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# Clinical Implementation of a Digital QA Management Platform for Monthly Quality Assurance in a Radiotherapy Department

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## ABSTRACT

A one-month trial implementation of RadMachine was performed to evaluate its use as a digital QA management platform for monthly quality assurance in a radiotherapy department. The department already used IBA myQA for routine QA acquisition and analysis; however, documentation, inventory control and review of previous results still depended partly on spreadsheet-based records and manual follow-up steps.

During the trial period, 79 clinical assets were registered, including linear accelerators, QA phantoms and measurement accessories. Assets were assigned to physical locations, and calibration-related records were uploaded when applicable. Monthly QA tests were configured using pre-existing RadMachine templates and adapted to match local procedures, tolerance criteria and reporting needs. Python-based customization was also explored for additional test development.

The platform was configured with the department's principal clinical systems, including two Halcyon linacs, one Varian Unique linac, one Philips CT scanner and two HDR units. The implementation demonstrated the feasibility of centralizing equipment organization, QA test configuration, automated analysis modules and structured report generation within a single digital workflow. This approach may improve traceability, standardization and longitudinal review of monthly QA results

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## INTRODUCTION

Monthly quality assurance (QA) in radiotherapy requires a structured workflow to verify the mechanical, dosimetric and image-based performance of treatment and measurement systems. In our department, monthly QA has been routinely performed since 2024 using the IBA myQA software environment, where the corresponding clinical equipment and QA tests had already been configured.

Despite having an established workflow, the process remained distributed across different tools, part of the workflow still relied on spreadsheet-based records and manual review of previous results, as shown in Figure 1.

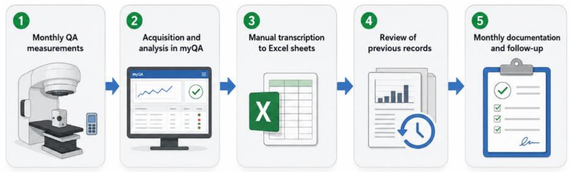


**Figure 1. Pre-implementation monthly QA workflow in our department.**

This approach supported routine QA execution but limited detailed inventory control, standardization of test definitions and efficient visualization of historical trends. RadMachine was implemented as a complementary digital QA management platform to centralize documentation, improve traceability and support structured review of monthly QA results.

## METHODS AND MATERIALS

A license of RadMachine was acquired to evaluate its implementation as a digital QA management platform using the department's existing QA workflow as a reference.

The first phase consisted of creating a departmental inventory of 79 clinical assets, including linear accelerators, QA phantoms and measurement accessories. Each asset was assigned to a physical storage location within the department.

Monthly QA tests were configured using pre-existing RadMachine templates as a starting point and adapted to match local procedures, tolerance criteria and reporting needs. Python-based customization was also explored to modify existing tests and create additional QA tools. The implementation workflow is summarized in Figure 2.

**Figure 2 summary of the main implementation steps performed during the trial period.**

## RESULTS

RadMachine was configured with the department's main clinical systems, including two Halcyon linacs, one Varian Unique linac, one Philips CT scanner and two HDR units. Each system was linked to its corresponding monthly QA tests within a centralized digital environment.

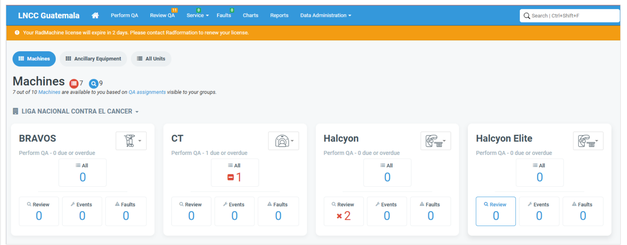


**Figure 3. Main platform view with configured clinical systems**

The main equipment view allowed QA workflows to be organized by clinical system, while individual test interfaces displayed parameters, tolerances and result-entry fields in a standardized format.

