(Continued from page 3)

1. Review of equipment performance
2. Settings used
3. Examination protocols
4. Survey methodology
5. Procedure protocol
6. Operator skill
7. Procedure complexity

- For interventional procedures, if the DRL is exceeded, the investigation should proceed in the following order:
  1. Evaluation of equipment
  2. Evaluation of procedure protocols
  3. Evaluation of operator technique
- If the local DRL is below the median of the national survey, then image quality (rather than reduction in dose) should be the priority in further optimisation
- The national legislation should identify the organisations that have the responsibility for carrying out the different components of setting a DRL value.
- DRLs should be set for common examinations performed, with priority to those that have the highest frequency and those that result in the highest patient dose.
- National surveys should be carried out of medium and large facilities with sufficient workload to provide a representative selection of patients, covering a range of healthcare providers.
- For an initial survey a randomised selection of 20-30 facilities should be used.
- A local survey should consist of at least 20 patients (preferably 30 for x-ray and CT and 50 for mammography).
- Phantoms can be used as an initial step in evaluating performance, but cannot replace patient dose surveys.
- All dosimeters, PKA meters etc. should be calibrated regularly and should be traceable to a primary standard.
- If in a region where multiple national DRLs are established (e.g. Europe) the median of the nation DRLs (i.e. the median of the 75 percentiles of the medians) should be established as the regional DRL.
- Both national and regional DRLs should be reviewed every 3-5 years, or when significant changes in technology become available.
- Local DRLs should be reviewed 3 yearly for x-ray units (or when a significant change has been included) or annually for CT, interventional procedures, SPECT/CT and PET/CT.
- Published DRL values should be accompanied by a statement from the group including the size of the 'standard patient', the details of the specific examination and the date of the survey.
- Hospital and radiology information systems (HIS and RIS respectively) should be used if possible.
- If possible, continuous collection of data from the HIS / RIS should be used to aid the process.
- Multi-modality procedures (such as SPECT/CT) should have DRL values for each modality independently.

Isabel Dodson Starts

RPC is pleased to announce that Isabel Dodson has joined the team in October as a Senior Physicist in Radiation Protection. In her own words:

"After graduating from The University of Kent with a Physics degree in 2014, I gained a place on the NHS Scientist Training Programme (STP). This is a national scheme which is part of the government's Modernising Scientific Careers initiative. The programme is carried out over three years and is focused on work based training but also includes a part time MSc degree in Medical Physics. After the first year of training I chose to specialise in the area of Radiation Safety. The final two years were then dedicated to working in my chosen specialist area. By completing all of the requirements of the STP I am now eligible to become a state registered Clinical Scientist. After three years of working at another NHS Trust, I am looking forward to becoming part of the team at RPC and St George's Hospital.

Isabel can be contacted on **020 8725 3073** or via **info@sghrpc.co.uk**

Working with ionising radiation: notify, register or get consent from the Health and Safety Executive

Hopefully all readers are aware that from 1st January 2018, under the new Ionising Radiations Regulations 2017, employers must apply to the Health and Safety Executive (HSE) for permission to perform certain types of work with ionising radiation

The type of application is based on a 'graded approach' to risk. Depending on the risk from the practice involving ionising radiation, employers will need to notify, register or get consent from the HSE. Work with radiation generators, such as X-ray devices, requires registration. Small radioactive sources, such as those used for calibration of sentinel node probes, also require registration. Work with the administration of radioactive substances for medical purposes requires, as well as radiopharmacy services, require consent.

There is a fee of £25 for registration/consent.

You must apply:

- **before you start new work**
- **by 5th February 2018, if you've previously notified HSE of the work. Previous notification cannot be carried forward.**

The application can be submitted by any authorised employee. The link to apply can be found at:

https://services.hse.gov.uk/bssd/

RPA clients should contact RPC urgently if you have not yet registered your X-ray department or obtained consent for nuclear medicine or radiopharmacy services. We can then advise further on the registration/consent process.

