



# SAFRON

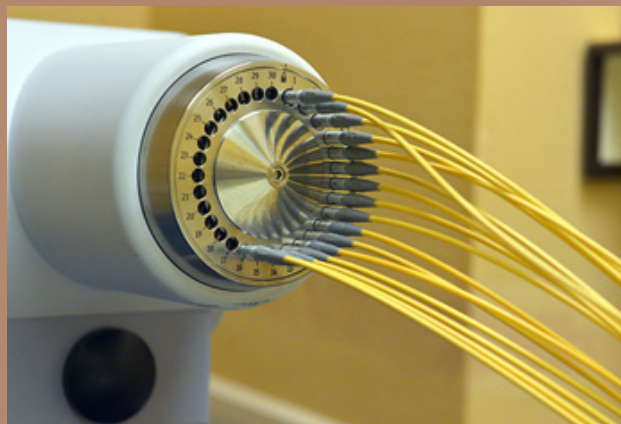
SAFety in Radiation ONcology

<https://rpop.iaea.org/SAFRON/Default.aspx>

## Updates on Patient Safety in Radiotherapy

August 2017

SAFRON Now Includes Brachytherapy Events



Brachytherapy is a complex process involving an intricate series of steps that must all be performed correctly to administer a safe and accurate treatment. Safety incidents can and do occur.

In 2000, the IAEA included 22 brachytherapy incidents and accidents in a review of lessons learned from accidental exposures in radiotherapy.<sup>1</sup> For the years 2011 through 2015, the U.S. Nuclear Regulatory Commission reported to Congress 27 HDR “abnormal occurrences” involving the wrong treatment site or overdose of greater than 50% to the treatment site, as well as nine grossly mispositioned permanent prostate seed implants.<sup>2</sup> The French regulator Autorité de Sûreté Nucléaire described 19 notifications in 2013 and 2014 of significant radiation protection events concerning pulsed dose rate and high dose rate brachytherapy treatments.<sup>3</sup> In 2016, Public Health England published a review of 279 radiotherapy error reports involving brachytherapy treatments, including 71 errors that reached the patient.<sup>4</sup>

Although SAFRON was initially limited to incidents involving external beam treatments, the benefits of an international safety learning and reporting system apply to all radiotherapy modalities. The IAEA has released an updated version of SAFRON to also address brachytherapy.

### What are the Professionals saying?

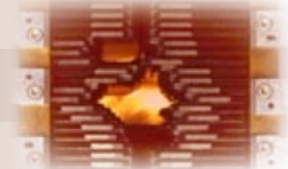
*“More than 500 HDR accidents (including one death) have been reported along the entire chain of procedures from source packing to delivery of dose. Human error has been the prime cause of radiation events....A collaborating team of specifically trained personnel following quality assurance (QA) procedures is necessary to prevent accidents...Accidents and incidents should be reported and the lessons learned should be shared with other users to prevent similar mistakes.”*

International Commission on Radiological Protection. ICRP Publication 97, Prevention of High-dose-rate Brachytherapy Accidents. *Ann ICRP* 2005; 35:1-51.

When submitting a new incident or searching for incidents, the user is asked to select a treatment modality and brachytherapy is one of the choices. Next, the user is asked to select a treatment method such as high dose rate remote afterloader, permanent manual brachytherapy or electronic brachytherapy.

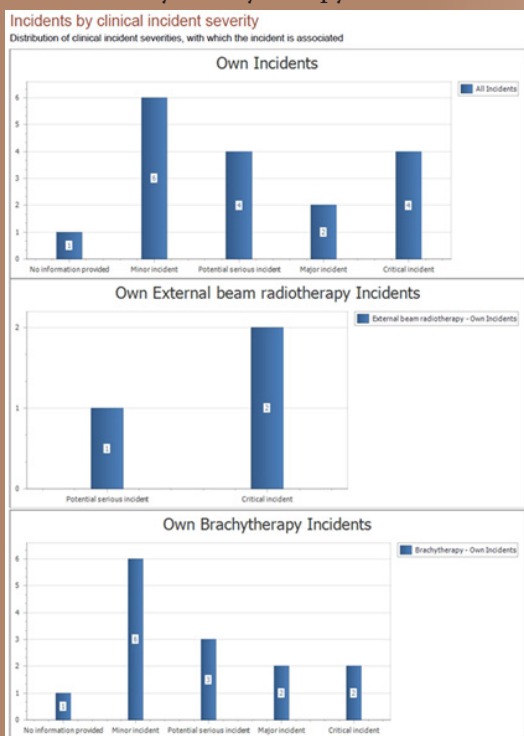
A separate list of process steps for brachytherapy was developed for SAFRON based on applicable portions of the consensus recommendations for incident learning database structures in the 2012 article by Ford et al<sup>5</sup>. The list of safety barriers used in SAFRON was updated to add several barriers that are important in brachytherapy treatments.<sup>4</sup>

