JOINT CIRCULAR No. 2237/1999/TTLT/BKHCNMT-BYT
Jointly issued by
THE MINISTRY OF SCIENCE, TECHNOLOGY and ENVIRONMENT
and
THE MINISTRY OF HEALTH

Dated 28/12/1999

GUIDANCE ON RADIATION SAFETY IN MEDICAL PRACTICES

Pursuant to Article 28 (Item 2, 3) and Article 29 of the Ordinance on Radiation Safety and Control, dated 25/6/1996;

Pursuant to Articles 34 and 48 of Decree 50/1998/ND-CP issued by the Government, dated 16/7/1998, detailing the implementation of the Ordinance on Radiation Safety and Control;

The Ministry of Science, Technology and Environment and the Ministry of Health hereby jointly issue the following guidance on radioactive safety implementation in medical practices.

I. SUBJECTS AND SCOPE OF APPLICATION

This Joint Circular regulates State or private establishments, including foreign invested establishments, conducting medical examination, treatment, research, medical training and other related to medical practices (hereinafter referred to as medical establishments) that involve the use of X-ray generating equipment and radiotherapy devices (hereinafter referred to as radiation devices), and sealed and unsealed radioactive sources for medical check, treatment, and scientific research and training.

II. RESPONSIBILITIES FOR ENSURING RADIOACTIVE SAFETY

1. Managers of radiation facility(ies) in a medical establishment

Radiation facility(ies) within a medical establishment are sub-unit(s) (such as faculty(ies), department(s), ward(s), office(s), group(s)) that involve the direct use of radiation device(s), and sealed and unsealed radioactive source(s) to conduct medical check, treatment, and scienctific research and training.

The manager of a radiation facility within a medical establishment is the person who heads, or is in charge of, the radiation facility.

Managers of radiation facilities shall have knowledge and regulations on radioactive safety and control and be responsible for the facility to comply with those regulations.

2. Radiation safety officers of radiation facilities

a) The radiation safety officer of a radiation facility is designated by the manager of the medical establishment. The safety officer shall be trained in radiation safety whose cirricula have been prescribed by the Ministry of Science, Technology & Environment and the Ministry of Health and have a certificate granted by the radiation safety training center authorised by the Ministry of Science, Technology & Environment. The safety officer can be the person who directly carries out medical check and treatment involving the use of radiation devices.

b) Safety officers have the responsibility for the facilities to comply with the regulations specified in Article 11 of the Ordinance on Radioactive Safety and Control.

3. Radiation officers of medical establishments

a) Radiation officers are doctors, physicians, nurses, orderlies, pharmacists, engineers, and technicians whose work directly involves the use of radiation devices or unsealed/sealed radioactive sources, or caretakers of patients who are treated with radioisotops.

b) Radiation officers shall be responsible to comply with regulations specified in Article 11 of the Ordinance on Radioactive Safety and Control. The radiation officers shall take all reasonably achievable measures to minimise patient doses while collecting necessary clinical information.

III. REGULATIONS ON NOTIFICATION, AND REGISTRATION AND LICENSE APPLICATION

1. Notification

a) Radiation facilities conducting work involving the use of radiation devices, unsealed/sealed radioactive sources, and radioactive waste shall notify the

respective provincial/city Department of Science, Technology & Environment within 15 days after receiving the device(s), using forms in Appendix 1 of this Joint Cicular (Forms 1, 2, 3, 4, 5, 6). A copy of the notification shall also be submitted to the respective provincial/city Department of Health for monitoring. In case of selling or transferring the devices, the sellers or transferors shall report in writing to provincial/city Department of Science, Technology & Environment where the devices were previously notified. The buyers or transferees shall also notify their respective provincial/city Department of Science, Technology & Environment.

b) Departments of Science, Technology & Environment are responsible for management of notifications. Within 15 days after receiving the notification, Departments of Science, Technology & Environment shall submit the notification to Vietnam Radiation Protection and Nuclear Safety Authority under the Ministry of Science, Technology & Environment.

2. Registration

a) Radiation facilities possessing radiation devices, unsealed/sealed radioactive sources, radioactive wastes for which there is no plan of using within the next 6 months shall apply for registration. If immediate use is planned, registration will not be neccessary.