Media Services, SGUL Ref – 109443

RPC News

RPC News Spring -Summer 2018

Dear Reader, ***You are probably expecting a bumper edition of RPC News, full of information about the practical impact of the new Ionising Radiation (Medical Exposure) Regulations 2017 and Ionising Radiations Regulations 2017. Although these came into force on 6th February 2018 (and 1st January 2018 for the reduced eye dose limit), we are still awaiting further guidance from the regulators and professional bodies on their practical implementation.***

The Approved Code of Practice (a compliance guidance for IRR 2017) has only just been published, the "Companion Guide" to IR(ME)R 2017 is yet to make an appearance and the revised Medical and Dental Guidance Notes (a professional guide to all radiation protection legislation) will not be issued until the middle of the year. As such, we intend to refrain from giving definitive advice at this point. The practical implications of the new regulations are not expected to be significant. However, we will be reissuing our RPS handbook later in the year to cater for the new requirements of IRR 2017. This will include new information on cooperation between employers over personal dose monitoring arrangements and improved templates for local rules and radiation risk assessments. Additional employer's procedures will be issued to augment the IR(ME)R handbook template that was supplied to customers in 2016.

We intend to issue a special edition of RPC News later in the year, focusing exclusively on the impact of the new regulations. Clients are advised that no action is required in the meantime, except where specially advised by one of the RPC team. However, you are advised to ensure that your organisation has obtained registration and/or consent from the Health and Safety Executive for practices involving ionising radiation. Please see elsewhere in this newsletter for further information on the process.

Kathryn St John-Mosse

New online radiation protection training course available

RPC is pleased to announce the launch of our new online radiation protection training module (known as "moodle" to many of you). RPC's first online radiation protection course, launched in 2015, was deemed to be highly successful, with over 2400 subscribers. The second course to be presented is entitled 'Update Training for Radiographers 2018'. The course, which is designed to provide around two hours of update training in radiation protection, covers a range of current issues including an update on patient dose in CT, reporting radiation incidents and radiation risks in paediatric imaging.
The training is suitable for radiographers, radiologists and any other person involved in diagnostic radiology and can be accessed via the following link: www.sghrpc.co.uk/moodle. This course is not suitable for staff who have not undertaken previous radiation protection training. Feedback on the training has been very positive so far. Users have found the course content interesting and informative, and most subscribers appreciate the concept of having to pass a quiz at the end of each module to assess learning before being issued with a certificate of completion.

Any person wishing to take the training should contact Gillian Hermanstein by email **info@sghrpc.co.uk**. The training is provided free of charge to RPC's RPA customers.

Contents

St George's University Hospitals NHS
NHS Foundation Trust

THE RADIOLOGICAL PROTECTION CENTRE
Incorporating The John Perry Laboratory

New publication on radiation risks from digital mammography in breast screening

Public Health England have recently published a paper detailing the radiation risks facing women attending the NHS Breast Screening Programme for screening with digital mammography. In the paper, the authors have attempted to compare risk and benefit of the digital breast screening in the NHS Breast Screening Programme (NHSBSP). This report is a follow-up to NHSBSP Report 54, deemed necessary because major changes in practice have since taken place.

To estimate the risk associated with the routine screening as part of the NHSBSP, they used a radiation risk model, patient dose data and data available from the national screening statistics. They assumed that a typical examination consisted of 2 views (3.0 mGy total for breasts < 90 mm and 5.0 mGy total for breasts >90 mm). Risk factors were taken from HPA Report CRCE-028. Based on those numbers, it was estimated that 18 to 36 cancers were induced per year in the 1,770,436 women screened. Between 3 and 7 of those patients are expected to die from the radiation-induced breast-cancer resulting from the X-ray mammogram.

The benefit i.e. the number of lives saved, was estimated assuming an approximate 20% reduction in mortality due to early detection using regular mammography. The average detection rate is 8.4 per 1000 woman according to NHSBSP statistics, which has to be corrected for over-diagnosed cancers (19%). Therefore, 14,872 breast cancers are screen-detected every year and 1,071 lives saved.

