

Circuit of radiopharmaceutical drugs in the nuclear medicine unit of the Specialized hospital "Pierre & Marie Curie"

L. ABBAS¹, Y. Mezaour²

¹ University of Algiers 1 Benyoucef Benkhadda, Faculty of Pharmacy

² Central Pharmacy in CPMC. .

Abstract :

The radio pharmaceutical drugs (RPDs) are subject to a particular drug circuit; this is why we have therefore carried out a quality audit on the management of RPDs in the Nuclear Medicine Unit of the Endocrinology Department (UMNSE) of the SH CPMC, based on the recommendations of the International Atomic Energy Agency (IAEA). The present study aims at improving and advancing RPDs management practices within UMNSE using several checklists and surveys as deployed below. In addition, we have also established questionnaires that target patients and staff separately in order to assess their knowledge about radio pharmacy and radiation protection. Also, after studying the results, we have established recommendations and informative documents that have been published for staff and patients. The knowledge tests reveal shortcomings, particularly among category B staff. Also, the patients showed interest and supported the idea of giving them oral and written explanations. In collaboration with the service, we have produced an attractive and easy-to-read leaflet. We have included important definitions such as iodine therapy and patient instructions. We have produced a large model poster for the staff which provides reminders on radiation protection: protective equipment, safety distance, sensitivity of tissues to radiation and medical follow-up

Keywords:

Keyword 1: Radiopharmaceuticals Keyword 2: Quality audit Keyword 3: IAEA Keyword 4: Drug circuit Keyword 5: Radiation protection

I- Introduction :

Radioactive pharmaceutical drugs (RPDs) used in nuclear medicine are drugs containing radioactive elements, in the form of unsealed sources that can be administered parenteral, orally or pulmonary route for diagnostic or therapeutic purposes. RPDs covers the rational understanding of drug design, preparation and their quality control, the relationship between the physico-chemical and biological properties of RPDs and their clinical applications. As well as their chemistry and the problems related to the management, selection, storage, distribution and therefore the proper use of radiopharmaceuticals.

► Problematic:

Does the radio pharmaceutical circuit comply with IAEA standards?
Does the Nuclear Medicine Unit comply with IAEA standards for radiation protection?

II- Material and methods:

We have established audit checklists in the form of tables for premises, staff, preparation/dispensing and waste management. Then, the use of iodine and technetium. Finally, radioprotection of personnel, patients and the environment .

We also carried out tests of knowledge targeting respectively, the personnel of the unit which we divided into two categories according to their exposure, and a third survey for patients with thyroid cancer.

