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European ALARA Network

Newsletter

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Editorial

Dear Readers,

After a relatively short absence, the EAN Newsletter is back for its 37th issue!

This newsletter includes a broad description of the Swiss Radium Action Plan launched by the Swiss Federal Office of Public Health, the first elements of which were presented in the EAN Newsletter no.36. This issue also includes two articles related to the implementation of the ALARA principle in the medical field: the first one dealing with the use of thyroid shields in dental radiography (article elaborated by Public Health England) and the second one presenting the results of inspections in radiology departments performed by the Swedish Radiation Safety Authority (Strålsäkerhetsmyndigheten, SSM).

If you are interested to publish your own contributions in the Newsletter, feel free to contact the Editorial Board.

Regarding EAN future events, the 16th Workshop on ALARA in Industrial Radiography will be held in March 2016 in Bern (Switzerland). Late registrations are still accepted.

Note also that EAN_{NORM} will organize its next Workshop in December at Stockholm. Lastly, we inform you that the EAN 17th workshop, planned in 2017, will deal with ALARA in emergency exposure situations.

The EAN Newsletter Editorial Board.

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The Radium Action Plan in Switzerland

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Introduction

In June 2014, radium-contaminated waste was discovered during work carried out for motorway construction at a former landfill site in Switzerland. The press then published a list of about 90 buildings possibly contaminated with radium in Switzerland. The origin of the radium was from the shutdown of watchmaking workshops and private apartments where radium work had been carried out in the past. Due to this, the Swiss Federal Office of Public Health (SFOPH) as regulatory body in radiation protection communicated its intent to do its utmost to control once and for all the radiological legacy of the period 1920 to 1960.

Situation of radium in Switzerland

Radium was used to produce luminescent paint in the watchmaking industry between 1920 and 1960. In spite of the precautions taken to disperse as little radium as possible, given its cost, employees were exposed and surface contamination occurred in the workshops and in private apartments or buildings where work was carried out. At the time, given the limited management of the waste resulting from the use of radium, radium residues were found in household waste and, in the absence of any particular precautions, this waste was sent to ordinary landfill sites.

Once the radiation emitted by radium was found to be carcinogenic, its use in watchmaking was subjected to authorisation and rules for protection were imposed by the ordinance of 19 April 1963. This led to radium being abandoned and replaced by the significantly less radiotoxic radionuclide tritium. The industry regulatory body (Suva) then carried out checks on companies that had been granted radium authorisations. However, homes in which work with radium had been previously carried out were not subjected to a systematic contamination check. A radiological legacy therefore exists in certain private dwellings and their surroundings.

In 2003, the Federal Commission for Radiological Protection published a recommendation for the management of radiological legacies [1]. The Commission made proposals for an action plan that was principally aimed at adapting the legal basis to this problem, the creation of a land register, the justification for intervention when the limit of 1 mSv/year is exceeded for the public, and actively informing those concerned. The implementation of these recommendations was not considered a priority; the program of job rationalisation led the SFOPH to review its strategy and to concentrate mainly on the protection of the population against risks associated with high doses

Figure 1. – Watchmaking workshop in Mont Lucelle (formally Canton of Bern) in the 1950's (source: Keystone)

Radium Action Plan

The specific problem of radium resulting from watchmaking mainly concerns the Swiss Jurassic Arc. After having examined the steps taken abroad, principally in France [4], the lessons learnt demonstrate that:

- action is necessary because legacy situations from the past can involve health issues and have an environmental impact;
- the inventory phase, the identification of the sites and the initial contact with the owners concerned is indispensable for the operation to run smoothly;
- the diagnostic phase is essential in order to confirm the absence of health issues;
- the remediation phase involves decontamination and waste management, as well as the rehabilitation of the concerned premises and lands.

All these steps require resources for planning, coordination, diagnostics, detailed protocols, dose assessments, contacts with individuals, owners and local authorities, the press, the companies involved in the remediation, etc.

The key objective of the radium action plan is to guarantee that the annual exposure of the population from residual radium contamination does not exceed 1 mSv, and to ensure the protection of workers and the environment against risks associated with the remobilisation of the radium present in the buildings, ground and landfill sites.

Content and time-line of the action plan

The radium action plan 2015-2019 is made up of four elements: to account for the sites where radium was handled, to diagnose its presence or absence, to plan and to carry out remediation justified from the viewpoint of radiological protection, and to put in place monitoring of the landfill sites in which radioactive waste was placed. In the light of the above, the action plan was launched without delay so as to assess the present situation relating to residual contamination from radium, to determine the resulting exposure of the population, and to reduce it when it exceeds the limit of 1 mSv per year.