Documents for applying for registration shall comprise of:

Registration application (Registration Form);

Copies of passports of the radiation devices or radioactive sources or layout of radioactive waste storage.

b) Documents for applying for registration of radiation devices, unsealed/sealed radioactive sources, or radioactive waste storage shall be submitted to the Vietnam Radiation Protection and Nuclear Safety Authority, the Ministry of Science, Technology & Environment.

c) Documents for applying for registration of X-ray generators (except for cyclotrons) shall be submitted to the respective provincial/city Departments of Science, Technology & Environment.

d) Departments of Science, Technology & Environment shall submit monthly reports of the list of registrations issued in the previous month to the Vietnam Radiation Protection and Nuclear Safety Authority, the Ministry of Science, Technology & Environment.

3. Application for licenses for conducting radiation practices and special radiation practices

a) The following who are preparing to conduct a radiation practice shall apply for licenses:

- Radiation facilities that use radiation devices and unsealed/sealed radioactive sources.

- Radiation facilities that export/import or transport radiotherapy devices (except for cyclotrons) and unsealed/sealed radioactive sources.

- Personnels who perform special radiation work such as operating, installing, repairing radiotherapy devices.

b) Documents for applying for licences for radiation facilities using radiation devices and unsealed/sealed radioactive sources shall comprise of:

- License Application (Appendix 3, Form 1).

- A copy of License for manufacture of radiation devices, unsealed/sealed radioactive sources issued by the competent authority in the exporting country (if available)

- Radioactive safety assessment

- A copy of layout/design of the room(s) where radiation devices are located or nuclear medicine practices are conducted (drawings of arrangement, dimensions of the room).

- List of radiation officers and safety officers and their qualifications. In case of using radiotherapy devices, a copy of operator's license for performing special radiation practices shall be attached.

c) Documents for applying for licences for exporting, importing and transporting radiotherapy devices (except for transporting cyclotrons), and unsealed/sealed radioactive sources shall comprise of:

- Licence application (Appendix 3, Form 2 and 3)
- Notification (Appendix 1)

d) Documents for applying for licenses for radiation officers to perform special radiation practices, including operating, installing and repairing radiotherapy devices shall comprise of:

- Licence application for radiation officers to perform special radiation practices (Appendix 3, Form 4)
- Copies of specialized certificates and/or degrees.
- Copy of radiation safety certificate issued by authorised training center(s).

- Certificate of Health issued by district medical centers, or provincial/city health preventive centers, or Institute for Health and Environmental Hygiene.

e) Documents applying for licenses for using, exporting, importing and transporting radiotherapy devices (except for cyclotrons), unsealed/sealed radioactive sources, or for conducting special radiation practice shall be submitted to the Vietnam Radiation Protection and Nuclear Safety Authority.

f) Documents applying for licenses for using X-ray generators (except for cyclotrons) shall be submitted to the respective provincial/city Departments of Science, Technology & Environment. The Departments of Science, Technology & Environment shall cooperate with the Department of Health to conduct the radiation safety appraisal before issueing the license.

g) Departments of Science, Technology & Environment shall annually submit a list of licenses issued in the year and a report on the status of radioactive safety and control in the province/city to the Vietnam Radiation Protection and Nuclear Safety Authority by 20 December in the calender year.

4. Notification and application for registration and license can be made simultaneously.

5. At least 60 days before the license expire date, the licensee shall apply for a renewal.

Documents required for license renewal shall comprise of:

- Renewal application (Appendix 4)
- Report on radiation safety assessment

6. Radiation facilities who wish to upgrade, extend the scope and operations beyond what have been specified in the licenses, or who wish to upgrade radiation equipment beyond what have been specified by the registration certificate shall comly with Article 30 of the Decree No 50/1998/NĐ-CP issued by the Government dated July 16th 1998.

7. License revocation shall conform with Article 32 of the Decree No 50/1998/NĐ-CP issued by the Government dated July 16th 1998.

8. The Ministry of Science, Technology & Environment, Provincial/city Departments of Science, Technology & Environment will issue registrations and licenses in accordance with Article 23, Clause 2, Item b,c and Article 24, Clause 2, Item b, c of the Ordinance on Radiation Safety and Control.

9. Radiation facilities applying for registration, licence, licence renewal, or licence amendment shall pay assessment fees and charges in accordance with regulations by the Ministry of Finance (Article 27 of the Ordinance on Radiation Safety and Control).

