

Radiation Safety of Current European Practices of Therapeutic Nuclear Medicine: Survey Results from 20 HERCA Countries

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Original research

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Abstract

Purpose: New radiotherapies in nuclear medicine have been introduced in Europe during recent years. Moreover, radiation safety of therapeutic nuclear medicine should be in line with the latest European Council Directive on Basic Safety Standards (BSSD) (2013/59/Euratom). The purpose of this study was to acquire up-to-date information on nuclear medicine treatments in Europe and on the implementation of the requirements of the BSSD in HERCA (Heads of the European Radiological protection Competent Authorities) member states.

Methods: An electronic questionnaire was distributed to competent authorities of 32 HERCA member states. The questionnaire addressed 33 explicitly considered treatments including 13 different radionuclides, and for each treatment, a similar set of questions was included. Questions covered the use of treatments, hospitalization of patients and waste management related to therapeutic nuclear medicine involving other radionuclides than ^{131}I , justification of treatments, individual treatment planning, involvement of a medical physics expert (MPE) and radiation protection instructions related to release of the patient.

Results: Responses were obtained from 20 HERCA countries. All countries used ^{131}I -NaI for benign thyroid diseases and thyroid ablation of adults. $^{223}\text{RaCl}_2$ (Xofigo®) for bone metastases, ^{177}Lu -somatostatin analogues for neuroendocrine tumors and ^{177}Lu -PSMA for castration resistant prostate cancer (PC) and PC-metastases were used in 90%, 65% and 55% of countries respectively. Only a few countries had treatment specific criteria for hospitalization and waste management for new treatments. Requirements for justification of new therapies were in place in almost all countries. Individual treatment planning was required for all therapies in 55% and for some therapies in 28% of the responding countries. Implementation of the requirement for MPEs to be closely involved in nuclear medicine practices varied to a great extent among countries. Almost all countries answered that some radiation protection instructions existed for patients released after other than ^{131}I treatment, however in a very few countries had specific guidelines been developed.

Conclusions: There is a wide variation in therapeutic use of nuclear medicine across Europe, but there is an increasing tendency towards these types of treatments. Furthermore, the implementation of the BSSD on the involvement of MPEs and individual treatment planning including dosimetry differs from country to country. Requirements on justification are in place.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the latest manuscript can be downloaded and [accessed as a PDF](#).