Table 1. – Content and time-line of the Radium Action Plan

Actions	Measures	Impact
1. Search for potentially contaminated buildings and landfills	Search and list the buildings concerned and identify other possibly impacted sites (landfill sites) Inform the owners and/or the public authorities	Protection of the health of the population (< 1 mSv/yr)
2. Diagnostic of potentially contaminated buildings	Initiate contact with the owners Carry out the diagnostic measurements Evaluate the need for remediation or optimization	Protection of the workers
3. Remediation of contaminated buildings	Plan and carry out the remediation Ensure the work is carried out Separate and remove the radium waste	Protection of the environment
4. Monitor the potentially contaminated landfills	Put in place site monitoring, (leachate from the landfill sites) Supervise the workers and guarantee the removal of the waste	

Searching for potentially contaminated site

The search for radium-contaminated sites will involve the use of the following different information sources:

- Historical information (federal, cantonal and municipal archives)
- Contacting the professionals concerned (watchmaking industry, radium suppliers)
- Contacting individuals (information requests).

A databank of potentially contaminated sites will be created. The conditions for data protection and confidentiality will be the subject of a decision to be confirmed by a steering committee.

Diagnostic of the potentially contaminated buildings, accompanying measures

A diagnostic plan was established with a timeline, based on the list of the potential radium-contaminated sites, the results of the pilot diagnostics and the procedures drawn up in the preparatory phase.

For each group of sites (canton or region) a coordination with the cantonal and municipal services is required. In particular, they need to be informed of the programme and agree on their participation in contacting the residents;

The following actions are to be carried out for each potentially contaminated site:

- Contact with the residents of the site (tenants and owners) and definition of the conditions for the diagnostic (timing, duration, implications for the residents);
- Carrying out the diagnostic according to the established procedure;
- Initially inform the residents at the end of the diagnostic; when needed, propose immediate arrangements in the case of significant contamination;
- Prepare the diagnostic report with proposals on the follow-up (release or remediation);

- Submit the report to the steering committee in cases of proven contamination (higher than 1 mSv per year);
- Those responsible for the action plan (FOPH) will officially inform the persons concerned (tenants and owners) and the authorities.

Remediation of the contaminated buildings

Remediation is a very specific procedure at the site in question and requires good collaboration between the occupants of the site and the owner. The remediation procedure is preceded by a campaign of measures that are complementary to the diagnostic programme in order to determine the extent and nature of the contamination. This partially invasive process (moving furniture, carpets, floor coverings) is carried out in close collaboration with the inhabitant.
Based on these measurements, and with the support of a construction specialist, an action plan is established, and submitted to the project supervisor (in principle the owner). The aim is to reduce the contamination to a minimum and to guarantee the habitability of the premises without unacceptable risk.

The project supervisor chooses a construction company to carry out the remediation work. This company must be informed of the presence of radium and required to respect the radiation safety instructions laid down on a case-by-case basis by the SFOPH, who in collaboration with Suva, provides support for the work.

In the case where no person or company can be held responsible for the contamination, and that therefore the costs are borne by the Confederation, the offer from the company charged with the remediation is to be sent to the SFOPH for financial approval. The SFOPH shall engage a specialist in the field of construction to judge the adequacy of the offer. Once the SFOPH has accepted, the remedial work will be carried out under the radiological surveillance of the SFOPH or the Suva. A final check of the remediation is made by the SFOPH at the end of the work. The report of this inspection contains a proposal for future actions.

For the implementation of the remediation, priority will be given to sites where the highest contamination levels have been observed. The total duration of this step depends on the number of remediations to be carried out and on the construction and administrative difficulties that are met. It is hoped that the action plan will be completely realised in five years.

The decision to release the site, based on the final control report, is taken by the SFOPH and sent to the steering committee for approval. The decision for release may contain conditions in the form of restricted use in the case of reassignment or transformation of the site or easements. The terms for defining the conditions (updating the land registry etc.) are defined with the competent administrative authorities (municipality, canton). The persons concerned (tenants, owners) are informed of the decision of release. This decision is also registered by the administrative authorities. In the case where the results of the remediation do not permit a total or conditional release of the site, an ad hoc approach is proposed by the SFOPH, approved by the steering committee and submitted to those responsible for the site (tenants, owners) and to the authorities competent for construction matters and domestic hygiene.