SAFRON statistical reports were also updated to incorporate brachytherapy incidents. For each of the types of statistical reports, there are now separate graphs to show external beam and brachytherapy incidents combined, only external beam radiotherapy incidents and only brachytherapy incidents.



## SAFRON statistical reports

SAFRON statistical reports were also updated to incorporate brachytherapy incidents. For each of the types of statistical reports, there are now separate graphs to show external beam and brachytherapy incidents combined, only external beam radiotherapy incidents and only brachytherapy incidents.



## References

1. International Atomic Energy Agency. Safety Reports Series No. 17, Lessons Learned from Accidental Exposures in Radiotherapy. Vienna: International Atomic Energy Agency, 2000.
2. U.S. Nuclear Regulatory Commission. Reports to Congress on Abnormal Occurrences, Fiscal Years 2011-2015, NUREG-0090, Volumes 34-38. Washington, DC: U.S. Nuclear Regulatory Commission; 2012-2016. Available at <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0090/>.
3. Autorité de Sûreté Nucléaire. Patient safety - Paving the way for progress, No. 8, Pulsed-Dose-Rate and High Dose-Rate Brachytherapy, June 2015. Available at <http://www.french-nuclear-safety.fr/Information/Publications/Publications-for-the-professionals>.
4. Public Health England. Safer Radiotherapy, Radiotherapy Newsletter of Public Health England, September 2016, Issue 20. Available at [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/558593/Safer\\_radiotherapy\\_20th\\_Newsletter.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/558593/Safer_radiotherapy_20th_Newsletter.pdf).
5. Ford EC, Fong de Los Santos L, Pawlicki T, Sutlief S, Dunscombe P. Consensus recommendations for incident learning database structures in radiation oncology. Med Phys 2012; 39:7272-90.

## “Edit Local Information” Function

The process to add a new event in SAFRON is designed to take just a few minutes in a single session. In some cases, certain information may not be available until the completion of an investigation and root cause analysis. SAFRON now allows contributors to update two sections of a submitted report to complete information that may not have been available at the time of the initial report. To use this function, you can search the dataset “My Incident Reports” to identify the report you wish to update. At the top right of the “View Incident Report” screen, click on “Edit Local Information.”

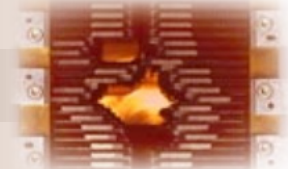
**View Incident Report**  
You can view incident report details below.

[EDIT INCIDENT REPORT](#)

**Patient treated with wrong treatment parameters.**

Treatment modality:	External beam radiotherapy
Equipment used:	
Treatment method:	
Date of discovery:	2014-05-23
Who discovered the incident?	Radiation therapist/staff at treatment unit treating patients
How was the incident discovered?	Clinical review of patient
What phase in the process is the incident associated with?	3.1.2.1. Setting of treatment machine parameters

On the “Edit Local Information” screen, you may now add or modify information in the text boxes for “Describe corrective action” and “Who should be or has been informed about the incident.” After updating these text boxes, click on the “Save” button.



