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Library Current Awareness Bulletin Radiology – June 2021

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News

BIR supports AXREM radiotherapy campaign
The British Institute of Radiology
June 2021
[The AXREM manifesto makes the case for more awareness for radiotherapy amongst patients and health professionals, increased funding, improved access to services, improved screening processes, revised payment mechanisms and a review of the tariff system, more radiotherapy satellite centres and more funding for IT support systems.]

'Digital connectivity key to future of imaging services'
The Society of Radiographers
May 2021
[National specialty adviser, Dr Sam Hare, spells out NHS strategy for imaging.]

National programme launched to develop AHP support workforce
The Society of Radiographers
May 2021
[Health Education England's national AHP support workforce programme has been launched to provide national leadership and support on recognising, developing, and expanding this non-registered staff group.]

New guidance for fast-track breast cancer radiotherapy treatment
The Royal College of Radiologists
May 2021
[Cancer experts from across the UK have supported the roll out of fast-track radiotherapy for patients with breast cancer, via a series of new consensus statements to inform clinical practice.]

RCR unveils UK's first standardised radiotherapy consent forms
The Royal College of Radiologists
May 2021
[A pioneering series of new patient consent forms has been launched to help standardise and strengthen the informed consent process for adult cancer patients undergoing radiotherapy.]

RCR welcomes HSIB report on preventing misidentification of outpatients
The Royal College of Radiologists
June 2021
[The HSIB report highlights how communication gaps, staff workloads and poor NHS IT can all lead to the misidentification of outpatients, and recommends that NHS England should now conduct a review into the systemic risks and controls around the issue.]

Safer Radiotherapy e-bulletin now available
The Society of Radiographers
May 2021
[The Society and College of Radiographers is part of a steering group convened by Public Health England (PHE) to improve patient safety across the UK, and the Safer Radiotherapy e-bulletin provides key messages and learning from error reports and patient safety initiatives.]

SoR poster tackles abuse of staff during obstetric scans
The Society of Radiographers
May 2021
[Based on feedback from sonographer members, the SoR has developed a poster to be displayed in obstetric ultrasound waiting rooms.]

Statistics

Diagnostic imaging dataset for February 2021
NHS England
June 2021
[The Diagnostic Imaging Dataset (DID) is a central collection of detailed information about diagnostic imaging tests carried out on NHS patients, extracted from local Radiology Information Systems (RISs) and submitted monthly.]

Guidance

Designing facilities for diagnostic imaging (HBN 6)
NHS Estates
Updated May 2021

How we regulate radiological and civil nuclear safety in the UK
Department for Business, Energy & Industrial Strategy
April 2021

Safer radiotherapy: Radiotherapy error and near miss reporting: the unseen pathway
Public Health England
May 2021

Artificial Intelligence

Artificial intelligence in radiology: 100 commercially available products and their scientific evidence.
van Leeuwen K.G., Schalekamp S.R., Matthieu J.C.M, van Ginneken B., and de Rooij M.
European Radiology, vol. 31 (6) pp. 3797-3804
June 2021
[**Objectives**: Map the current landscape of commercially available artificial intelligence (AI) software for radiology and review the availability of their scientific evidence. **Methods**: We created an online overview of CE-marked AI software products for clinical radiology based on vendor-supplied product specifications (www.aiforradiology.com). Characteristics such as modality, subspeciality, main task, regulatory information, deployment, and pricing model were retrieved. We conducted an extensive literature search on the available scientific evidence of these products. Articles were classified according to a hierarchical model of efficacy. **Results**: The overview included 100 CE-marked AI products from 54 different vendors. For 64/100 products, there was no peer-reviewed evidence of its efficacy. We observed a large heterogeneity in deployment methods, pricing models, and regulatory classes. The evidence of the remaining 36/100 products comprised 237 papers that predominantly (65%) focused on diagnostic accuracy (efficacy level 2). From the 100 products, 18 had evidence that regarded level 3 or higher, validating the (potential) impact on diagnostic thinking, patient outcome, or costs. Half of the available evidence (116/237) were independent and not (co-)funded or (co-)authored by the vendor. **Conclusions**: Even though the commercial supply of AI software in radiology already holds 100 CE-marked products, we conclude that the sector is still in its infancy. For 64/100 products, peer-reviewed evidence on its efficacy is lacking. Only 18/100 AI products have demonstrated (potential) clinical impact.KEY POINTS• Artificial intelligence in radiology is still in its infancy even though already 100 CE-marked AI products are commercially available. • Only 36 out of 100 products have peer-reviewed evidence of which most studies demonstrate lower levels of efficacy. • There is a wide variety in deployment strategies, pricing models, and CE marking class of AI products for radiology.]