Surveillance of the landfill sites and other contaminated sites

In the landfill sites and other sites identified as being contaminated with radium, the SFOPH is in charge of implementing appropriate radiological surveillance and monitoring. This action, which has the principal aim of guaranteeing the protection of the workers and the environment during the work, may lead to a remobilisation and a dispersal of the contamination, and will be done in close collaboration with the Swiss Federal Office of the Environment and the relevant municipalities and cantons. In regard to the potentially contaminated public landfill sites, it is not envisaged to search and eliminate radioactive traces present in the mass of waste.

Involvement will simply consist of a visit to each site concerned, measurement of the exposure levels at the surface of the site and measurement of the radioactive concentration of the leachates from the site. On this basis, an approach that enables the site workers to avoid exposure and to monitor the activity of the leachates could be implemented as needed.

Information and contact policy relating to the action plan

A code of conduct for informing the involved parties (owners, tenants, administration, and media) will be drawn up and submitted for approval from the steering committee prior to informing the support group and the involved parties.

Transparency is limited by the rights to privacy and the interests of the individuals. Although the existence of potentially contaminated sites in a region may be openly stated, a precise location of the sites must be avoided in order to protect the interests of the individuals. The press will be informed of this strategy and committed to accept and respect it.

The arrangements for contacting the inhabitants (owners, tenants) are to be defined in collaboration with the local authorities (cantons and municipalities).

Statutory conditions

The SFOPH has instructed an external expert to prepare a legal opinion on the question as to whether the Confederation has the power to take appropriate action to rehabilitate contaminated properties and who must support the costs.

The legal opinion essentially concluded that, according to the federal jurisprudence, the Confederation is required to proceed to any remediation measures required in connection with an implementation by substitution and that a transfer of costs onto the current owners of the affected buildings is hardly conceivable for reasons of proportionality and expediency. To effectively trace to those responsible for the contaminations would be possible only in very rare cases, as today they are no longer traceable and identifiable or because they no longer exist.

It should be noted here that the Confederation shall pay the costs of remediation only when they are associated with the limit value being exceeded. Below this value, the remediation is borne by the owner, who benefits from the skills of the SFOPH in the protection of the workers and in the removal of the radioactive waste.

Status of the Radium Action Plan at the end of 2015

Until the end of 2015, 90 buildings covering 564 apartments or commercial units or rooms, have undergone a radium diagnostic. Remediation is necessary for 24 buildings. Eight of them have already been remediated. The status of the diagnostic measurements and the remediation number are listed in the next table below. The radium action plan has foreseen to measure more than 500 buildings or sites which are disseminate mainly in the Jura region. ❑

Table 2. – Status of the Plan at the end of 2015

Action	Building	Details, number of units, apartments, commercial rooms
Diagnostic already realized	90	564
Case where a remediation is needed	24	19 apartments, 11 garden
Case without remediation	66	545
Remediation already finished (31.12.2015)	8	7 apartments, 5 garden

References

[1] Recommandations 2003 de la Commission fédérale de radioprotection
[2] Plan d'action national radon 2012 - 2020
[3] Rapports de mesure sur les décharges des Fléoles (Lieschenweg) à Bienne
[4] La gestion des sites et sols pollués par la radioactivité. Revue Contrôle, n° 195, 2002

The Use of Thyroid Shields in Dental Radiography

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Introduction

In the UK, the current Guidance Notes for Dental Practitioners on the Safe Use of X-rays state that "Thyroid collars should be used in those few cases where the thyroid may be in the primary beam, based on advice from an MPE [Medical Physics Expert]" (NRPB, 2001).
The question of whether thyroid shields are beneficial has come to the fore recently due to a number of factors, including:

- the introduction of new imaging technologies such as cone beam CT (CBCT), which have been generally associated with higher patient doses
- high profile publications linking dental radiography to increased cancer risks
- national organisations promoting the use of thyroid shields.

This has left many dental practitioners unsure as to whether they should, or indeed are required, to provide thyroid shields for their patients. This paper reports a review of the available evidence for the use of thyroid shields in dental radiography.

For most patients the thyroid will not be within the X-ray beam (see Figure 1.a) and therefore the advice seems to be clear that thyroid shields are not normally required.

Figure 1.a and 1.b – Location of the thyroid (left) and typical thyroid shield (right).

There are some dental radiographic exams where the thyroid will be within the primary beam (eg. maxillary anterior occlusal radiograph), however these are not common examinations for a general dental practice. There may also be circumstances where difficulties with certain patient groups may require the use of unusual positioning techniques, which could place the thyroid within the primary X-ray beam.

