioners to assist in completion of the self assessment questionnaires issued by HIQA; and the provision of webinars to assist practitioners in preparing for an inspection. The NRPC would like to acknowledge the support and collaboration of the HSE National Oral Health Office in this regard.

Findings from the HIQA dental inspections to date have been positive and encouraging. For example, governance and staff responsibilities were clearly understood; equipment was maintained in accordance with the regulations; clinical audit was undertaken regularly; and incidents were reported and managed appropriately.

These outcomes aligned with the findings of the radiation protection audit of dental practices undertaken by the HSE Internal Audit team. However, the HSE auditors also noted issues in relation to obsolete local procedures and guidelines, and the limited availability of a MPE service.

HIQA role in the justification of medical radiation procedures

HIQA, as the competent authority for patient radiation protection, has a statutory responsibility for the justification of practices involving medical ionising radiation. In this regard, HIQA engaged with the NRPC as part of a consultation exercise to establish the scope and requirements of this inaugural role and how best to implement it nationally. Work on this initiative will continue in 2023.

Radiation protection training programme

Both SI 256 (2018) and SI 30 (2019) require the undertaking to demonstrate that all employees are appropriately trained and competent to work with medical ionising radiation. Staff training records shall be maintained locally and made available to both the EPA and HIQA upon request.

To date, many locations have developed in-house training programmes which typically adhere to international guidelines on radiation protection and are tailored to the particular cohort of staff in attendance, based on their level of occupational risk to exposure. There is no nationally agreed training programme with a standardised content or uniform style of delivery. And staff who routinely change employment throughout the year are often required to attend repetitive training sessions which is perhaps an unnecessary waste of time and resources across the hospital networks.

The NRPC acknowledged the legal obligations imposed on the undertaking and proposed to develop a standardised radiation protection training programme for all staff. The aim of this project is to develop online training resources, tailored to the specific needs of clinical and non-clinical staff in order to support the delivery of local training initiatives. The programme will be made available on the HSELand platform where with certificates of attendance will be issued which are valid across all locations for a specific period of time. In developing this programme, collaboration with the various medical training bodies will be required to ensure that competency assessment and continuous professional development are incorporated into the training. However, this may prove difficult as the Medical Council is yet to issue guidelines on the specific requirements for clinical training in radiation protection.

In the interim, efforts to develop the training programme are underway. A scoping exercise has been successfully undertaken by the NRPC and submitted to the HSELand team for consideration. The programme will include individual training modules focussed on corporate induction, staff who work with medical ionising radiation and finally, knowledge requirements for specialist clinicians whose work necessitates direct exposure to radiation when treating patients. The corporate induction training module was in development at the time of writing this report.

Medical Physics Expert service

The HIQA inspections to date have highlighted how the limited number of MPEs available nationally has impacted on HSE compliance with the regulations. Sourcing and recruiting medical physicists with the requisite training and practical experience has proven to be a challenge. Demands placed on the MPE service nationally exceed capacity and as a consequence, many MPEs are obliged to support radiation protection services across multiple hospital and community locations.

Currently, outside of radiotherapy, there is no formal Irish training programme for medical physicists to advance to the level of MPE. In an effort to address the shortage of MPE resources, the NRPC is supporting the development of a training pathway for medical physicists which, it is anticipated, will help to attract graduates and advance the educational and practical experience elements to meet the requirements of MPE.

The Department of Health is developing a professional register for MPEs in accordance with SI 256 (2018)(19) and will set the criteria for registration. The Irish College of Physicists in Medicine currently maintain a voluntary register of MPEs that operate in Ireland. The timeline for transition from this voluntary index to the statutory register maintained by the Minister for Health has yet to be announced.

NRPC support for this initiative is ongoing.

Occupational exposure to medical ionising radiation

All staff who are routinely exposed to medical ionising radiation are required to wear suitable personal protective equipment and where appropriate, a dosimetry badge for recording personal exposure levels. The undertaking has a statutory obligation to ensure that radiation risks to staff are routinely assessed and that records are made available to the regulator upon request.