Smart chest X-ray worklist prioritization using artificial intelligence: a clinical workflow simulation.
Baltruschat I., Steinmeister L., Nickisch H., Saalbach A., Grass M., Adam G., Knopp T., and Ittrich H.
European Radiology, vol. 31 (6) pp. 3837-3845
June 2021
[**Objective**: The aim is to evaluate whether smart worklist prioritization by artificial intelligence (AI) can optimize the radiology workflow and reduce report turnaround times (RTATs) for critical findings in chest radiographs (CXRs). Furthermore, we investigate a method to counteract the effect of false negative predictions by AI-resulting in an extremely and dangerously long RTAT, as CXRs are sorted to the end of the worklist. **Methods**: We developed a simulation framework that models the current workflow at a university hospital by incorporating hospital-specific CXR generation rates and reporting rates and pathology distribution. Using this, we simulated the standard worklist processing "first-in, first-out" (FIFO) and compared it with a worklist prioritization based on urgency. Examination prioritization was performed by the AI, classifying eight different pathological findings ranked in descending order of urgency: pneumothorax, pleural effusion, infiltrate, congestion, atelectasis, cardiomegaly, mass, and foreign object. Furthermore, we introduced an upper limit for the maximum waiting time, after which the highest urgency is assigned to the examination. **Results**: The average RTAT for all critical findings was significantly reduced in all prioritization simulations compared to the FIFO simulation (e.g., pneumothorax: 35.6 min vs. 80.1 min; $p < 0.0001$), while the maximum RTAT for most findings increased at the same time (e.g., pneumothorax: 1293 min vs 890 min; $p < 0.0001$). Our "upper limit" substantially reduced the maximum RTAT in all classes (e.g., pneumothorax: 979 min vs. 1293 min/1178 min; $p < 0.0001$). **Conclusion**: Our simulations demonstrate that smart worklist prioritization by AI can reduce the average RTAT for critical findings in CXRs while maintaining a small maximum RTAT as FIFO.KEY POINTS• Development of a realistic clinical workflow simulator based on empirical data from a hospital allowed precise assessment of smart worklist prioritization using artificial intelligence. • Employing a smart worklist prioritization without a threshold for maximum waiting time runs the risk of false negative predictions of the artificial intelligence greatly increasing the report turnaround time. • Use of a state-of-the-art convolution neural network can reduce the average report turnaround time almost to the upper limit of a perfect classification algorithm (e.g., pneumothorax: 35.6 min vs. 30.4 min).]

To buy or not to buy-evaluating commercial AI solutions in radiology (the ECLAIR guidelines).
Omoumi P., Ducarouge A., Tournier A., Harvey H., Kahn C.E., Louvet-de Verchère F., Pinto Dos Santos D. et al
European Radiology, vol. 31 (6) pp. 3786-3796
June 2021
[Artificial intelligence (AI) has made impressive progress over the past few years, including many applications in medical imaging. Numerous commercial solutions based on AI techniques are now available for sale, forcing radiology practices to learn how to properly assess these tools. While several guidelines describing good practices for conducting and reporting AI-based research in medicine and radiology have been published, fewer efforts have focused on recommendations addressing the key questions to consider when critically assessing AI solutions before purchase. Commercial AI solutions are typically complicated software products, for the evaluation of which many factors are to be considered. In this work, authors from academia and industry have joined efforts to propose a practical framework that will help stakeholders evaluate commercial AI solutions in radiology (the ECLAIR guidelines) and reach an informed decision. Topics to consider in the evaluation include the relevance of the solution from the point of view of each stakeholder, issues regarding performance and validation, usability and integration, regulatory and legal aspects, and financial and support services. KEY POINTS: • Numerous commercial solutions based on artificial intelligence techniques are now available for sale, and radiology practices have to learn how to properly assess these tools. • We propose a framework focusing on practical points to consider when assessing an AI solution in medical imaging, allowing all stakeholders to conduct relevant discussions with manufacturers and reach an informed decision as to whether to purchase an AI commercial solution for imaging applications. • Topics to consider in the evaluation include the relevance of the solution from the point of view of each stakeholder, issues regarding performance and validation, usability and integration, regulatory and legal aspects, and financial and support services.]