Figure 1.b shows a typical thyroid shield. The shield is wrapped around the patient's neck and contains a sheet of lead or lead equivalent material (typically 0.5 mm of lead) to reduce the radiation exposure of the thyroid.

Literature review

A search of the literature was carried out to determine the current evidence base related to dental radiography and thyroid exposure. This search focused on measured doses to the thyroid and the efficacy of thyroid shields. The resultant documents were reviewed to ensure that they were appropriate to the topic of interest. A brief summary is provided of the relevant documents, in chronological order.

Sikorski and Taylor (1984) showed a reduction in thyroid exposure of 5-56% for a full mouth series of radiographs, 2-18% for bitewing radiographs and 10-79% for panoramic radiographs when using a thyroid shield. The choice of collimation and technique were not detailed for intra-oral radiography, however, given the date of this publication it is likely that circular collimators and the bisecting angle technique were use.

Schmidt, Velders and van Ginkel (1998) showed that a thyroid collar reduced the equivalent dose to the thyroid for intra-oral periapical radiographs but not for bitewing radiographs. The choice of collimation and technique was not discussed.

Rush and Thompson (2007) considered the entrance dose to the thyroid from intra-oral radiography. The authors looked at the choice of collimation, technique and provision of a thyroid shield over a range of anatomical views. The maximum thyroid entrance doses over the range of anatomical views is summarised in Table 1 below.

Table 1. – Summary of results from Rush and Thompson (2007)

Collimator, Technique, Thyroid shield	Entrance Dose (µGy)
Rectangular, Bisecting angle, no shield	9.5
Rectangular, Paralleling, no shield	1.5
Circular, Bisecting angle, no shield	13.5
Circular, Paralleling, no shield	4
Rectangular, Paralleling, shield	0.4

Hujoel, Hollender and Bollen (2008) showed that the equivalent dose to the thyroid was 32-92 µGy for intra-oral radiographs, 330 µGy for posterior anterior (PA) cephalometric radiographs and 90 µGy for panoramic radiographs. For intra-oral radiographs, circular collimation was used and the choice of technique was not described.
Sheikh (2010) showed the entrance dose to the thyroid was 109 µGy for a full mouth series and 15 µGy for a single maxillary occlusal radiograph. A circular collimator and bisecting angle technique were used.
Koivisto et al. (2012) estimated the equivalent dose to the thyroid of 800 µSv for a CBCT radiograph (exposure factors used were 8 cm x 8 cm field of view, 84 kV and 145 mAs giving a dose area product of 574 mGy cm2).

Grünheid et al. (2012) determined equivalent doses to the thyroid to be 167-367 µSv for CBCT, 67 µSv for a panoramic radiograph and 30 µSv for a lateral cephalometric radiograph.
Toossi, Akrabi and Roodi (2012) measured the entrance dose to the thyroid to be on average 38 µGy from panoramic radiographs.
Qu (2012) looked at equivalent doses to the thyroid for different CBCT radiographs with and without thyroid shields. The results are shown in table 2 below.

Han et al. (2013) considered the use of thyroid shields in panoramic radiography. The results for the equivalent dose received by the thyroid are summarised in Table 3. They concluded that the thyroid shield reduces the equivalent dose to the thyroid for digital radiography but not for film imaging. The authors also considered the use of a second thyroid collar positioned around the back of the patient and found that this offered no significant additional dose saving.

Table 2. – Summary of results from Qu (2012)

Field of view	Equivalent dose to thyroid (µSv)			
	No shield (µSv)	Shield front (µSv)	Shield front and back (µSv)	% Reduction in thyrdoid dose (front shield)
20x19	1895	625	728	67%
16x10	2700	768	740	72%
16x7	2360	695	695	71%

Table 3. – Summary of results from Han *et al.* (2013)

Machine	Dose without thyroid shied (µSv)	Dose with thyroid shield (µSv)	% Reduction in thyroid dose
GE OP200 (film)	27.89	25.20	10%
Sirona Orthophos CD (film)	67.87	58.87	13%
Sirona Orthophos XG plus (digital CCD)	54.60	43.95	20%
Planmeca Promax (digital CCD)	54.95	42.60	22%

Effect of intra-oral radiography technique

One letter to the editor in a dental journal (Hamilton, 2012) called for a review of the use of thyroid collars, citing policy statements in the UK, EC and USA. The letter presented the image on the left below (Figure 2.a) as an example of the thyroid being in the primary X-ray beam for an upper anterior periapical radiograph.
Figure 2.a shows the X-ray tube directing the X-ray beam towards the thyroid; however, this image shows unusual operator technique. Figure 2b, on the right, shows the standard positioning for this radiograph using the paralleling technique (Whaites, 2002). For a long time, the paralleling technique, which should not cause the thyroid to be directly exposed, has been the recommended intra-oral imaging technique in the UK. However, there may be exceptional cases where this positioning cannot be used and the operator should then consider using a thyroid shield, if the thyroid would be directly exposed, in line with current UK advice.