The risk of developing a radiation-induced cancer for women attending a single full digital screening examination was estimated to be from 1 in 49,000 to 1 in 98,000. Women who attend all seven screening examinations have a risk of radiation-induced cancer of 1 in 7,000 to 1 in 14,000. The ratio of induced cancers to detected cancers is approximately 1:400 to 1:800. The number of lives saved was calculated to be approximately 150 to 300 times higher than the number of fatal cancers induced. Women who have a compressed breast thickness of more than 90 mm have slightly lower ratios, but with the benefit still being 100 to 200 times higher than the risk.

The full publication is available at **https://www.gov.uk/government/publications/breast-screening-radiation-risk-with-digital-mammography**

Latest Care Quality Commission IR(ME)R Report Published

The latest IR(ME)R report from the CQC has been published and is available via their website at http://www.cqc.org.uk/sites/default/files/20171023_irmer_annual_report_2016.pdf. The report provides an analysis of incident notifications of exposures "much greater than intended" (MGTI) for the year 2016.

The number of notifications has increased by 3% since 2015 (1319 total notifications in 2016 vs. 1277 in 2015). This is likely to be due to the overall increase of examinations carried out in 2016, estimated to be 3% higher than 2015. The CQC states that there is no reason to believe that the increase is due to poor practice, noting that governance and incident reporting culture is improving.

81% of total notifications came from diagnostic radiology (no change from 2015). The largest cause was operator error (58%), followed by referrer error (32%), which follows the trend of previous years. As in 2015, over a third of errors resulting in doses MGTI were caused by the wrong patient receiving a medical exposure. CQC have expressed concern that patient identification errors are still the highest category of notification, despite the implementation of the 'Pause and Check' procedure in 2015. 60% of radiology notifications were for CT scans. This is due to the lower threshold for determining whether an exposure is "MGTI". However, the Department of Health issued new guidance in 2017 which changed some of the thresholds for reporting incidents resulting from high-dose procedures, including CT. It is likely that the number of CT notifications will decrease in next year's report.

An issue raised in the analysis of radiology notifications was inconsistency in the dose values reported to the CQC. The report clarifies that the dose value reported should be that which was delivered in error, not the total dose.

For Nuclear Medicine, notifications increased 17% from 52 to 61 from the previous year, compared to a 5% increase in activity. The categories of error were comparable to previous years in terms of operator/administration and referrer errors. Similar to diagnostic radiology, 46% of the 61 notifications arose from the wrong patient being referred for the procedure. Only two notifications arose from radionuclide therapies. Some of the highest doses in diagnostic radiology occur in PET-CT which accounted for over 20% of nuclear medicine notifications in 2016. A priority in this technology is to ensure comprehensive operator training and competency assessment.

For Radiotherapy, 189 notifications were received in 2016. The number of treatment exposure notifications has remained consistent at around 70 for the past four years. The other two thirds of notifications related to errors in planning and verification imaging. The most common errors were failures in imaging protocol or failure to scan adequate anatomy.

The CQC report highlights the importance of honest and open discussion surrounding errors in radiation exposures within and between trusts in order to better instil a culture of radiation protection and to share good practice to prevent future incidents. The CQC feels that the new IR(ME)R legislation represents an ideal opportunity for departments to re-evaluate their governance processes and associated culture. RPC's customers should continue to report radiation incidents to us in the normal way and we will advise when notification to the CQC is required. We will also give advice on the reporting process and improvements in practice, where necessary

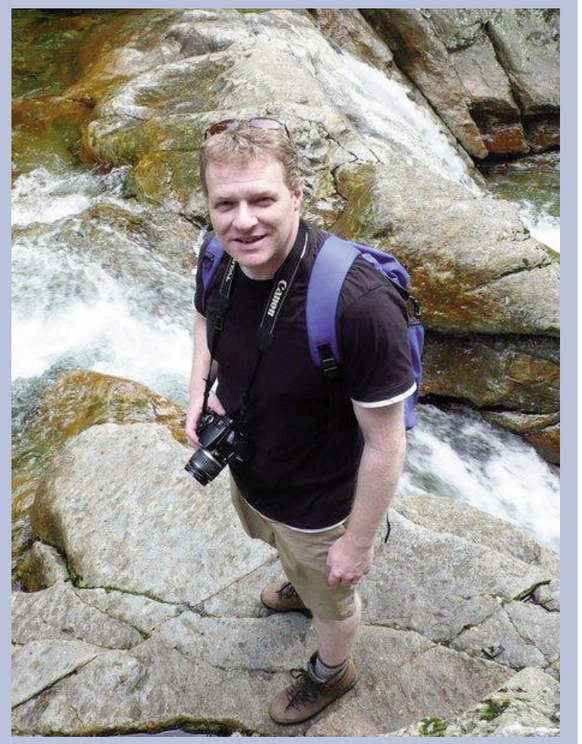
Meet Bruce Walmsley,
St George's Hospital's new RPA