COVID-19: Impact on Radiology Services

Accelerated implementation of remote reporting during the COVID-19 pandemic.
Callaway M., Greenhalgh R., Harden S., Elford J., Drinkwater K., Vanburen T. and Ramsden W.
Clinical Radiology, vol. 76(6) pp. 443-446
June 2021
[**Aim**: To assess, via a survey of UK radiological departments, if the COVID-19 pandemic led to a change in radiological reporting undertaken in a home environment with appropriate IT support. **Materials and methods**: All imaging departments in the UK were contacted and asked about the provision of home reporting and IT support before and after the first wave of the pandemic. **Results**: One hundred and thirty-seven of the 217 departments contacted replied, producing a response rate of 61%. There was a 147% increase in the provision of remote access viewing and reporting platforms during the pandemic. Although 578 consultants had access to a viewing platform pre-pandemic, this had increased to 1,431 during the course of the first wave. **Conclusion**: This survey represents work undertaken by UK NHS Trusts in co-ordinating and providing increased home-reporting facilities to UK radiologists during the first wave of this global pandemic. The impact of these facilities has been shown to allow more than just the provision of reporting of both elective and emergency imaging and provides additional flexibility in how UK radiologists can help support and provide services. This is a good start, but there are potential problems that now need to be overcome.]

The 12-hour shift: radiographers' perspectives and its applicability during a pandemic.
Ooi J.W.L., Er A.T.W., Lee W.C., Chee H.C.
Radiography, vol. 27 (2) pp. 512-518
May 2021
[**Introduction**: Traditionally, shift work for radiographers at our institution comprised of three shift patterns - morning (8am-2pm), afternoon (2pm-9pm) and night (9pm-8am). However, when COVID-19 was first detected in Singapore in January 2020, the 12-h shift was introduced for better team segregation and deployment to meet the service needs of the Emergency Department. The 12-h shift consisted of the day (9am-9pm) and night (9pm-9am) shifts. While the 12-h shift is common to nursing practices, it is new to the radiography profession within the study centre. This study explores the radiographers' perspectives of the new shift and the impact of shift patterns on radiographers' wellness and work performance compared to the original three shift patterns. **Methods**: A mixed-methods design study was adopted for this single-centre evaluation. An anonymous online questionnaire was administered to radiographers who had experienced both shift types. Additionally, the number of radiographers who

had taken sick leave, and images rejected and accepted from the X-ray consoles were retrospectively collected to measure the impact of the new shift. **Results**: Radiographers experienced fatigue and appreciated the longer rest days associated with the 12-h shift. Additionally, the sick leave rates and image reject counts were more favourable with the 12-h shift pattern. **Conclusion**: The findings indicate that the extended shift hours are effective during a pandemic but may result in radiographer burnout during a prolonged outbreak. **Implications for practice**: Studying these variables will provide an effective starting point in understanding the efficacy and applicability of a 12-h shift system during pandemic periods.]

Diagnostic Radiology

Analysis of characteristics of images acquired with a prototype clinical proton radiography system.
Sarosiek C., DeJongh E.A., Coutrakon G., DeJongh D.F., Duffin K.L., Karonis N.T., Ordoñez C.E., Pankuch M. et al
Medical Physics, vol. 48 (5) pp. 2271-2278
May 2021
[**Purpose**: Verification of patient-specific proton stopping powers obtained in the patient's treatment position can be used to reduce the distal and proximal margins needed in particle beam planning. Proton radiography can be used as a pretreatment instrument to verify integrated stopping power consistency with the treatment planning CT. Although a proton radiograph is a pixel by pixel representation of integrated stopping powers, the image may also be of high enough quality and contrast to be used for patient alignment. This investigation quantifies the accuracy and image quality of a prototype proton radiography system on a clinical proton delivery system. **Methods**: We have developed a clinical prototype proton radiography system designed for integration into efficient clinical workflows. We tested the images obtained by this system for water-equivalent thickness (WET) accuracy, image noise, and spatial resolution. We evaluated the WET accuracy by comparing the average WET and rms error in several regions of interest (ROI) on a proton radiograph of a custom peg phantom. We measured the spatial resolution on a CATPHAN Line Pair phantom and a custom edge phantom by measuring the 10% value of the modulation transfer function (MTF). In addition, we tested the ability to detect proton range errors due to anatomical changes in a patient with a customized CIRS pediatric head phantom and inserts of varying WET placed in the posterior fossae of the brain. We took proton radiographs of the phantom with each insert in place and created difference maps between the resulting images. Integrated proton range was measured from an ROI in the difference maps. **Results**: We measured the WET accuracy of the proton radiographic images to be ±0.2 mm (0.33%) from known values. The spatial resolution of the images was 0.6 lp/mm on the line pair phantom and 1.13 lp/mm on the edge phantom. We were able to detect anatomical changes producing changes in WET as low as 0.6 mm. **Conclusion**: The proton radiography system produces images with image quality sufficient for pretreatment range consistency verification.]