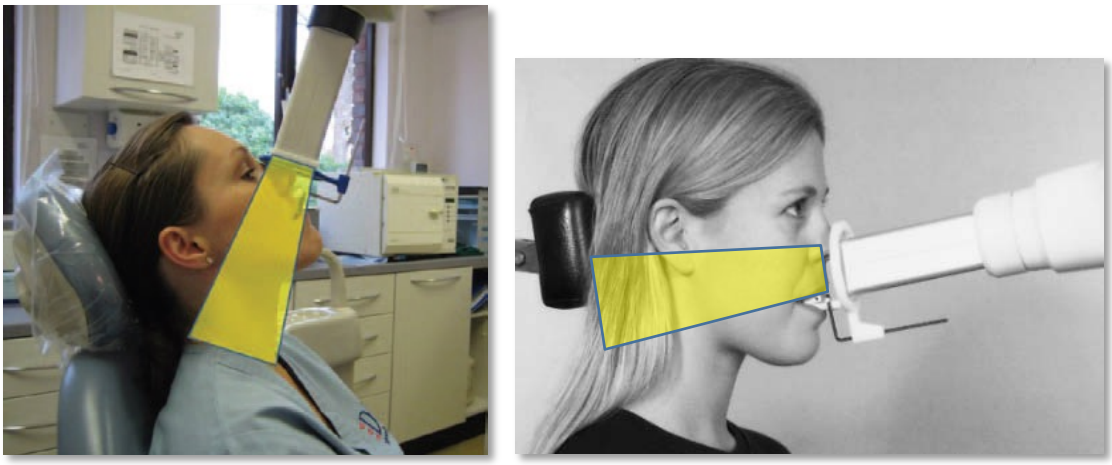

Figure 2.a and b. – Intra-oral cone positioning for a maxilliary incisor shown in (left) Hamilton (2012) and (right) Whaites (2002)

Organisational policy statements on the use of thyroid shields

The UK position on the use of thyroid collars is similar to that of some other countries; including New Zealand where thyroid shields are recommended for projections such as the vertex occlusal exam (National Radiation Laboratory, n.d.) and Ireland where the Radiological Protection Institute of Ireland (RPII) states that "Where the thyroid will be exposed, special consideration should be given to the shielding of the thyroid. A thyroid collar may be required where intraoral radiographs with circular collimation are taken on persons under the age of 30 years" (RPII, 2011).

Guidance published by the European Commission (EC) recommends shielding where the thyroid is "very close to" the X-ray beam (EC 2004, 2012). No definition of "very close to" is provided, however it does acknowledge that "it is probable that rectangular collimation for intraoral radiography offers similar level of thyroid protection to lead shielding, in addition to its other dose reducing effects" (EC, 2004). In the USA, the NCRP (2003) requires thyroid collars for children and recommends them for adults. The Image Gently alliance has also recommended that dentists should "always use thyroid collars" when radiographing children (Image Gently, n.d.). The American Thyroid Association (ATA) goes further and recommends thyroid shields for adults as well as children, "The ATA thus endorses the recommendations of the National Council on Radiation Protection & Measurements (NCRP) Report 145, Radiation Protection in Dentistry, 2003. However, it urges a reconsideration of

the less stringent requirement put forth for thyroid shielding in adults as compared to children" (ATA, 2013). The American Dental Association (ADA) (2012) recommends thyroid shields "whenever possible".

Discussion

It is evident from all the policy statements that they do not reference any published papers that demonstrate the benefits of thyroid shields, therefore it is hard for the reader to understand the basis for the recommendations.

The use of the paralleling technique for intra-oral radiography is not explicitly recommended in any policy statement. Although the paralleling technique is the recommended intra-oral imaging technique in the UK (Whaites, 2002), the bisecting angle technique was found to be widespread in a 2003 survey. This showed that 48% of respondents in the UK used the bisecting angle technique either always or often (Tugnait, Clerehugh and Hirschmann, 2003), therefore it is probably still widely used today. A change to the paralleling technique is a relatively straightforward change in clinical practice which would significantly reduce thyroid exposure.