Figures

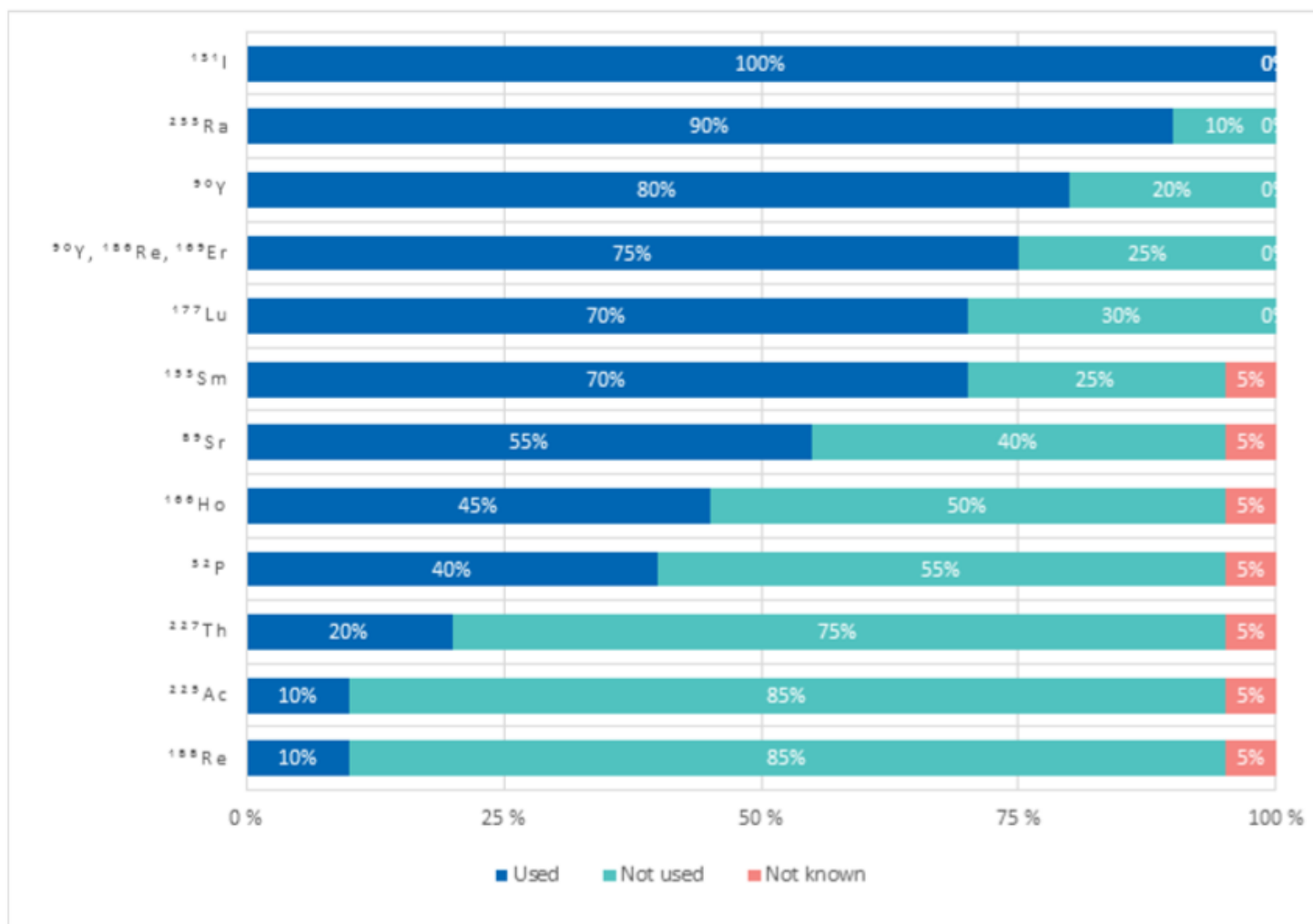


Figure 1

Therapeutic use of radionuclides in Europe per radionuclide.