I joined St. George's Hospital in September last year to be the new lead Radiation Protection Adviser for the Trust. As such I will be solely focussed on issues with radiation protection in the Trust itself including management, training, incidents and investigations and providing assurance of compliance with all the regulations governing the use of ionising radiation and radioactive substances in the workplace.

I hope to foster good relations and good practices in all areas of the Trust working with radiation and using the various radiological services, from referral to reporting. I'm keen on identifying new ways to solve old problems and adapt and change practices and ultimately contribute to improving the quality of service to the patient and the safety of the staff who deliver it.

I have been working as a physicist / clinical scientist for over 25 years, from Nuclear Medicine to Diagnostic Radiology and Radiation Protection. I have presented at national and international conferences as well as teaching at under graduate and post graduate level and I have a special interest in SPECT /CT as it brings together two of my favourite subjects of Nuclear Medicine and CT.

Away from the workplace I have two young children (boys 5 & 8 years) to keep me busy. I'll watch any sci-fi film or TV series especially if it's based on the Marvel comics I loved as a child. I love to garden when I can and have recently taken up clay pigeon shooting both of which are a really good way to let off some steam in very different ways!



ICRP publish new guidance on Diagnostic Reference Levels in medical imaging

International Commission on Radiological Protection (ICRP) have recently released updated guidance on diagnostic reference levels (DRLs) in medical imaging (known as ICRP report 135). The main aims of the new guidance were:

- Clarify the definition of terms used in previous guidance
- Recommend time intervals for reviewing DRLs
- Describe the appropriate use of DRLs
- Advise on the application of DRLs to new technologies (including hybrid imaging)
- Advise on paediatric DRLs (not covered in this article) ICRP 135 can be summarised as follows:
- DRLs are meant as a type of investigation level, but should only be applied to appropriate groups of patients undergoing the same examination on similar equipment. DRLs should be used to aid optimisation. They are not a dose limit.
- All persons who have a role in subjecting patients to a medical exposure should be familiar with the DRL process.
- The DRLs should be taken into account with the image quality and the required clinical information for optimisation.
- DRL quantity:
  - X-Ray Units: air kerma-area product (PKA) or kerma (Ka,e)
  - Mammography: (1 or more) incident air kerma (Ka,i), entrance-surface air kerma (Ka,e) or mean glandular dose (DG)
  - Fluoroscopy: air kerma-area product (PKA), cumulative air kerma (Ka,r), fluoroscopy time, and the number of radiographic images
  - CT: computed tomography dose index (volume) (CTDIvol) or dose-length product (DLP) and the number of scan sequences in the examination
  - Nuclear Medicine: administered activity or administered activity per unit weight (not relevant for all examinations)
  - Dental Radiography: incident air kerma (Ka,i) at the cone tip
  - Panoramic Dental Radiography: air kerma-area product (PKA) or dose-width product measured at the receiving slit
  - Effective dose is NOT appropriate for the DRL
- DRLs for interventional procedures: all possible DRL quantities should be recorded to aid optimisation (cumulative fluoroscopy exposure time is a poor indicator of patient dose, but may be used as a subsidiary DRL quantity). A multiplication factor for the complexity of an interventional procedure may be useful.
- The DRL should be calculated using the median of the data for patients within an agreed weight range undergoing a particular scan on similar imaging equipment.
- The DRL process should be included in the continual quality assurance programme.
- It is counted that the DRL is 'constantly exceeded' if the median of the data collected exceeds the DRL value. If the DRL is 'constantly exceeded', an investigation should promptly be carried out and instigate any necessary corrective action. The review should include:

(Continued overleaf)