The NRPC commenced work on the development of national guidance for undertakings to identify and manage employees who met the criteria for Category A³ status. The guidance will include for example, advice on establishing a local surveillance programme for Category A workers, what to do in the event of a staff member reaching their maximum level of radiation exposure and what training would be required for the occupational health physician in order so they can undertake the appropriate medical assessments.

During the course of discussion, a number of issues were identified, detailed herein.

- **Personal dosimetry data**

The NRPC acknowledged that it was not straight forward for an undertaking to confirm the personal dosimetry of an individual practitioner as many clinicians routinely work across multiple sites and different healthcare services. Each service does not necessarily share personal dosimetry data with the next service. The NRPC sought guidance from the HSE Data Protection Office in this regard.

³ Staff routinely exposed to high levels of radiation are assigned Category A status based on personal dosimetry readings and shall undergo periodic occupational health assessment in accordance with SI 30 (2019).

The EPA confirmed to the NRPC that they are in the process of developing a national register of dosimetry information however this may take some time to establish. In the interim, to ensure compliance with SI 30 (2019), the undertaking must request from each practitioner their personal dosimetry information, collated from every place of their employment. There is, perhaps, a possibility that some clinicians may be reticent about providing this data, given the implications to their practice should they exceed the legal levels of safe exposure, as decreed in SI 30 (2019).

- **Validation of personal dosimetry data**

Practitioners are legally required to provide the undertaking with personal dosimetry information however this dictate is currently not enforced and there is no way of validating any data submitted. It would not be reasonable for an occupational health physician to assess an employee for Category A status based on inaccurate or incomplete personal dosimetry records.

- **Occupational health clinician training to manage Category A workers**

The recognition of Category A workers in this jurisdiction is a new phenomenon as traditionally, the levels of exposure associated with medical ionising radiation did not meet the regulatory limits established by the legislation. The safe limits of radiation exposure were lowered in SI 30 (2019) and as a consequence, many clinicians who routinely undertake high dose procedures may reach Category A status and require mandatory radiation protection surveillance. Currently, there is no formal surveillance programme in place for the management of Category A workers and occupational health physicians are not trained on how best to assess employees for workplace related radiation exposure.

- **Referral pathways for occupational health physicians**

There is no approved pathway for an occupational health physician to refer an employee should they be concerned about the deterministic effects of radiation exposure. Governance of the surveillance programme, in addition to where and to whom an employee should be referred if further assessment or treatment is required, must be determined.

The NRPC has engaged with the regulator and the Office of the Chief Clinical Officer to consider the matters raised and how to resolve them.

Conclusion

Throughout the year, the NRPC endeavoured to promote safe practice for patients and staff across all hospital and community radiology and radiotherapy services. Positive steps were taken to ensure regulatory compliance and support frontline staff with inspections and quality improvement initiatives. Incident reports were reviewed and where trends became apparent, they provided opportunities for learning and informed national initiatives.