IV. TECHNICAL REQUIREMENTS FOR RADIATION EQUIPMENT

1. General requirements for X-ray generators and other radiotherapy devices containing unsealed/sealed radioactive sources for health checks and treatment are as follows:

a/ To comply with International or Vietnamese standards ;

b/ To be attached with equipment documents such as technical specifications, user's manual, maintenance instructions and safety instructions and copies of those documents translated into Vietnamese;

c/ To be equipped with automatic beam control;

d/ To be controlled of irradiation within the examination and treatment area.

2. Requirements for X-ray generators and other radiotherapy devices using sealed radioactive sources for health treatment are as follows:

a/ X-ray generators and accessories are to produce reasonably low radiation intensity.

b/ Parameters set up for X-ray generators such as: high voltage (KV), high current (mA), generating period (s), mAs, focal point, focal length, dimensions of radioactive field, and filter, etc. shall be clearly indicated.

c/ An operating timer shall be installed in order to automatically stop the machine when reaching the pre-determined level. In the generation mode, a time limit must also be set up.

3. Requirements for radiation devices in health treatment:

a/ Radiation devices shall be equipped with accessories to control operation parameters such as radiation type, energy, radiation filter, radioactive field size, radiation beam orientation and radiation duration and doses.

b/ Radiation devices employing radioactive sources must be able to automatically return to safety state in case of emergency and the sources remain shielded until beam control is re-activated from the control pannel.

c/ In addition, teletheraphy devices shall have:

- two separate systems for the device to return to safety state and stop irradiation in case of emergency;

- safety inter-locks to automatically halt the irradiation if the device operates in conditions different from the pre-set conditions.

d/ The safety inter-locks shall be designed in the way that if they are temporarily shut down for maintenance, the teletherapy devices are functionable under the direct control of the maintenance officers by using appropriate tools, codes or keys.

e/ Structure design for sources used for teletherapy and brachytherapy shall be in compliance with those of sealed sources.

V. ARRANGMENT FOR RADIATION ROOM

Rooms for radiation devices shall meet the following requirements:

a/ Rooms shall be far from populous areas, public paths, and pediatric, obstetrics and other clinic wards not directly involving radiation.

b/ Dimensions of X-ray rooms must conform with Vietnamese standards; ventilation window must be at least 2 metres higher than the floor.

c/ Rooms for teletherapy equipment shall be at least $30m^2$, 4m wide and 3m high, with well lit and ventilation systems.

d/ When calculating the thickness of walls, ceiling, floor and doors of radiation rooms, device parameters (such as current intensity, voltage, and source radioactivity), and coefficients of device utilisation and occupation of the area outside the room shall be taken into account to ensure that the annual dose limit for the public remains at 1mSv.

đ/ Radiation devices shall be shielded so that the annual dose limit for the operators is not to exceed 20mSv.

1. Arrangement for radiation devices:

a/ Each room contains only one radiation device.

In case of two X-ray machines in one room, only one machine can be operated at a time. The radiation device shall be positioned in such a way that the control pannel, doors or populous areas are not directly exposed to the radiation beam.

b/ The control pannel shall be located outside and next to the radiation room and equipped with means to observe and communicate with patients. If X-ray equipment has operation voltage of lower than 150 kV, the control pannel can be located in the radiation room, but the lead shield must be provided.

2. Radiotherapy rooms must be equipped with automatic radiation mornitoring device to detect abnormal operation.

3. Entrance to the teletherapy room shall be zigzaged.

4. Doors to the teletherapy room must be inter-locked in order to:

a/ Allow to start the radiotherapy device only when the doors are tightly closed.

b/ Automatically stop irradiation if the door is accidentally opened.

5. Warning signs:

a/ Red lights must be installed on the top of the entrance door of radiation rooms and lit when radiation devices start to operate.

b/ Radioactive warning signs must be placed at doors of radiation rooms (Appendix 5).

VI. GENERAL REQUIREMENTS FOR RADIATION SAFETY IN DEPARTMENT OF NUCLEAR MEDICINE

1. The department of nuclear medicine must be located far from other departments to prevent people from passing by.

The radioactive warning sign must be placed at the entrance to the department (Appendix 5).

