

THE CENTRAL REGISTRIES OF OCCUPATIONAL AND MEDICAL EXPOSURE IN THE CZECH REPUBLIC

K. Petrová¹⁾, Z. Prouza²⁾



XA05C0007

¹⁾ National Institute of Radiation Protection, Šrobárova 48, 100 00 Prague 10, Czech Republic

²⁾ State Office of Nuclear Safety, Slezská 9, 120 29 Prague 2, Czech Republic

ABSTRACT

This paper is intended to provide some insight into the recent situation in the Czech Republic concerning the registration and evaluation of occupational and medical radiation exposures. Since 1993 the creation of the Central (national) Registries of Occupational (CROE) and Medical Exposure (CRME) has been started. One of the main functions of these registries will be to provide statistics to guide policy making on a national basis. Authors give more detailed information on the structure of creating programs and discuss some actual arising problems.

INTRODUCTION

The actions leading to the creation of CROE and CRME were opened in 1994 by Radiation Hygiene Centre of National Institute of Public Health under the financial participation of the Ministry of Industry and Trade and Ministry of Health. In accordance with the changes in the structure of radiation protection in our republic this year, registries are now created in new National Institute of Radiation Protection which is supervised by State Office of Nuclear Safety.

Creating central registries, Czech Republic (CZ) follows the international recommendation and world-wide trends in the evaluation of occupational exposures (OE). This registration system enable us to follow and control not only the individual doses of workers, but also to follow a radiation history of workers, estimate collective doses in different occupational categories, operational activities on the national level (data requested by UNSCEAR), determine time trends for the individual worker's occupational categories, compare the radiation occupational exposure for different practices, evaluate the efficiency of the ALARA methods applied into the practice, help to find groups of workers significant from the point of view of radiation protection and collect data for epidemiological studies.

CROE - RECENT SITUATION

The basis of the registration and evaluation of OE is the individual monitoring of classified workers. The employer's duty, covered by the Regulation No.5 / 1979 in our country, is to secure individual monitoring of radiation workers and record results of monitoring.

At present there are five dosimetry services, about twenty thousand monitored workers and one thousand registered employers in CZ. Distribution of workers according to four basic occupational groups is given in Tab. 1. Personal dosimetry for external irradiation is based on the film dosimeter, TLD is used now for extremities and operative dosimetry in NPP, internal dosimetry is based on the measurements of ambient dose equivalent and time spent in a given workplace or on whole - body counting in a special cases .

As it has been already mentioned the creation of central registration system has been started since 1994 and following steps have been already done: the choice of the company for software covering of the system, the start of the co-operation with all our dosimetric services, methodology unification of OE dosimetric evaluation in our country (1).

The database system is using ORACLE and operating in HP computers. The CROE databases are - personal, utilities (employers), dosimetric services, values of the personal dosimetric quantities , accidents, cumulative five years values.

Occupational group	Year				
	1975	1980	1985	1990	1993
Uran. industry ¹⁾	11,20	10,30	10,30	7,90	3,3
General industry ²⁾	3,5	5,4	6,8	7,80	5,7
Medicine ²⁾	3,7	5,6	7,1	8,20	11,10
NPP ³⁾				1,50	2,6

¹⁾ Dosimetry Service of Uranium Industry

²⁾ National service of Personal Dosimetry, Ltd.

³⁾ Dosimetry Service of NPP Dukovany

Table 1: Numbers of monitored workers (in thousands) for four basic occupational groups in the Czech Republic.

Databases contain detailed identification of employers including their activity categories (Tab.2) and the dose records for all monitored workers with details of their age, sex, occupational category (Tab.3), type of handling radiation source. The data will be reorganized annually and individual dose assessment will be maintain for the current year and previous five years. Earlier data will be archived. The system uses special identification number for workers (birth number) and employers (random number) and all data are treated as confidential. Recently the registration cards serving for a contact between CROE and dosimetric services and employers are created. The cards will provide for CROE entrance data of all radiation workers in CZ and any changes in their registration.

1.0. Health service	4.2. Chemical
1.1. Hospitals	4.3. Mining
1.2. Other medical facilities	4.4. Building
1.3. Special medical facilities	5.0. Uranium industry
2.0. Education, research	6.0. Defence
3.0. Energetics	7.0. Agriculture, food
3.1. NPP Dukovany	8.0. Transport
3.2. NPP Temelín	9.0. Specialized facility
3.3. Others	9.1. Customs, inspectorates, supervision
4.0. General industry	9.2. Services, repair work, tests
4.1. Engineering	

Table 2: Employer's activity categories in CROE.

The contact with the International System on Occupational Exposure was also opened up in 1994 and the created national system of ORE registration is built in the harmony with the recommendations and demands of this international system. This is a reason for instance for such detailed structure of occupational categories in NPP.

The start of routine work of CROE is planned for next year. CROE will have a number of functions - to provide the new employer with summarized information of an individual's dose history, to

guarantee a right annual dose calculation for workers with two or more employers, to provide statistics to national regulatory authorities.