There is only one study where different techniques were compared (Rush and Thompson, 2007). This showed the use of rectangular collimation reduced the thyroid entrance dose from 4 µGy to 1.5 µGy and the use of paralleling technique from 9.5 µGy to 1.5 µGy. The use of a shield further reduced the entrance dose from 1.5 µGy to 0.4 µGy. This indicates that the appropriate choice of technique has the most significant influence on thyroid dose, the thyroid shield having a similar effect to using a rectangular collimator instead of a circular collimator.

The type of radiograph clearly influences the dose to the thyroid, with some evidence of no or very little benefit of a thyroid shield for bitewing radiographs but significant dose saving for other views (Sikorski and Taylor, 1984; Schmidt, Velders and van Ginkel, 1998). This is as expected, as the X-ray beam passes close to, or exposes, the thyroid for some views.

One study (see table 3) considered four different panoramic X-ray machines and showed that the thyroid shield had a significant effect on reducing the equivalent dose to the thyroid when using two of the four machines (Han et al., 2013). The two machines where the thyroid collar was beneficial used digital imaging systems. The authors' conclusion that digital imaging reduced the dose to the thyroid is difficult to confirm with such a small number of systems. The size of the X-ray beam, choice of exposure factors, geometry of the scanning system or small changes in positioning of the shield or patient could all account for the results seen and these aspects are not inherent to either film or digital imaging. The reported results appear to support this, as one of the film systems gives a significantly lower dose to the thyroid, without a shield, than the two digital machines when using a shield. This result would suggest the choice of equipment to be have significantly more influence on the reduction of thyroid doses than the use of a thyroid shield.

The ranges of thyroid doses, without the use of thyroid shields, presented in the literature are summarised in Table 4.

Table 4. – Summary of the range of thyroid doses presented in the literature reviewed in this report

Type of radiograph	Equivalent Dose (µSv)
Intra-oral	1.5-13.5, 15, 32-92
Panoramic	27.9-67.9, 38, 67, 90
Lateral Ceph	30, 330
CBCT	167-367, 970, 1895-2700

Table 4 shows the significant differences in reported doses. Most papers do not provide details of the exposure settings selected on the X-ray set, so the differences could be explained by the choice of exposure settings on the machines, the measurement method used or the positioning of the phantom.

In the case of CBCT, patient doses are generally higher than other types of dental radiography therefore as would be expected the doses to the thyroid are higher than other

techniques. The equipment reported in the literature is generally large field of view scanners that will expose the thyroid to higher levels of scattered radiation than small field of view scanners.

Conclusion

Thyroid shields are capable of reducing the thyroid dose received by a patient during some dental radiography procedures and there is only a small associated cost. These two factors have probably led to the publication of policy statements recommending their use. It should be recognised, however, that the thyroid will always be exposed to some level of radiation due to internal transmission and scatter in the body.

For intra-oral, panoramic and cephalometric radiography, the use of appropriate equipment, exposure factors, technique and collimation all have equal or greater influence on the dose to the thyroid. As these factors also reduce both the effective dose to the patient and the exposure of the operator, these should be advocated ahead of the use of a thyroid shield.

For CBCT radiography, there may be a role for thyroid shields, however due to the paucity of data this must be a decision made by the practitioner in consultation with a Medical Physics Expert, taking into account the specific exam and model of CBCT.

For all extra-oral imaging the operator would need to ensure that the thyroid shield is outside the primary X-ray beam, otherwise it may render the image unusable and require a repeat radiograph without the shield.

On the balance of available information, it is considered that the existing UK guidance is appropriate and proportionate to the risks associated with exposure of the thyroid. Further research into the benefits of thyroid shields in CBCT radiography, especially for small fields of view, would be welcome. ❑

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Low Compliance with X-Rays Imaging Procedures

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Inspections performed by the Swedish Radiation Safety Authority (SSM) showed that radiographers do not always apply standard procedures and policies for reducing the radiation dose to patients. Nor did hospital management evaluate compliance with these procedures

Background

In May 2012, the Swedish Radiation Safety Authority distributed a questionnaire to all radiology departments in Sweden, totalling 199 departments. The supervisors were urged to account for their procedural compliance in the areas of ID checks, when examining women of childbearing age, use of gonad protection and use of compression.

In 2013 and 2014, 94 of these radiology departments were requested to report on their compliance with basic radiation protection guidelines to SSM by filling out an Internet form:

- The number of examinations in which the procedures were complied with.
- The number of examinations in which the procedures should have been complied with.