Diagnostic performance of the Kaiser score for characterizing lesions on breast MRI with comparison to a multiparametric classification system.
Istomin A., Masarwah A., Vanninen R., Okuma H., and Sudah M.
European Journal of Radiology, vol. 138
May 2021
[**Purpose**: To determine the diagnostic performance of the Kaiser score and to compare it with the BI-RADS-based multiparametric classification system (MCS). **Method**: Two breast radiologists, blinded to the clinical and pathological information, separately evaluated a database of 499 consecutive patients with structural 3.0 T breast MRI and 697 histopathologically verified lesions. The Kaiser scores and corresponding MCS categories were recorded. The sensitivity and specificity of the Kaiser score and the MCS categories to differentiate benign from malignant lesions were calculated. The interobserver reproducibility and receiver operating characteristic (ROC) parameters were analysed. **Results**: The sensitivity and specificity of the MCS were 100 % and 12 %, respectively, and those of the Kaiser score were 98.5 % and 34.8 % for reader 1 and 98.7 % and 47.5 % for reader 2. The area under the ROC-curve was 85.9 and 87.6 for readers 1 and 2. The interobserver intraclass correlation coefficient was excellent at 0.882. Reader 1 upgraded six lesions from BI-RADS 3 to a Kaiser score of >4, and reader 2 upgraded seven lesions. When applying the Kaiser score to 158 benign lesions readers 1 and 2 would have reduced the biopsy rate by 22.8 % and 35.4 %, respectively. **Conclusions**: The Kaiser score showed high diagnostic accuracy with excellent interobserver reproducibility. The MCS had perfect sensitivity but low specificity. Although the Kaiser score had slightly lower sensitivity, its specificity was 3-4 times greater than that of the MCS. Thus, the Kaiser score has the potential to considerably reduce the biopsy rate for true negative lesions.]

Dual-energy computed tomography in acute ischemic stroke: state-of-the-art.
Mangesius S, Janjic T., Steiger R., Haider L., Rehwald R., Knoflach M., Widmann G., Gizewski E., and Grams A.
European Radiology, vol. 31 (6) pp. 4138-4147
June 2021
[Dual-energy computed tomography (DECT) allows distinguishing between tissues with similar X-ray attenuation but different atomic numbers. Recent studies demonstrated that this technique has several areas of application in patients with ischemic stroke and a potential impact on patient management. After endovascular stroke therapy (EST), hyperdense areas can represent either hemorrhage or contrast staining due to blood-brain barrier disruption, which can be differentiated reliably by DECT. Further applications are improved visualization of early infarctions, compared to single-energy computed tomography, and prediction of transformation into infarction or hemorrhage in contrast-enhancing areas. In addition, DECT allows detection and evaluation of the material composition of intra-arterial clots after EST. This review summarizes the clinical state-of-the-art of DECT in patients with stroke, and features some prospects for future developments. KEY POINTS: • Dual-energy computed tomography (DECT) allows differentiation between tissues with similar X-ray attenuation but differentatomic numbers. • DECT has several areas of application in patients with ischemic stroke and a potential impact on patient management. • Prospects for future developments in DECT may improve treatment decision-making.]

Initial chest radiograph scores inform COVID-19 status, intensive care unit admission and need for mechanical ventilation.
Shen B., Hoshmand-Kochi M., Abbasi A., Glass S., Jiang Z., Singer A.J., Thode H.C., Li H., Hou W., and Duong T.Q.
Clinical Radiology, vol. 76 (6) p. 473
June 2021
[**Aim**: To evaluate whether portable chest radiography (CXR) scores are associated with coronavirus disease 2019 (COVID-19) status and various clinical outcomes. **Materials and methods**: This retrospective study included 500 initial CXR from COVID-19-suspected patients. Each CXR was scored based on geographic extent and degree of opacity as indicators of disease severity. COVID-19 status and clinical outcomes including intensive care unit (ICU) admission, mechanical ventilation, mortality, length of hospitalisation, and duration on ventilator were collected. Multivariable logistic regression analysis was performed to evaluate the relationship between CXR scores and COVID-19 status, CXR scores and clinical outcomes, adjusted for code status, age, gender and co-morbidities. **Results**: The interclass correlation coefficients amongst raters were 0.94 and 0.90 for the extent score and opacity score, respectively. CXR scores were significantly (p 0.05). CXR scores were not associated with length of hospitalisation or duration on ventilation (p>0.05). **Conclusions**: Initial CXR scores have prognostic value and are associated with COVID-19 positivity, ICU admission, and mechanical ventilation.]