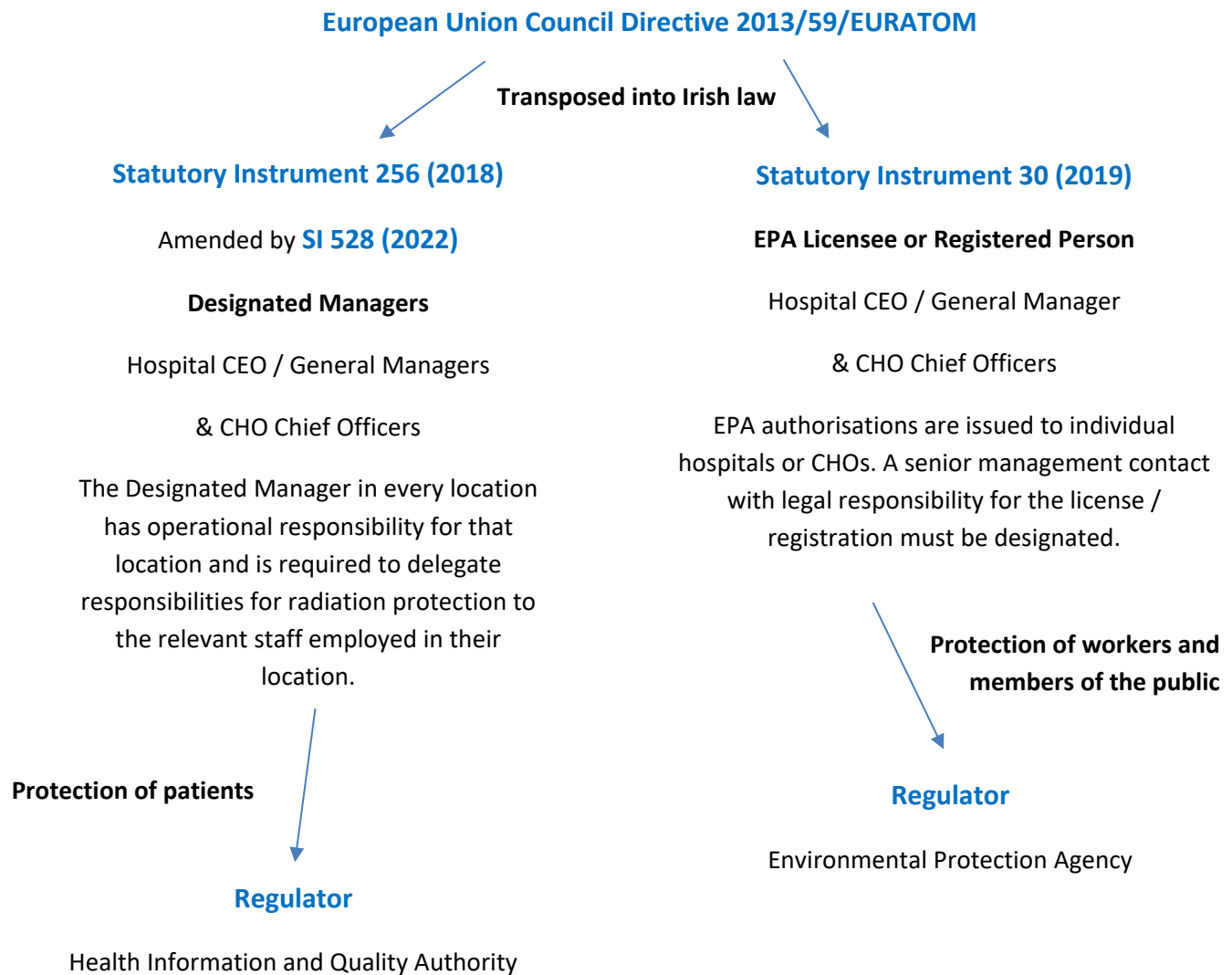
The ongoing, collaborative, working relationship with frontline radiation protection teams was maintained throughout the year. This, together with the positive and proactive engagement with external stakeholders such as the Department of Health, EPA and HIQA, helped to further NRPC objectives.

This teamwork approach to radiation protection will undoubtedly continue in 2023.

Appendix 1: Membership of the National Radiation Safety Committee 2022

MEMBERSHIP OF THE NATIONAL RADIATION PROTECTION COMMITTEE 2022	
CO-CHAIRS	
Dr. Andrew Bolas	Assistant National Oral Health Lead, Community Operations
Dr. Ciaran Browne	Acute Hospital Operations, HSE
MEMBERS	
Dr. Conor McDonnell	Workplace Health and Wellbeing Unit, 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. Geraldine O’Reilly (January to September)	Voluntary Healthcare Association Risk Management Forum
Ms. Mandy Lewis (October to December)	
Ms. Louise Fahy	Radiotherapy Medical Physics Expert
Ms. Maureen Nolan	Director of Nursing, Office of the Nursing and Midwifery Services Director, HSE
Ms. Michele Monahan	Senior Radiography Services Manager
Dr. Margot Brannigan	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

Appendix 2: Legal Framework for Radiation Protection



Appendix 3: HSE Governance of Radiation Protection under SI 256 (2018)