1.0. Defectoscopy (2)	5.0.0. NPP (6)	6.0.0. Medicine (4)
2.0. Well logging (2)	5.1.0. Inspection, control (3)	6.1.0. Radiodiagnostics (4)
3.0. Radioisotopes (7)	5.2.0. Radiation protection (3)	6.2.0. Nuclear medicine (3)
4.0. Uranium industry (5)	5.3.0. Operation, maintenance (8)	6.3.0. Radiotherapy (5)
	5.4.0. Chemistry (3)	6.4.0. Veterinary medicine (1)
	5.5.0. Fuel handling (1)	7.0. The others specialized
	5.6.0. Waste disposal (1)	workers (4)

Table 3: Occupational categories in CROE (the number of items for each category in parentheses).

CRME - RECENT SITUATION

The survey and evaluation of medical radiation exposure (MRE) exists as a part of all reports of UNSCEAR from 1958. The aim of these world-wide studies is an estimation of world-wide dose, analyse of frequencies and dose distributions and determination of time trends in this area. This information enables us to evaluate the regional differences in the use of sources of ionizing radiation (SIR) in medicine and to determinate topics of interest on this field. They enable us also to estimate a health detriment from MRE and compare it with the detriment from other sources. Results of these studies help to find reasons for regional differences in doses for the same procedures, search the way for decreasing patient's exposure and their effectiveness evaluation, determine the age and sex distribution of the patients for individual procedures. It is assumed that the results of these analyses will serve as a quantitative input of optimization studies carried on by governments and radiation protection authorities. It is well known that the main problem of world-wide evaluation of MRE is the lack of necessary data in many countries. There are many sources of uncertainties for the correct assessment of collective dose from ME:

- estimates of countrywide values are often based on extensive extrapolations from small samples,
- varying definitions and different ways of categorisation of individual procedures,
- age distribution of patients does not fit an age distribution of population for which risk factors were determined,
- patients have often changed health status with different metabolic and physiologic processes.

The solution of these problems is the topic of interest of many authors. Concerning the problem with the collection of data there are several ways used in different countries - organization of national surveys, co-operation with hospitals, universities, health insurance companies (2, 3). Concerning the problem with the evaluation of MRE - one of possibilities is to take account of age and sex differences in risk coefficient and use a new quantity for evaluation of detriment from MRE (4). Generally it is possible to say that taking account of age and sex of patients, a detriment is significantly decreasing. This estimation depends of course also on demographic structure of individual countries.

We are taking account of all these problems and we would like to avoid them creating the national registration system in our country. In CZ there are recently 350 radiodiagnostic, 52 nuclear medicine and 40 radiotherapy workplaces. There was performed about 9.5 mil radiodiagnostic, 250 ths nuclear medicine and 22 ths radiotherapy procedures (numbers from Institute of Health Information Systems of Ministry of Health of CZ, in 1993). This is big amount of data and it is impossible to sort all of them according to all demanded parameters. There are three main sources of data :

- the regular annual statistic survey of Ministry of Health which is managed by Institute of Health Information Systems (IHIS), but there is no possibility to sort patients according to their age and sex, IHIS collects only the numbers of procedures and there is also problem with the clear definition of individual examinations,

- the organization of a national survey and use information systems of individual health utilities - there is problem with co-operation and organization of this survey,
- the co-operation with health insurance companies - there are twenty companies in CZ now, but one of them - General Health Insurance Comp. (GHIC) is the biggest one which cover about 80% of our population.

Database GHIC obtains birth number of each patient from that it is possible to determine age and sex of patient and GHIC has unified list of all examination - so this is exceptional opportunity to obtain statistically significant data for MRE evaluation in our country. We will obtain only part of birth number of patient, the system will not operate with confidential personal data, it will be anonymous, but before this modification of data the system will identify each patient as individual - it means we will be able to say not only how many procedures were performed but also how many patients were examined. In principle we would like to collect data by both way in co-operation with GHIC and with selected representatives health utilities. The data from IHIS which are collected on the national level we can use for better approximation of collected data to a national level.

GHIC provided us with first data which are related to the region with 1,2 mil inhabitants (app. 10 mil inhabitants live in CZ now) in 1994. The analyze of these data shows first results - there was performed 17 exam. in nuclear medicine and 500 exam. in radiodiagnostics per 1000 inhabitants. Both numbers are lower than numbers representing CZ in UNSCEAR Report 1993. The proportion of females to males is 1,2 for both type of procedures. This result fits perfectly the sex distribution of inhabitant in the higher age groups in our country. We have to put of course these first results to detailed analysis and to compare and to complete them with data from other sources. To create a methodology for regular collection of data is our main goal for near future.

REFERENCES

1. Prouza, Z. and col. : Occupational Radiation Exposure in the Czech and Slovak Republic, Rad.Prot.Dos. , Vol.54, Nos 3/4, pp.333-336 (1994).
2. Beentjes, L.B., Timmermans, C.W.M.: Age and sex specific population doses due to nuclear medicine procedures in the Netherlands, Nucl.Med.Biol.17, 261-268 (1990).
3. Wall, B.F.: British Medical X Ray Statistics and Their Relevance for Radiation Protection Policies, Rad.Prot.Dos. 36, (1991).
4. Huda, W., Bews, J.: Population Irradiation Factors in Diagnostic Medical Dosimetry, Health Phys.59, 345-347 (1990)
5. Beninson, D., Sowby, D.: Age and Sex Dependent Weighting Factors for Medical Irradiation, Rad.Prot.Dos. 11, 57-60 (1985).