Education, Training and Workforce Development

Enhancing communication between foundation doctors and radiologists: a quality improvement project.
Chuang Y-H, Jones V., Trail M., Szewczyk-Bieda M., Nandwani G.M.
Postgraduate Medical Journal, vol. 97 (1147) pp. 321-324
May 2021
[Facilitating radiological imaging for patients is an essential task for foundation year (FY) doctors. Achieving competence in this task can significantly enhance patient management. We evaluated the confidence and skills of FY doctors in facilitating radiological imaging before and after introduction of formal training. Twenty surgical FYs working at a large teaching hospital were surveyed to evaluate their baseline level of competence in booking and discussing imaging with radiology colleagues. Parameters were measured on a Likert scale, including confidence in discussing requests and satisfaction of their own performance following discussions with radiologists. Eight radiology consultants were surveyed to evaluate their opinions on FYs' communication and established areas for improvement. A teaching session was then delivered to improve communication skills. Furthermore, Previous investigation results, Answer you need from the scan, Clinical status and story, Crucial: how urgent is the scan, Safety (PACCSS) poster was introduced to remind the FYs of the salient information required when discussing imaging. One month after the intervention, the initial participants were resurveyed. Based on a 10-point Likert scale, the FYs demonstrated a mean improvement in self-reported confidence (2.1±1.1, p<0.01), and in satisfaction of own

performance after a discussion (1.7±1.1, p<0.01). We identified deficiencies in surgical FY doctors' confidence and skills in facilitating radiological imaging. There was a demonstrable benefit with focused training in improving these skills. This could potentially provide significant benefits in patient care and management. Interspecialty communication should be introduced into undergraduate and postgraduate educational curriculum.]

Expectations of therapeutic radiography students in Wales about transitioning to practice during the Covid-19 pandemic as registrants on the HCPC temporary register.
Courtier N., Brown P., Mundy L., Pope E., Chivers E., and Williamson K.
Radiography, vol. 27(2) pp. 316-321
May 2021
[**Introduction**: The Covid-19 crisis continues to profoundly impact on radiotherapy practice in the UK. We explore the views of therapeutic radiographer students on entering their first post in unique circumstances as a means to evaluate the support that may minimise negative impacts on their transition to practitioners. **Method**: Focus groups were conducted outside of students' final year educational programme and immediately prior to them starting work. Qualitative data were analysed using a framework analysis. **Results**: Emergent themes from the eleven participants were: Covid-19 as a layer on top of underlying anxieties; Degree of readiness for imminent psychological, emotional and practical challenges; Feeling valued as a health professional/radiographer at this time; A mixed student and qualified staff professional identity as HCPC temporary registrants. **Conclusion**: Uncertainties related to Covid-19 were seen to add a destabilising component to existing anxieties and challenges. In this context, there are significant risks of impaired professional socialisation due to incongruence between students' expectations and the reality in clinical departments. **Implications for practice**: Informed academic support and flexible clinical preceptorship that address anxieties and congruence barriers are vital to guide new practitioners through a health crisis that presents significant challenges but also opportunity for professional development.]