Results of the inspections

In 2012, 199 radiology departments in Sweden were requested by SSM to report on existing guidelines regarding identity checks, X-ray examinations of women of childbearing age, when to use lead shielding of gonads for male patients and when to use compression. Thirteen radiology departments lacked guidelines and were requested to establish them.

Over the course of 2013 and 2014, SSM conducted a follow-up to the 2012 survey of existing guidelines for reducing the radiation dose to patients. Heads of staff at 94 radiology departments were requested to evaluate their compliance with existing guidelines for reducing radiation doses to patients.

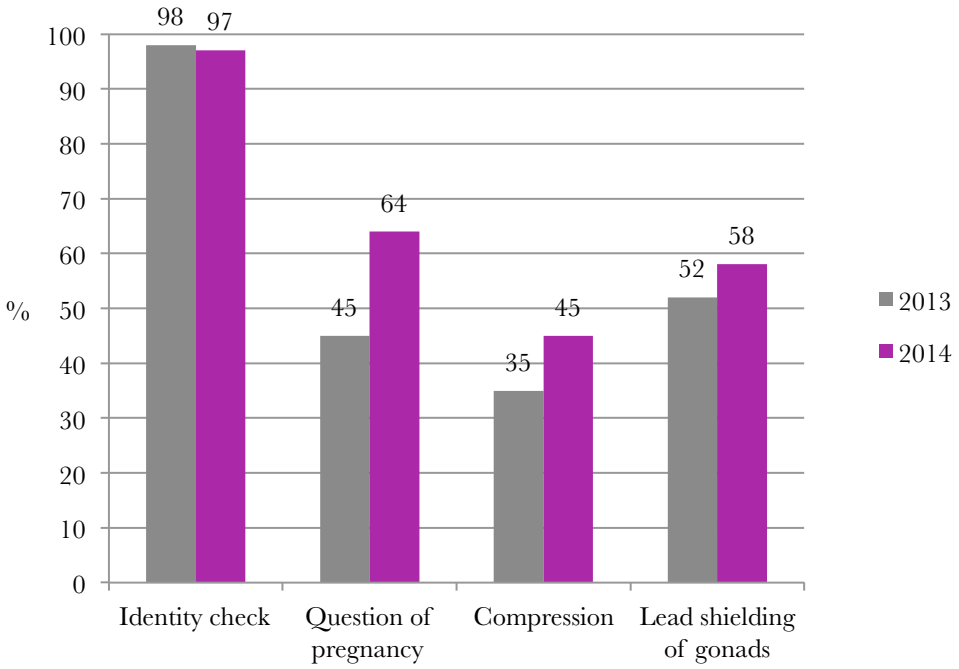
The procedures examined were:

- ID verification
- Asking women of childbearing age about possible pregnancy
- Use of lead shielding of gonads
- Use of compression

When comparing the two periods 2013 and 2014, SSM has noted that the radiology departments have increased their ability to produce required data for a certain period regarding use of basic radiation protection guidelines. For the period in 2013, only 33 per cent of the participating radiological departments were able to produce required data. For the period in 2014, 93 per cent of the radiology departments were able to produce required data. This should indicate that the radiology departments now have the ability to evaluate their compliance with basic radiation protection guidelines.

Despite this improvement, compliance with basic radiation protection guidelines is still low, around 50 per cent, indicating that there is great potential for improvement. The spread is wide and several radiology departments, in both public and private healthcare, have 100 per cent compliance with guidelines.

Over the course of 2015, the Swedish Radiation Safety Authority plans to continue its regulatory focus on the area of practical radiation protection work at national radiology departments. ❑



Average values for all radiology departments in Sweden when comparing 2013 and 2014.

Figure 1. – Comparison 2013/2014 for compliance with basic radiation protection guidelines

EAN Workshops

EAN 16th Workshop: ALARA in Industrial Radiography

Industrial radiography for non-destructive testing (NDT) using gamma and X-ray sources is a long-established and widespread practice. A key radiation protection principle is optimisation, to ensure that the radiation exposure of radiography workers and other persons are maintained As Low As Reasonably Achievable (ALARA).

In 2001, in Rome, the 5th EAN Workshop specifically considered ALARA in industrial radiography. It was concluded that ALARA was not always being achieved, and improvements in radiography equipment, working procedures, training and safety culture were recommended.

Since then, industrial radiography has remained an area of concern in radiation protection, due to the levels of radiation exposure received and, in particular, the number and magnitude of accidental exposures. Consequently, EAN has decided to re-visit this topic.