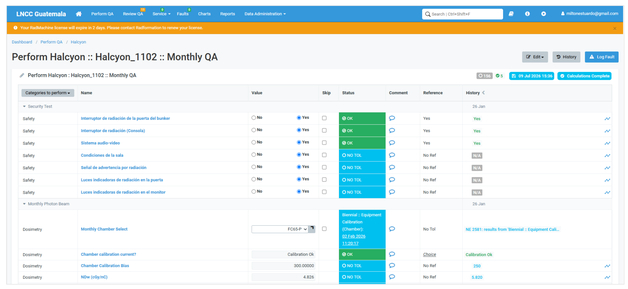


**Figure 4. Example of an individual QA test view**

Automated image-analysis modules were configured for selected imaged based QA procedures, allowing imported images to be analyzed and documented within the same platform.

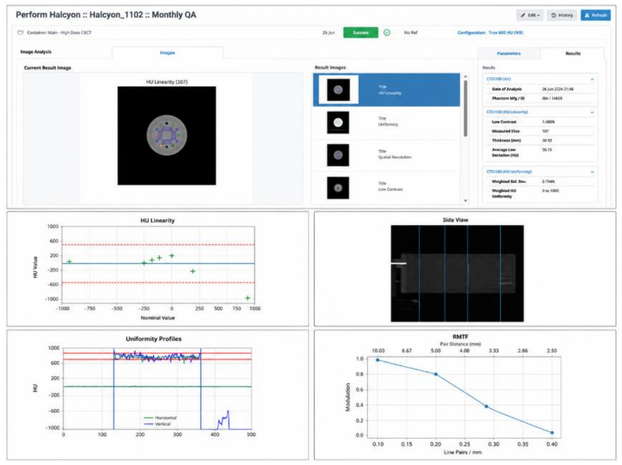


**Figure 5. Example of an automated image-analysis modules**

Structured report generation was also configured, providing consistent summaries of recorded QA results. These outputs demonstrated the feasibility of centralizing equipment organization, test configuration, automated analysis and documentation within a single monthly QA workflow.

## DISCUSSION

The main challenge during implementation was the initial setup effort. Each clinical asset had to be registered, documented and assigned to a physical location, which was time-consuming but necessary to improve traceability across equipment, measurement devices and QA procedures.

Although RadMachine provides preconfigured QA templates, local adaptation was required to match departmental procedures and equipment-specific needs. Linking measurement devices, tests and customized templates involved an initial learning curve. Basic dosimetric evaluations were relatively straightforward to configure by defining input variables and calculation formulas. In contrast, beam-profile and image-analysis tests required more detailed customization because the platform allowed extraction of multiple parameters, requiring the user to decide which metrics should be calculated, processed and reported.

This flexibility allowed tests to be adapted to local QA criteria, but also required careful template development and validation. Once configured, the monthly QA workflow became more structured: results could be stored in a standardized format, reviewed across different systems and visualized over time, supporting trend analysis and internal QA review.

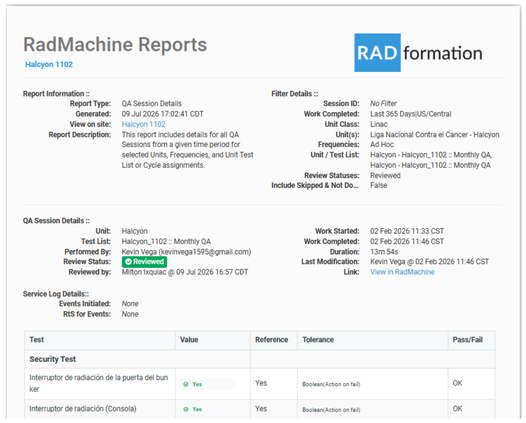


**Figure 6. Example of generated report**

## CONCLUSIONS

- RadMachine was successfully evaluated as a digital platform for organizing monthly QA record, equipment information, test templates and calibration-related documentation.
- Although the initial setup required considerable configuration effort, especially for inventory creation and customized test development, the resulting workflow supported improved traceability, standardized documentation and structured review of QA results.
- Digital QA management may be particularly useful in departments with multiple treatment systems and measurement devices, where centralized records and longitudinal trend visualization can support more consistent internal QA review.

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