The impact of COVID-19 upon student radiographers and clinical training.
Rainford L.A., Zanardo M., Buissink C., Decoster R., Hennessy W., Knapp K., Kraus B., Lanca L., Lewis S. et al
Radiography, vol. 27(2) pp. 464-474
May 2021
[**Introduction**: To investigate student clinical placement concerns and opinions, during the initial COVID-19 pandemic outbreak and to inform educational institution support planning. **Methods**: Between mid-June to mid-July 2020, educational institutions from 12 countries were invited to participate in an online survey designed to gain student radiographer opinion from a wide geographical spread and countries with varying levels of COVID-19 cases. **Results**: 1277 respondents participated, of these 592 had completed clinical placements during January to June 2020. Accommodation and cohabiting risks were identified as challenging, as was isolation from family, travel to clinical placements, and to a lesser extent childcare. Students stated they had been affected by the feeling of isolation and concerns about the virus whilst on placement. Overall 35.4% of all respondents were 'Not at all worried' about being a radiographer, however, 64.6% expressed varying levels of concern and individual domestic or health situations significantly impacted responses ($p \leq 0.05$). Year 4 students and recent graduates were significantly more likely to be 'Not worried at all' compared to Year 2 and 3 students ($p \leq 0.05$). The need for improved communication regarding clinical placements scheduling was identified as almost 50% of students on clinical placements between January to June 2020 identified the completion of assessments as challenging. Furthermore, only 66% of respondents with COVID-19 imaging experience stated being confident with personal protective equipment (PPE) use. **Conclusion**: Student radiographers identified key challenges which require consideration to ensure appropriate measures are in place to support their ongoing needs. Importantly PPE training is required before placement regardless of prior COVID-19 imaging experience. **Implications for practice**: As the next academic year commences, the study findings identify important matters to be considered by education institutions with responsibility for Radiography training and as students commence clinical placements during the on-going global COVID-19 pandemic.

Interventional Radiology

Evaluation of a prospective adverse event reporting system in interventional radiology.
Mulvihill S.B., Healy G.M., O'Rourke C., and Cantwell C.P.
Clinical Radiology, In Press, Corrected Proof
May 2021
[**Aim**: To assess the performance of a prospective adverse event (AE) reporting system. **Materials and methods**: Four hundred and seventy-one consecutive arterial procedures were performed in 465 patients (median age, 65 years; interquartile range, 54-77; 276 men) over 2 years by four interventional radiologists at a single centre where clinical follow-up was not performed routinely by interventional radiology (IR). AEs were reported prospectively using a radiology information system or in interventional radiologists' electronic records and combined in a departmental listing of adverse events (DLAE). A retrospective medical record review was performed to identify a reference standard list of AEs for this observational cohort study. AEs were graded according to the Society of Interventional Radiology AE classification system. Descriptive statistics were calculated for the performance of the DLAE. A model comparing the rate of reporting of AEs with and without integration of clinical follow-up was tested for significance. **Results**: Thirty-eight of the 471 (8%) IR procedures had an AE according to the reference standard. The DLAE identified 20/38 (53%) of AEs (K=0.67 [good agreement], 95% confidence interval [CI] agreement=0.53-0.81; p=0.0001; sensitivity 52.6% [95% CI, 36-69%], specificity 100% [95% CI, 99-100%], positive predictive value [PPV] 100%, negative predictive value [NPV] 96 [95% CI, 94.5-97%], accuracy 96% [95% CI, 94-97%]). The performance of the AE reporting system will improve with integration of clinical follow-up (p=0.0015). **Conclusion**: A prospective AE reporting system without clinical integration will not detect all procedure complications.]

Evaluation of novel X-ray protective eyewear in reducing the eye dose to interventional radiology physicians.
Endo M., Haga Y., Sota M., Tanaka A., Otomo K., Murabayashi Y., Abe M., Kaga Y., Inaba Y., Suzuki M. et al
Journal of Radiation Research, vol. 62 (3) pp. 414-419
May 2021
[The new recommendation of the International Commission on Radiological Protection for occupational eye dose is an equivalent dose limit to the eye of 20 mSv year-1, averaged over a 5-year period. This recommendation is a drastic reduction from the previous limit of 150 mSv year-1. Hence, it is important to protect physicians' eyes from X-ray radiation. Particularly in interventional radiology (IVR) procedures, many physicians use protective lead (Pb) glasses to reduce their occupational exposure. This study assessed the shielding effects of novel 0.07 mm Pb glasses. The novel glasses (XR-700) have Pb-acrylic lens molded in three dimensions. We studied the novel type of 0.07 mm Pb glasses over a period of seven consecutive months. The eye dose occupational radiation exposure of seven IVR physicians was evaluated during various procedures. All IVR physicians wore eye dosimeters (DOSIRIS™) close to the left side of the left eye. To calculate the shielding effects of the glasses, this same type of eye dosimeter was worn both inside and outside of the Pb lenses. The average shielding effect of the novel glasses across the seven physicians was 61.4%. Our results suggest an improved shielding effect for IVR physicians that use these glasses. No physician complained that the new glasses were uncomfortable; therefore comfort is not a problem. The lightweight glasses were acceptable to IVR physicians, who often must perform long procedures. Thus, the novel glasses are comfortable and reasonably protective. Based on the results of this study, we recommend that IVR physicians use these novel 0.07 mm Pb glasses to reduce their exposure.]

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