2. The arrangement of rooms in the department must follow the following principle: Radioactive intensity decreases from the inner to the outer or from the lower to the upper if the department is a multi-storey building (the radioactive drug stock and radioactive pharmaceutics rooms shall be in the inner-most). Rooms which contain unsealed radioactive sources shall be located adjacent to each other to avoid wide-spread radioactive contamination.

3. Requirements for rooms containing unsealed radioactive sources:

a/ The room must be well ventilated.

b/ The thickness of walls, floors, ceilings, entrance/exit doors must be calculated in the same manner as those of the rooms containing radiation devices to maintain the annual dose for the public at 1mSv. The wall surface must be smooth and coated with water-resistant layer for easy decontamination.

c/ The floors must be coated with smooth, water-resistant layer with a drainage to the radioactive sewage.

d/ Surface of table which is in direct contact with radioactive source must be made from smooth, radiation-resistant materials with no cracks to be easily cleaned.

e/ Water tap of lavatory basin can be used by elbow, foot or automatically.

f/ The room must be equipped with a fume carbinet especially designed for handling of radioactive materials that can produce gas.

g/ Tweezers or cylinders must be used to reduce exposure to hands.

4. The following measurement tools shall be used:

- Radioactive pharmaceutic calibration devices.

- Dose-rate instruments of appropriate sensitivity.

- Surface dectectors of sufficient radiation sensitivity.

5. Unsealed sources shall be kept in a special store with lock. There shall be a drawer for each source so that the person handling the source will not be exposed to other sources in the store. Each drawer shall has its own opening with the name of the radio-isotope and its activity clearly labelled. The radio-isotopes must be kept in concrete containers (glass bottle, plastic bottle, metal box). The movement of the radio-isotopes must be recorded.

6. There must be separate rooms for patients who have used radioactive medicines. The rooms must be shielded to ensure that the outside dose-rate is maintained not to exceed the annual dose limit specified for the public (1mSv/year). Each room shall accomodate only one patient. In case that there are more than one patients in one room, mobile lead shields are required to prevent radiation from one patient to another.

There must be mobile lead sheld for staffs when interacting with patients.

Patients are allowed to be discharged from the hospital only when the radioactivity of their bodies are reduced to be lower than the specified value (Appendix 6).

7. If there is radioacive contamination decomtaimination must be conducted.

Radioactive contamination areas shall be cleaned from the outside to the inside to minimize the spread of contamination.

The safety officer must be present during the radioactive decontamination.

VII. MANAGEMENT OF RADIOACTIVE WASTE

1. Solid, liquid or gas radioactive wastes are allowed to be released to the environment only after being examined to meet the criteria specified by Ministry of Science, Technology and Environment.

2. Dis-used sealed sources must be kept in separate stores that are radiation-shielded and are protected from thieves.

3. Short half-life radioactive wastes (less than 30 days) with the total activity or specific activity greater than the exempted level must be stored for a sufficient period

for decay until the activity meets the accepted level for discharging to the environment.

a/ For liquid wastes: liquid wastes (including excretion substances of patients who have used radioactive pharmaceutical products) shall be drained into one of the two separate underground storages that shall be constructed in a way that no liquid is leaked out of the storages. These storages shall be shielded for radiation protection, covered for rain protection in accordance with regulations and have sufficient capacity to store the liquid for a necessary period of time (10 times of the half life of the isotope that has the longest half-life among the discharged isotopes). Of these two storages, one is used for receiving daily radioactive liquid wastes and the other is used for retaining the wastes before being discharged to the environment or diluted with common wastewaters in the mixing pool as regulated by the Ministry of Science, Technology and Environment.

b/ For solid wastes: Radioactively contaminated solid materials (syringes, broken glass, etc.) shall be collected into plastic bags which will then be put into metal bins with foot opening. The bags shall be transferred to 1 of the 2 separate storages (as in the case of liquid wastes). These stores shall be isolated, shielded and protected from decay until the waste activity is lower than the regulated level before being disposed of to the environment.

4. The handling of radioactively affected dead bodies of small animals shall be subjected to specific regulations.

VIII. QUALITY TESTING, RADIATION EQUIPMENT CALIBRATION, CLINICAL DOSE MEASRUMENT AND QUALITY ASSURANCE IN MEDICAL IRRADIATION

1. Radioactive sources and radiation equipment used in medical practices must undergo quality testing and calibration annually.