The workshop will consist of presentations (oral and posters) intended to highlight the main issues, and a significant part of the program will be devoted to discussions within working groups.

More information about the workshop and registration (until end of February) at

http://www.ean-workshop-16.ch/

EAN 17th Workshop: ALARA in Emergency Exposure Situations

The next EAN workshop will be devoted to the application of the ALARA principle in emergency exposure situations. Date (2017), venue and programme are still to be decided. ❑

ALARA NEWS

EAN$_{NORM}$: 8th Workshop and a new website

The central theme of the 8th EAN$_{NORM}$ workshop is "Three years into the new EU BSS: How far have we come with the transposition and what is the impact on NORM industrial activities?" Other topics will include, but not be limited to, new requirements to the construction industry, NORM metrology, radioecological aspects and recent NORM case studies.
As in previous EAN$_{NORM}$ workshops, target groups include, professionals involved in government NORM work, industrial NORM sectors (e.g. according to Annex VI in the BSS), academic research organisations and institutes, and other relevant professional and occupational health organisations.
The workshop will be organised by the Swedish Radiation Safety Authority. For further information and submission of papers contact Markos Koufakis at markos.koufakis@ssm.se or Helene Feldt at helene.feldt@ssm.sein Sweden, or visit the workshop's web page http://ean-norm.eu/?page_id=96.

Visit the new EAN$_{NORM}$ website http://www.ean-norm.eu that has recently been relaunched and now contains even more useful and relevant materials, documents and links.

EAN$_{NORM}$ is taken care of by IAF - Radioökologie GmbH, Dresden/Germany.
For more information, contact Astrid Schellenberger at schellenberger@iaf-dresden.de. ❑

NERIS Statement – Areas of research

NERIS is a European Platform on preparedness for nuclear and radiological emergency response and recovery, founded in June 2010. The mission of the NERIS Platform is to establish a forum for dialogue and methodological development between all European organisations and associations taking part in decision making of protective actions in nuclear and radiological emergencies and recovery in Europe. 55 institutions are currently member of the NERIS platform from which 28 supporting organizations.

An integral part of the mission of NERIS is to identify gaps and needs for further research and developments and addressing new and emerging challenges in the field of preparedness for nuclear or radiological emergency response and recovery. The Strategic Research Agenda (SRA) of NERIS, coordinated by the NERIS R&D Committee, identifies these research needs.

In the context of future EU research calls, NERIS has identified current research priorities which can serve as input for defining call topics. The definition of the research priorities proposed is based on the following elements:

- The priorities identified in the current SRA of NERIS: http://www.eu-neris.net/;
- The input from the members of the NERIS R&D Committee;
- The recently organized NERIS workshop (Milano, April 2015) and especially the
- Conclusions from the session rapporteurs;
- A consultation of all NERIS members related to the identified priorities (July 2015);
- The OPERRA survey;
- The realizations in past and current EU funded projects and especially from the Fukushima experience.

The current ranked research priorities identified by NERIS are:

1. Assessment of and communication of uncertainities;
2. Robust decicion-making;
3. Countermeasure strategy preparedness;
4. Atmospheric dispersion modelling;
5. Local radio-ecological models;
6. Monitoring strategies.

You may want to visit NERIS website to know more http://www.eu-neris.net ❑

FAQ ALARA

The IAEA proposed a list of frequently asked questions (FAQ) which intends to provide information to radiation protection specialists so they can answer quickly and correctly the most frequently asked questions. The EAN Newsletter proposes a selection of this FAQ in each issue.

Why did the ICRP recommendations propose specific dose limits for the eye lens and skin (and, more especially, for the extremities) rather than contenting itself with a whole body dose limit?

In most cases, if the annual effective dose limit (whole body dose) were to be reached following irradiation to a single organ, the dose to the organ would be significantly lower than the threshold at which deterministic effects for that organ would appear.

However, applying the same logic to the skin or to the eye lens shows that respecting the whole body effective dose limit is **not** sufficient to avoid the appearance of skin erythema or cataracts, etc. It was therefore necessary to propose specific dose limits to these parts of the body to ensure that people exposed will not develop deterministic effects to these organs: 500 mSv/year for the skin and the extremities, and 20 mSv/year* for the eye lens for occupationally exposed workers.

* Note that in 2010 ICRP recommended a decreased of the limit of dose for the lens (20 mSv/y averaged over 5 years when the previous limit was 150 mSv over 12 months). The Euratom Directive 2013/59 globally follows this recommendendation (article 9). ❑

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