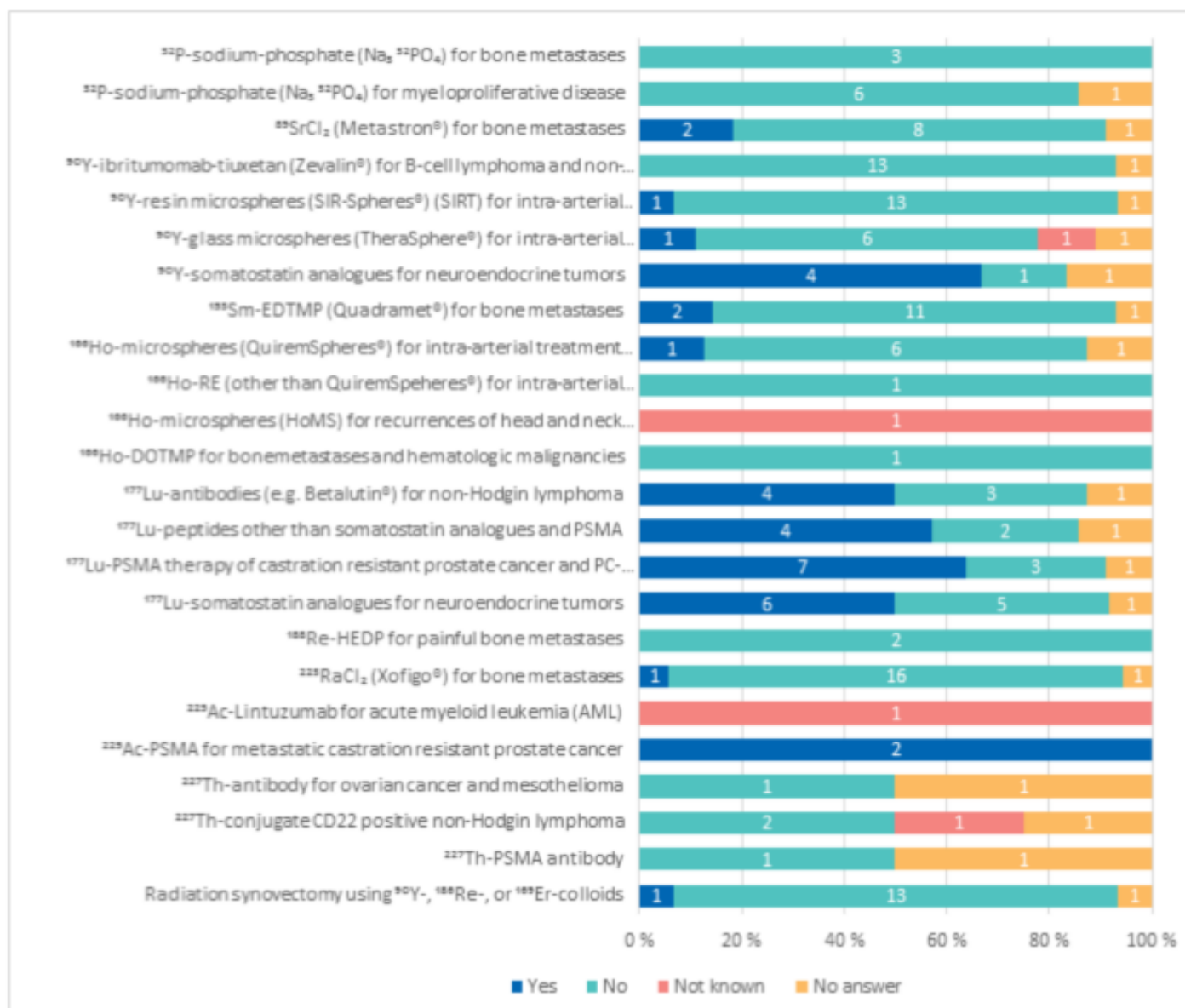


Figure 2

Relative distribution and number of countries that have established treatment specific criteria for hospitalization. The question in the survey was: "Is hospitalization required?".

