




Guide on how-to

# Preparing a radiotherapy quality assurance programme

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## Purpose of the guide.

The purpose of these guidelines is to summarize the steps and procedures for designing a radiotherapy quality assurance programme within the framework of the City Cancer Challenge Foundation (C/Can) project in response to the urgent need to reduce inequalities in accessing quality radiotherapy treatment in selected cities.

The recommendations made in this document are the result of a technical revision made by an external expert in planning radiotherapy services nominated by the International Atomic Energy Agency (IAEA), Dr Rodolfo Alfonso, in consultation with the C/Can team and based on the experiences and outputs developed by the radiotherapy city groups in the initial C/Can cities and are expected to be interpreted, analysed and tailored on the basis of the local context and the need to build a multisectoral consultative process within cities.

# Structure and suggested contents

# 1. Introduction.

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- ▶ A short description of the cancer burden, and when feasible, epidemiological trends, in the world, region, country and city.
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- ▶ Links to radiotherapy-related results from the needs assessment phase conducted in the city within the C/Can city process.
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- ▶ A description of the role of the quality assurance (QA) programme in delivering radiotherapy services.
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- ▶ A description of the process and methodology followed by the city team in designing the QA programme.
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- ▶ Links between the QA programme will be made with other national development plans or programmes related to improving the quality and safety of radiotherapy in the city.
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## AIM OF THE DOCUMENT

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- ▶ To describe the main purpose of the document and the potential interested parties.
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- ▶ To clarify the scope of the document in terms of objective of the QA programme (i.e. establish the minimum requirements that all radiotherapy departments in the city are recommended to comply with, stressing the need for minimal QA/QC tests of equipment, patient-related QA procedures, staff requirements and their respective roles) and implementation through peer review (i.e. review the routine processes and practices through comparison between departments and identify opportunities for improvement), and the extent the QA programme is aligned with other relevant and related national policies.
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## 2. Role of radiotherapy health professionals in QA.

- ▶ The role of key and support staff in the different stages of the radiotherapy process, including training requirements, should be described in detail, including radiation oncologist, medical physicist, radiation therapy technologist, radiation oncology nurse, radiation protection officer, medical dosimetrist, and in-house maintenance engineer.
- ▶ The rationale for establishing a departmental QA committee should also be described, as well as how to set it up locally.

## 3. Baseline information.

- ▶ A general description of the radiotherapy services available in the city, main equipment and implemented treatment modalities and techniques.
- ▶ A detailed description of the current situation of ongoing QA practices in the main radiotherapy departments in the city.

### QA/QC EQUIPMENT

- ▶ Inclusion of all measuring devices required for ensuring accurate dosage delivery to patients undergoing radiotherapy.
- ▶ A detailed description of the main QA/QC equipment available in the city.

### QA/QC PROTOCOLS, COMMITTEES, AND AUDITS

- ▶ A critical analysis of existing QA protocols or programmes already in place in the main radiotherapy services in the city, including their main constraints and areas for improvement.
- ▶ Provide, if available, links to the relevant written documents and/or include which international publications were used as reference.
- ▶ Explain if they have been approved/recognised by the hospital management and regional/national regulatory bodies.
- ▶ If departmental QA committees are established, their composition in terms of members and their responsibilities should be described.
- ▶ If external quality audits, peer reviews or postal dosimetry checks were or are periodically conducted, those actions should be referred to and described.

### HUMAN RESOURCES

- ▶ Describe currently available human resource capacity in all radiotherapy departments, as well as existing educational and training programmes.
- ▶ Specify the level of training reached by the staff in QA/QC procedures, and the requirements for additional training.
- ▶ Explain the main constraints and gap areas in implementing any on-going QA programmes due to lack of adequately skilled professionals.

## 4. Methodology.

- Describe the main assumptions, benchmarks and methods followed to design the QA programme.
- Links to the objectives of the city's radiotherapy development plan should be clear and explicit, particularly considering the expected increase in volume and complexity of treatments, which consequently may lead to more demanding QA procedures for every aspect of the design and delivery of radiotherapy.

### QA/QC EQUIPMENT

- Describe the main features and purposes of the measuring equipment required for QA/QC.
- Provide criteria for the selection of adequate instrumentation and guidelines to estimate equipment needs for QA/QC purposes, in accordance with the amount and complexity of technologies and procedures.
- It is recommended to provide tables with the minimum QA/QC equipment required for implementing comprehensive QA programmes during the different phases of the city's radiotherapy development plan.
- It is important to emphasise the need to include adequate QA/QC equipment when acquiring or updating the core treatment and imaging equipment.
- Describe which specific QA/QC equipment is required for precision radiation technologies and procedures, based on international recommended benchmarks.

### QA/QC PROTOCOLS, COMMITTEES, AND AUDITS

- Explain the protocols and codes of practices used as a reference for designing a comprehensive QA programme.
- Reflect the means for systematic analysis of treatment outcomes as part of the clinical aspects of the QA programme.
- Consider the implementation of modern approaches and tools for continuous improvement in quality and safety, as failure mode and effect analysis (FMEA), incident learning systems (ILS), and so on.



