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Review of ICRP94: Release of Patients After Therapy with Unsealed Radionuclides
International Commission on Radiological Protection

This report is the latest of several concise reports published by the ICRP on various aspects of medical radiation protection. In common with those reports, this document is an interesting and useful guide to its subject matter. In this case, the report is concerned with arrangements for dealing with patients who have been treated with radionuclides. Despite the title, the document considers aspects relating to hospitalisation of such patients as well as those pertaining to their release and it provides an invaluable summary of the very different approaches taken across the world.

The report inevitably focuses on radioiodine (I-131) treatments as this is by far the most common radionuclide treatment and thus is the main source of exposure to members of the public. Section 3 of the report, however, does give a useful, if brief, summary of other radionuclide therapies. Section 5 looks at current international recommendations on dose limits and dose constraints and provides an interesting review on the different interpretations of previous ICRP recommendations in various countries. Section 6 examines exposure pathways for I-131 treatment confirming that the main dose pathway from such patients is external irradiation. There is some useful discussion in this section and others on the tendency for calculation models to overestimate radiation doses. Contamination is also considered and the available literature extensively reviewed in this and the next section. A thought provoking comment from section 7 is that thyroid cancer induction in those under 20 years of age as a result of contamination from saliva may be a significant risk and this, of course, highlights the need for appropriate precautions.

Section 8 briefly looks at the various environmental pathways of radioiodine mainly focusing on discharge to sewers and its treatment thereafter. Methods of disposal of radioactive waste are considered in section 9 and this includes an interesting discussion on the need for storage tanks for accumulating I-131 patient excreta. Indeed one of the conclusions made in this section is that such storage has minimal benefit.

Section 10 examines the various factors that affect the decision to hospitalise or release patients and considers doses to hospital staff, financial and psychological costs of hospitalisation and doses to members of the public on release. There is a very topical, but brief, discussion on radiation detectors at airports. Reference is made to patient information documentation used to ease travel for patients recently treated with radioiodine; although ‘recently’ may not be the appropriate word considering the high sensitivity of the devices being used (quoted as being able to detect down to 0.01 MBq I-131 at 2–3 metres—the level of activity that might still be expected in a patient treated with 400 MBq I-131 after almost 4 months).

Section 11 looks at the release criteria used internationally and discusses the fixed activity approach used by some versus the more flexible approach of estimating doses to the public based on the patient’s particular circumstances. Indeed one of the recommendations of this report is to base release of patients on their family situation rather than the retained activity and worst-case scenario.

The final sections look at the increasing use of antibody therapy (with I-131 or Y-90) and issues such as death of patients treated with radionuclides, pregnancy and breastfeeding. Appendices A–C give examples of patient information leaflets and cards which, unfortunately, do not include information relating to travelling across borders or by air which would have been useful considering the earlier discussion.

On the whole, this is an easy to read and interesting summary of the subject. There are a few minor typographical errors in the report—one would have the less-experienced reader carrying out dose-rate measurements from radioiodine patients at 23 metres! But, all in all, an enjoyable and enlightening read.

J MacDonald

The Bomb and its Deadly Shadow. A Memoir by Dean Warren
Dean Warren
Xlibris
ISBN: 1-4134-6385-1

I thoroughly enjoyed reading this short (43 page) account of the life of the author’s father, Stafford Warren, and particularly his key role in advising
on radiological and health precautions during the atomic bomb development in World War II, and the period afterwards. He headed the US team who were the early visitors to Hiroshima and Nagasaki and later argued with the admirals to protect 42,000 personnel in Operation Crossroads, i.e., the Able and Baker tests at Bikini Atoll in 1946.

Stafford Warren was trained as a medical physician in the 1920s and then specialised in radiation therapy at the University of Rochester medical school. He was recruited by General Groves to set up the Medical section of the Manhattan Project. After the war he was chief of the radiological safety section during the Operations Crossroads tests on Bikini Atoll. For the testing programme, President Truman personally instructed Admiral Blandy to safeguard personnel and this empowered Warren, whom the US Navy had appointed as radiological safety adviser and chief of the radiological safety section. The author himself had enlisted in the navy and participated in the tests as a junior rating, to assist scientists with environmental marine monitoring.

There are many interesting anecdotes and stories about the Manhattan project, for example the prior estimates of yield of the Trinity test in New Mexico, where Warren affixed live rats with battery clips at various distances to check for blast effects. However the features of the memoir which I found most interesting were the great surprise about the effects of the underwater nuclear test, Baker, at Bikini Atoll when nine ships and small craft sank or capsized, including two battleships. Almost all vessels in the lagoon were rendered useless after the tests because of the high radiation levels. Compared to the present day very prevalent fear of radiation hazards, Stafford Warren had great difficulty in getting his precautions taken seriously. There was a general reluctance to accept the complex and unclear dangers: ‘Common people scoffed, officers showed outrage, top bosses pooh-poohed’.

Decontaminating the ships proved to be very difficult. There were too many angles and crevices, canvas and wood on the vessels. The early signs that radiation levels rose at night on ships led to an investigation that water plankton were feeding on organic material which concentrated radioactivity. The barnacles and algae of ships’ bottoms became radioactive, to the extent that x-ray film exposed inside the ships skin showed the rivets and welds—was this the first evidence which led to the future science of radioecology? Warren and his staff developed some practical steps to account for alpha and beta contamination, as the mobile Geiger instruments on board the ships could detect only gamma radiation. He wrote to Admiral Blandy nine days after Baker detonation, urging him to immediately end Operation Crossroads and warning that decontamination was largely useless. A few days later, mainly as a result of his arguments, Blandy ordered further decontamination work to be discontinued.

The memoir is illustrated with very striking monochrome photographs of the explosions, shortly after detonation, of the ships in the target fleet and the steam and water rising from the underwater tests.

Throughout the memoir it is the personal aspects of life which are most striking. The influx of families at Oak Ridge during the war, then afterwards the great movement back to universities who had issued ultimatums to faculty members in the fall of 1945: ‘Come back at once or be replaced’. What came across strongly was the dedication of the engineers and scientists during the war but also how their families pulled together in difficult circumstances.

I thoroughly recommend this as a very good read for anyone interested in the history of radiological protection, especially its practical aspects relating to defence, when the science was little developed and there were very many unknowns. It is a very interesting and personal story of the effect of the atomic weapon development program from the point of view of a family member who was at the heart of the work in the US.

Joe McHugh