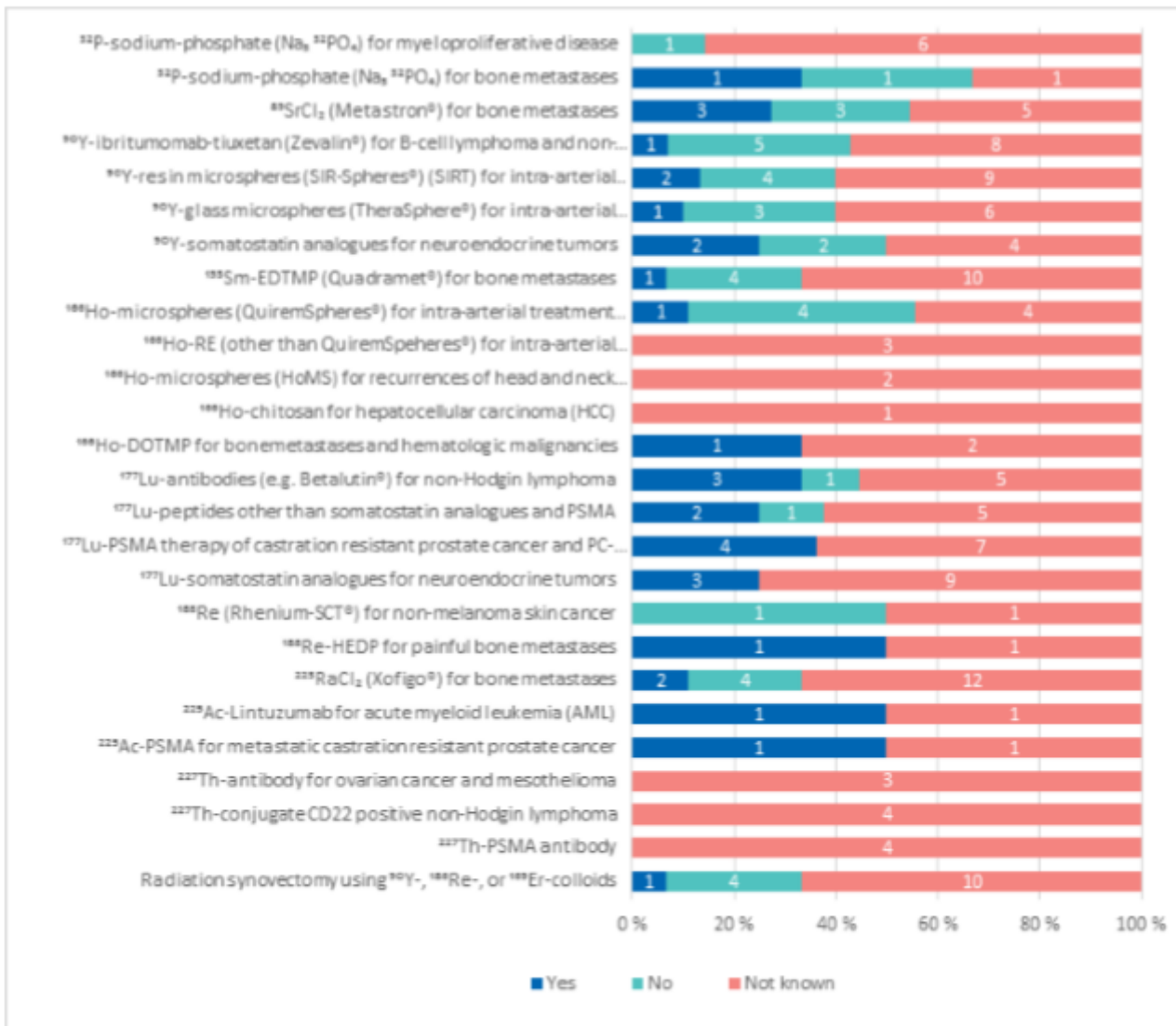


Figure 3

Relative distribution and number of countries that have established requirements for special waste water treatment. The question in the survey was: "Is special waste water treatment required?".

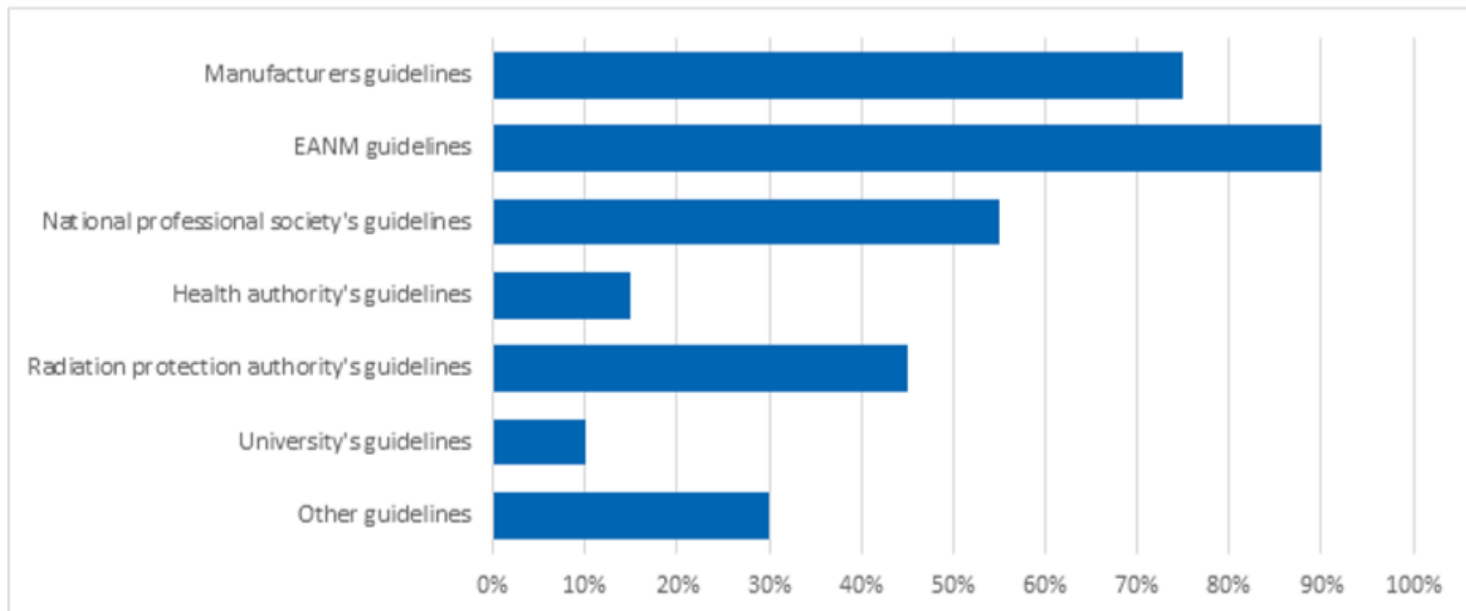


Figure 4

Use of different guidelines in European countries.