## HUMAN RESOURCES

- Reference the role of key and support staff in the different stages of the radiotherapy process (see Section 2). Consider the contribution of all the staff in QA/QC activities.
- Provide guidelines to estimate personnel needs related to QA/QC tasks, in relation to the volume and complexity of technologies and procedures; the use of activity-based algorithms is advisable.
- When feasible, highlight and define the specific role hospital managers and their clinical leaders should play in improving the quality of care and service delivery.

# 5. Implementation steps toward a QA programme.

- Provide an in-depth analysis of all the required actions and measures required to ensure the implementation of a comprehensive QA programme in all city radiotherapy services, with special emphasis on public reference centres.
- A stepwise approach, taking into account the capacity at baseline, should be followed in executing the QA programme, while those actions should be aligned with others proposed within the city radiotherapy development plan.

## QA/QC EQUIPMENT REQUIREMENTS

- Specify the type (and number) of QA/QC equipment that should be made available, acquired and commissioned for ensuring the implementation of a comprehensive QA programme, in the context of the various intervention packages detailed in the city radiotherapy development plan.

## QA/ QC PROTOCOLS, COMMITTEES AND AUDITS

Short-term actions (up to two years)

- Identify the existing QA programmes that should be updated and/or completed.
- Define the new QA protocols projected to be designed and implemented.
- Explain the strategies for creating a QA committee in the departments where these committees have not yet been established.
- Explain the planned actions for establishing radiation safety committees in all centres providing radiation treatment.

### Medium-term actions (up to five years)

- Explain which organisational measures to be put in place for ensuring coordination and smooth overlap between the departmental QA committee and the institutional radiation safety committee.
- It is advisable to create a city QA Committee to coordinate the implementation of standardised QA programmes in the city's radiotherapy departments and to promote inter-comparison exercises, peer review visits, network-based patient charts and plan discussions.
- Explain how the C/Can city executive committee plans to conform the radiotherapy city QA committee, e.g. which members should be appointed and ensure the participation of critical actors such as the nuclear regulatory body, SSDLs, etc.
- Describe the projected strategy for continuous improvement of the QA programme.
- Provide details on plans for systematic inter-comparisons, external dosimetry audits (postal) and quality audit visits (e.g. QUATRO).
- Present quality improvement strategy in detail, outlining the purpose and frequency of the different modalities.

### Long-term actions (up to ten years)

- Depending on the capacity at baseline, promote the implementation of comprehensive ILS in all radiotherapy services as a reactive approach for improving the quality and safety of the radiotherapy process. Use of already established ILS platforms, such as IAEA's SAFRON, is recommended.
- Encourage application of risk assessment approaches such as FMEA, in all radiotherapy services as a prospective approach for improving the quality and safety of the radiotherapy process.

## HUMANS RESOURCES

- Explain the measures put in place to ensure coordination between medical physicists, dosimetrists, maintenance engineers, radiation oncologists, radiation therapy technologists, and other medical disciplines and management.
- Provide an overview of the required training activities in specific QA/QC aspects of radiotherapy, including physics, clinical, technical and safety aspects.
- Review and conduct an analysis on how the contents related to QA/QC procedures are being covered in the existing educational syllabi, with special emphasis on competence-based residency programmes.

## 6. Conclusions

- ▶ Summarise the main outputs that can be accomplished and the expected impact in practice as a result of the implementation of the QA Programme.
- ▶ Provide in-depth analysis of the outcomes expected at the end of each phase of the QA programme, based on the assumption that the different phases can and will be implemented sequentially and as planned.
- ▶ Describe the main challenges and risks that the QA programme can face and provide possible measures and mitigation strategies to address them.

## 7. Contributors

- ▶ A detailed list of all members of the city team that contributed to the drafting of the document, including the participants in the peer review meetings conducted in the city, as well as all external experts who reviewed and edited the final draft.

## 8. References

- ▶ List all publications referenced in the document.
- ▶ The use of international benchmarks and guidelines, when available, is highly recommended, such as those included in the references below (not exhaustive):
  - › AAPM TG-40: G. J. Kutcher, L. Coia, M. Gillin, W. F. Hanson, S. Leibel, R. J. Morton, J. R. Palta, J. A. Purdy, L. E. Reinstein, G. K. Svensson, M. Weller, and L. Wingfield, "Comprehensive QA for radiation oncology: Report of AAPM Radiation Therapy Committee Task Group 40," *Med. Phys.* 21, 581–618 (1994).
  - › IAEA. Roles and Responsibilities, and Education and Training Requirements for Clinically Qualified Medical Physicists, Human Health Series No. 25. Vienna: International Atomic Energy Agency; 2013.
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- › IAEA. SAFRON: Learning from accidents and incidents. (visited on May 26th , 2020)
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- › Huq MS, Fraass BA, Dunscombe PB, et al. The report of Task Group 100 of the AAPM: application of risk analysis methods to radiation therapy quality management. Med Phys. 2016; 43:4209–4262.
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<https://citycancerchallenge.org/>