After having been installed or repaired, equipment must be re-calibrated. Establishments performing quality testing and calibration must be approved by the Ministry of Science, Technology and Environment. (These establishments must meet the requirement on staff competence on radiation safety and devices).

2. Typical values for clinical dose parameters must be determined and documented.

3. Radiation facilities, in addition to conforming to regulations on quality assurance of radiation safety management shall establish a specific program for assuring the quality of medical irradiation by experts in the fields such as radioactive physics, radioactive

pharmacy in commensurate with the principles specified by the Ministry of Health and the World Health Organization.

4. The program for assuring medical irradiation shall consist of:

a/ Measuring physical parameters of radiation equipment at the beginning and annually.

b/ Checking physical and clinical factors in diagnosis and treatment.

c/ Documenting records of processes and the related results.

d/ Checking the calibrating, operation conditions and radiation monitoring and measuring devices.

e/ Evaluating the independent and regular quality testing results obtained from the quality assurance program for radiotherapy procedures.

IX. REQUIREMENTS FOR MEDICAL IRRADIATION

1. General requirements

a/ In all cases, medical irradiation must be compared with other method(s) and based on doctor's prescription. If two methods bring about the same result, the radioactive method shall not be used.

b/ Only one patient, and orderlies if neccessary, are allowed to be in the radiation room.

2. Irradiation, radiography for diagnosis and treatment.

a/ Doctors or radiation operators must:

- Assure that the designated device is appropriate

- Avoid unnecessary irradiation and radiography.

- Consider radiation history of the patient.

b/ Hand-held or mobile radiation devices are deployed only when it is impossible to transfer the patient to a radiation establishment due to the patient's conditions or other factual circumstances and after safety measures for such device are applied.

c/ Irradiation on the abdomen or pelvis of pregnant women (or suspicious of being pregnant) shall be avoided, except for clinical obligatory reasons. In such cases, appropriate measures must be applied to minimize the radiation dose on the fetus.

d/ The patient's organs which are sensitive to radiation (gonad, crystalline lens, breast, thyroid) shall be appropriately shielded.

3. Examination and treatment in nuclear medicine.

a/ The doctor using radioactive substances for medical examination and treatment shall:

- Ensure patient doses are minimum, but sufficient for examination and treatment purposes.

- Consider examination history to avoid unnecessary doses.

- Refer to radioactivity levels for medical irradiation specified by domestic and foreign organisations such as the IAEA, WHO...

b/ The use of radioactive substaces to examine and treat pregnant women (or suspicious of being pregnant) shall be avoided, except for clinically obligatory reasons.

c/ For breast-feeding women, the feeding shall be suspended until the radioactive medicines are harmless to the child.

d/ Radioactive pharmaceutical products are only allowed to use for child examination and treatment except for clinically obligatory reasons and the radioactivity must be less than the level specified in Regulations.

e/ Patients must be well informed of the possible risks that may occur if radioactive pharmaceutical products are used.

4. Assistance to patients.

a/ Nobody is allowed to stay in the radiation room during the operation period except the radiation officer and orderlies/caretakers,

b/ Pregnant women and people who are under 18 year olds shall not be allowed to assist patients during radiation period.

c/ The orderlies/caretaker(s) must wear suitable protection (lead rubber apron, lead rubber glover, protection coat, lead shield). No part of their body shall be directly exposed to the radiation beam.

d/ These orderlies/caretaker(s) shall be under radioactive dose control.

X. SAFETY IN RADIATION DEVICE OPERATION

1. Radiation facilities shall develop and issue regulations on the use of radiation devices, operational procedures for each device, treatment plan for each kind of treatment to ensure radiation safety for staffs and patients.

2. Radiation officers shall:

- Conduct safety check of sources before and after operation.

- Keep doors firmly closed during the operation of the equipment.

- Conform with operational procedures.

- Look for abnormal signals in the devices in order to promptly detect problems and prevent the accidents.

- Not remove malfunction parts of the in-depth protection system to operate the equipment manually.

- Document operation data.

- Immediately inform the manger of the radiation facilities or safety officer if detecting loss of radioactive sources or potentials of radioactive accidents. Within his/her responsibilities, he/she shall be involved in accident remedy.

- Use appropriate radioactive safety measures.

3. Provision of radioactive safety equipment

- Every radioactive facility shall be equipped with appropriate radiation monitoring equipment compatible with the radiation devices used.