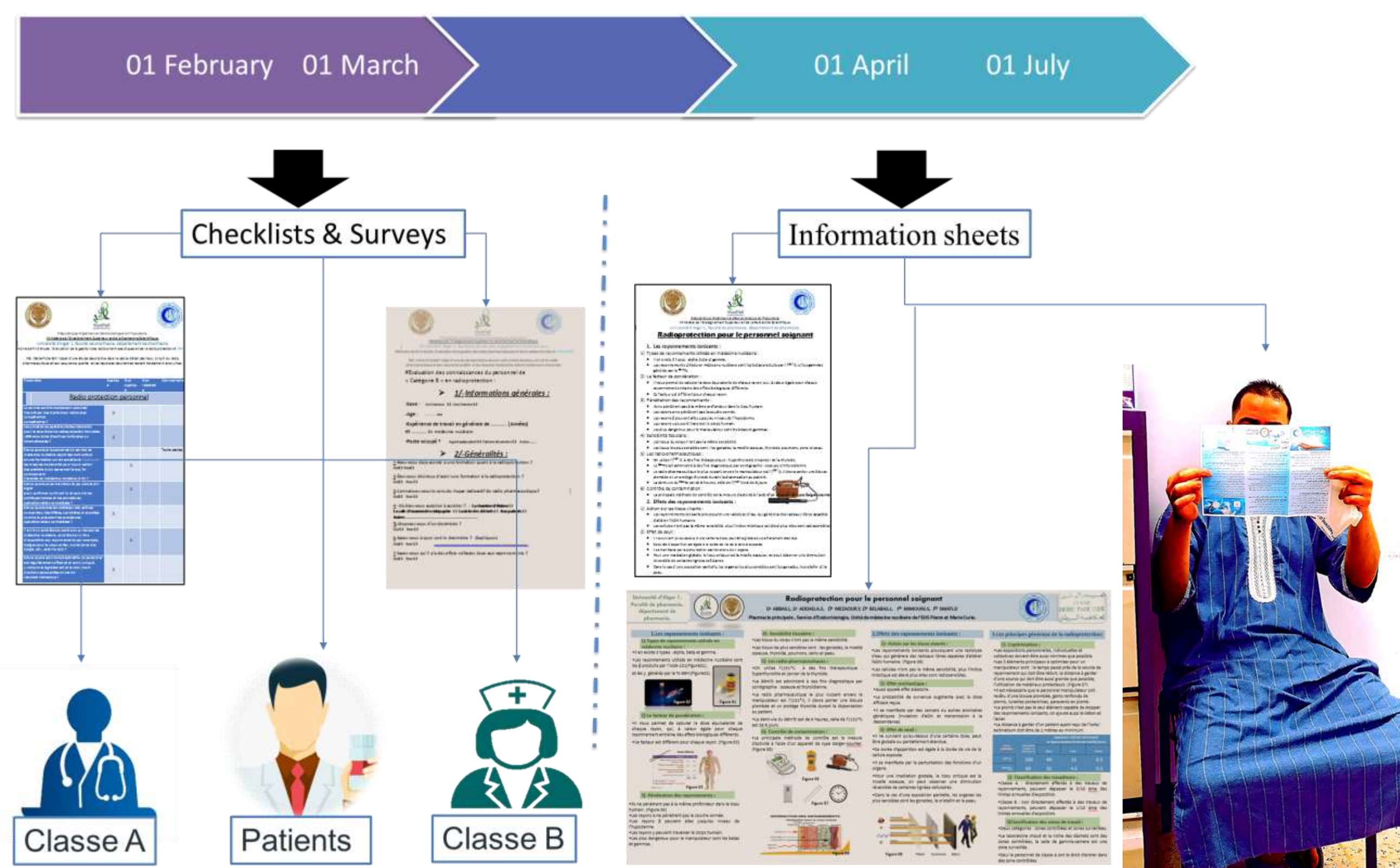


Figure 1

III- Results and discussion:

Premises, staff, preparation/dispensing and waste management:

- The unit does not have a radio-pharmacist, and the Competent Person in Radiation Protection (CPR) has not been trained in radiation protection by the Algerian Atomic Energy Commission.
- The staff has not received training recognized by a regulatory structure.
- The premises are compliant in terms of sealing, finishing and availability of materials.
- The fume hood is not equipped with a HEPA filter, which is not compliant; they must be present despite the absence of volatile radionuclides.
- The supply, preparation and dispensing appear to comply with IAEA standards.
- Traceability is respected for products and preparations.
- Some controls are carried out: aspect, activity, others not: radio chemical and radio nucleic purity which are essential to guarantee a protection of the patients and a good quality of the examination.
- The unit complies with waste management.



Figure 2

Radiation protection :

- The unit is compliant in terms of room design, segregation and classification of rooms, use of radiation panels.
- Availability of procedures to avoid any misadministration to patients: identification, traceability of doses, warning of pregnant/lactating women.
- Availability and application of good waste management procedures.
- The only non-conformities observed are: lack of training of personnel in radiation protection, no commitment of personnel for radiation exposure and no routine medical check-up.

Tc99m

- The wearing of regulatory clothing is respected except for the masks, justified by the absence of handling volatile radionuclides, all mask wearing is part of good aseptic preparation practices.
- The fume hood is disinfected, but by opening the vials, which is not in compliance.
- Disinfection baths are not available, or sprays are used.
- The personal dosimeter is worn but not stored in a suitable place according to IAEA recommendations.



Figure 3

Iodine-131*

Handling appears to be fully compliant, except for the wearing of leaded gloves which is a non-compliance, gloves which is a non-compliance.



Figure 4

Conclusion:

- The practical implementation of radiation protection requires the application of several means of protection and monitoring adapted to the characteristics and conditions of use of Ionizing Radiation (IR).
- The use of IR for medical purposes requires compliance with well established general standards (IAEA).
- The availability of radiation protection means must be ensured by the employer, their implementation is the responsibility of the workers.
- The RPDs used in nuclear medicine are potential sources of external irradiation and contamination
- They must therefore be administered by qualified and well-trained personnel in a specially equipped area, following radiation protection rules to limit exposure
- Quality control of the RPDs is required prior to its administration
Advice must be given to the patient to reduce his exposure and that of his entourage

- We reached our final purpose : improving and advancing RPDs management by publishing duplex promoting poster [✓]
- We boosted patient's understanding regarding RPDs by distributing flyers like shown next [✓]



Figure 5

References:

- [1] Book : « EANM_2019_TechGuide »
- [2] Book : « Manual on THERAPEUTIC USES OF IODINE-131 IAEA ».
- [3] Official web site of IAEA : « Diagnostic radiopharmaceuticals, radioactive drugs for diagnosis | IAEA ».
- [4] Book : « Strzelczyk - 2006 - Safety Reports Series No. 40, Applying Radiation S. ».
- [5] Book : « International Atomic Energy Agency - 2008 - Operational guidance on hospital Radio Pharmacy a ».
- [6] Book : « International Atomic Energy Agency - 2015 - Quality management audits in nuclear medicine prac ».
- [7] Official website of IAEA : « Human Health Campus - Virtual Course in Radio Pharmacy ».
- [8] Book : « Le Manipulateur - n° spécial - A.F.P.P.E. Septembre 1999..pdf ».
- [9] Graduation thesis 2021 entitled : «Inventory of Radiopharmaceuticals in Algeria: a survey of nuclear medicine services. Presented by: BENDJAL Chemseddine and SAIM Hammoud Abdelkrim».
- [10] Official Bulletin of European communities, Volume 33: «Council Directive 90/641 EURATOM of December, 4th »