## Lessons learned from brachytherapy event

### Malfunction of high dose rate equipment caused source wire to break off inside patient

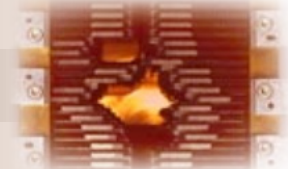
A patient was to be treated with a high dose rate unit containing 159 GBq of Ir-192. The prescribed dose was 18 Gy in three treatments. Five catheters were placed in the tumour and the source was stepped through the pre-programmed positions in each catheter. During the first treatment, the physician experienced difficulty placing the source wire into the fifth catheter. Personnel disregarded the alarm from an area radiation monitor because the unit console indicated 'safe.' The staff assumed that the area radiation monitor was malfunctioning.



In fact the source wire had been broken and the source had remained in the patient. The patient, with the source still in the catheter, was transported back to the nursing home. The source remained in the patient for almost four days, at which time the catheter containing the source fell out. Because of this misadministration, the patient received 16 000 Gy at 1 cm from the source instead of the prescribed 18 Gy. The nursing home staff placed the catheter in an area used to store non-radioactive medical waste. The waste was removed later by an incinerator company. The source was discovered when it tripped a radiation monitor located at the incinerator facility. The patient died shortly after removal of the source; it was clear that radiation exposure had been a major contributing cause of death. The loss of the source resulted in radiation exposure to 94 individuals, including persons at the cancer clinic and the nursing home, ambulance staff, and workers at the waste disposal company.

What phase in the process is the incident associated with?	3.3.1 Post irradiation survey/release criteria
Was anyone affected by the incident	Yes, one patient
Clinical incident severity	Critical incident
Describe the causes of the incident	<ul style="list-style-type: none"> <li>1.2 Inadequate standard/procedure/practice</li> <li>1.3 Standard/procedure/practice not followed</li> <li>2.2 Defective materials/tools/equipment</li> <li>6.1 Inadequate training/orientation</li> <li>6.4 Failure to recognize hazard</li> <li>8.1 Failure to address recognized hazard</li> </ul>

If you would like to study these events in more detail, see the free RPOP training material at [https://rpop.iaea.org/RPOP/RPoP/Content/Documents/TrainingAccidentPrevention/Lectures/AccPr\\_2.09\\_HDR\\_malfunction\\_USA\\_WEB.ppt](https://rpop.iaea.org/RPOP/RPoP/Content/Documents/TrainingAccidentPrevention/Lectures/AccPr_2.09_HDR_malfunction_USA_WEB.ppt).



## Success of IAEA e-learning course on Safety and Quality in Radiotherapy



# Safety and Quality in Radiotherapy

Since the launch of the e-learning course in November 30, 2016, 1123 participants have registered. Of these, 264 completed all 12 modules and received a certificate.

The IAEA surveyed the first 120 participants who completed the course and received responses from 48. The respondents are from 32 different countries on 5 continents. The majority are 25 to 35 years of age and about two-thirds are medical physicists. The respondents included both junior and senior professionals; 40% have 1-5 years of experience in radiotherapy while 25% have more than 15 years of experience. The average time to complete the full course was 5-7 hours. The majority of respondents said that the content of the course was relevant to their needs and they will be able to use the information in their daily work.

In July 2017, the IAEA E-learning Course: Safety and Quality in Radiotherapy received the American Association of Physicists in Medicine for Innovation in Medical Physics Education.

The e-learning course on Safety and Quality in Radiotherapy continues to be available at no charge on the IAEA internet platform. To access the course, it is first necessary to create an account using the IAEA NUCLEUS portal <https://nucleus.iaea.org/Pages/default.aspx>. After logging into your NUCLEUS account, you may directly access the e-learning course at <http://elearning.iaea.org/m2/course/view.php?id=392>.

## Opportunity for SAFRON users to share your experiences

The IAEA will host a Technical Meeting on Strengthening of Safety Culture in Radiotherapy through the Use of Incident Learning Systems at the IAEA's Headquarters in Vienna, Austria, from 10 to 13 October 2017.

The purpose of the meeting is to provide Member States, International, Regional and National Organizations and SAFRON users with an opportunity to evaluate and discuss the use of incident learning systems and how it can influence safety culture in radiotherapy. If you are using SAFRON as your incident learning contact:

[SAFRON.Contact-Point@iaea.org](mailto:SAFRON.Contact-Point@iaea.org)