- People whose work involves direct contact with radioactive sources shall be provided with necessary protection such as lead shields, lead rubber aprons, lead rubber gloves, protection glasses, coats, shoes, personal dose-meters, and lead containers to keep radioactive isotopes during transportation.

- Managers of those establishments shall ensure the full provision of such supplies.

XI. INVESTIGATION OF RADIATION ACCIDENTS DUE TO PATIENTS EXPOSURE

1. The managers of radiation facilities shall immediately conduct investigation upon the following incidents:

a/ Mistakes in performing radiotherapy on patients and tissues; using wrong radioactive pharmaceutics; or applying the dose rate significantly different from that prescribed by doctors.

b/ Diagnostic dose that is considerably higher than prescription, or the patient is exposed to radiation higher than the controlled dose due to repetition of the diagnostic dose.

c/ Equipment failures, accidental mistakes or abnormalities that are potential to cause patient doses significantly higher than prescription.

2. After investigation, the managers of radiation facilities shall:

a/ Re-calculate or re-evaluate the dose received by patients.

b/ Propose solutions for remediation, re-treating of the patients and prevention of future repetitions

c/ Immediately report to the higher level authorised body after investigating the cause of the incident. In case of serious accidents, the Radiation Protection and Nuclear Safety Authority, the Ministry of Science, Technology & Environment shall be informed.

d/ Inform the patient about the incident.

XII. DATA STORAGE

1. Radiation facilities shall keep the following patients' records for at least five years:

a/ For radiation diagnostics: records on necessary information (electric voltage, current, the radiation period), including times and date of irradiation.

b/ For nuclear medicine: records on names of radioactive pharmaceutics and their activities, and dates of application.

c/ For radiotherapy: records on description of subjected area, the dose at the focal point of the subjected area, dose on surrounding areas, and times and dates of irradiation.

2. Radiation facilities shall keep data on the machine calibration, periodical testing and specifications for at least 5 years.

3. Health records and dose history of radiation officers shall conform with regulations in Item 5, Article 9 of the Decision No 50/1998/NĐ-CP issued by the Government on 16/7/1998 .

XIII. IMPLEMENTATION

1. Provincial/city Departments of Science, Technology & Environment and Departments of Health shall perform the function of State management and supervision within their authority on radiation safety of radiation facilities.

2. Radiation facilities that have been operating, storing, or using radiation devices, sealed/unsealed radioactive sources, and radioactive wastes before the issuance of this

Circular shall make notification and lodge license application complied with Item III of this Circular within 90 days of this circular entering into force.

While waiting for license to be issued, these facilities are allowed to continue using the radiations devices and radioactive sources.

Within 3 years of this circular coming into effect, radiation facilities that fail to meet the requirements specified in Item II, IV, V, VI, VII, VIII, X and XII shall conform with provisions of this Circular.

3. The Ministry of Health shall designate health care centres to monitor the health of people suffering from over-dose irradiation and radioactive exposure, and provide treatment to those people.

4. Private or foreign invested radiation facilities, after obtained radiation safety licences as specified in Item III of this Circular, will be reviewed by the Ministry of Health and/or the respective Departments of Health and granted certificates if the facilities meet operation criteria and conditions required by law on private or foreign invested health-care establishments.

XIV. ENTRY INTO FORCE

This circular shall enter into force in 15 days after being signed.

Should there be any issues arising from implementation of this Circular, the two Ministries shall promptly be informed.

MINISTRY OF SCIENCE, TECHNOLOGY & ENVIRONMENT
DEPUTY MINISTER
(Signed)

Hoang Van Huay

MINISTRY OF HEALTH
DEPUTY MINISTER
(Signed)

Le Ngoc Trong

Annex 1 – Equipment Notification Forms

Annex 2 – Regislation Application Forms

Annex 3 – License Application Forms

Annex 5 – Radiation Warning Sign

The sign is a equilateral triangle (with ratio of dimensions specified in the drawing)

D – The diameter of the inscribed circle of the three edges. The circle, the three edges, and border are in red on yellow background.

Letters in the note box are in black on white background (clearly indicating: X – ray or radioactive rays)

Annex 6

The maximum radio-activity for patients treated by radioactive pharmaceutical products to be discharged from the hospital.

I Radioactive nuclides / Activity (MBq) / Iode 131/ 1100 /