

# Implementation of Web-Based QA Management Platform at Multi-Clinic, Multi-Vendor Institution

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## ABSTRACT

### Purpose:

A web-based quality assurance (QA) management platform can reduce clinic hardware and software needs while streamlining QA workflows through improved accessibility, trend tracking, and automated failure notifications. This study reports on the implementation of such a platform across multi-clinic, multi-vendor environments, highlighting integration challenges and opportunities.

### Methods:

This study describes the implementation of a web-based QA management platform (SunCheck, Mirion Inc.) across a large metropolitan radiation oncology practice spanning five clinical sites. The deployment encompassed multiple linac platforms (Elekta, Ethos, and TrueBeam/Varian), HDR, and diverse OIS and TPS systems, adding complexity to adoption. To support the transition, a standardization committee aligned current practices with existing machine QA guidelines. Additionally, risk analysis was assessed using failure mode and effects analysis (FMEA) for multiple patient-specific QA (PSQA) methods on the platform.

### Results:

Our experience suggests that engaging champions within each clinic can facilitate a smoother transition for standardization across multi-clinic environment. The standardization committee proposed a scalable machine QA template based on current guidelines. Our FMEA analysis highlights key PSQA failure modes and supports combining QA strategies to reduce risk. Compared to secondary check only scenario, measurement-based QA improved detection of TPS modeling issues in SBRT and complex plans, reducing FMEA risk-priority numbers from 321 to 210 for errors related to small field delivery and from 155 to 97 for errors related to MLC issues. While all PSQA methods lowered plan deliverability risk scores from 194 to 43.

### Conclusion:

This report provides perspective of enterprise-wide implementation of a web-based QA management platform in a multi-vendor, multi-clinic environment, and suggests methods to maximize risk reduction. As such, it provides valuable information for other clinics considering a similar transition.

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## INTRODUCTION

Radiation oncology QA programs across large healthcare networks often involve heterogeneous equipment, workflows, and documentation practices. A web-based quality assurance (QA) management platform can streamline QA operations by enabling centralized data access, automated notifications, and longitudinal performance tracking while reducing clinic-specific hardware and software requirements.

However, implementation across a multi-clinic, multi-vendor environment presents challenges due to differences in clinical practices, accelerator platforms, oncology information systems (OIS), treatment planning systems (TPS), and existing QA workflows.

This study reports the implementation of a web-based QA management platform across a large metropolitan radiation oncology practice and evaluates strategies for workflow standardization and risk reduction.

## METHODS AND MATERIALS

### Implementation Environment

A web-based QA management platform (SunCHECK, Mirion Inc.) was implemented across five clinical sites within a metropolitan radiation oncology network. The implementation included:

- Diverse equipments at different sites
  - Multiple linear accelerator platforms (Elekta VersaHD, Elekta Infinity, Varian Ethos, and Varina TrueBeam)
  - HDR system
- Diverse clinical software environments
  - OIS platform (Mosaik)
  - TPS platform (RayStation)
- QA workflows standardization
  - Machine QA
  - Patient-specific QA (PSQA)

The heterogeneity of clinical environments required coordinated workflow evaluation and standardization prior to deployment.

### Implementation Strategy

#### 1. Standardization Committee

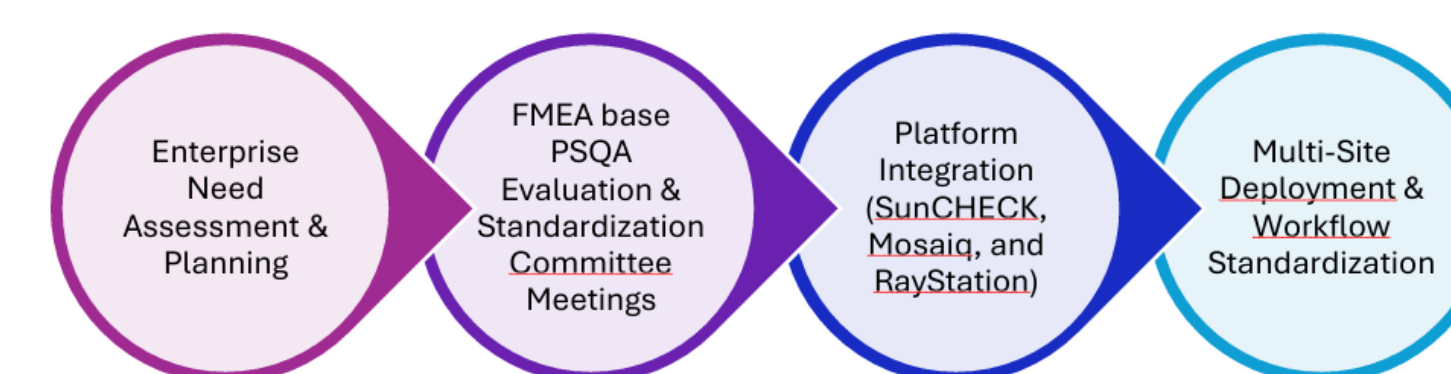
A standardization committee was established to facilitate enterprise-wide adoption. Key responsibilities included:

- Reviewing existing QA workflows across clinical sites
- Identifying practice variations and implementation barriers
- Aligning procedures with established machine QA guidelines
- Developing scalable QA templates applicable across different platforms

#### 2. Site Champion Engagement

Clinical champions from each site were engaged throughout implementation to:

- Facilitate communication between local teams and implementation leads
- Identify site-specific workflow considerations
- Support user adoption and transition to standardized processes



**Figure 1.** Workflow for enterprise-wide implementation of a web-based QA management platform (SunCheck) across a multi-site, multi-vendor radiation oncology network .

### Risk-Based Evaluation of PSQA Workflows

Failure mode and effects analysis (FMEA) was performed to evaluate potential risks associated with PSQA workflow implementation. The analysis focused on identifying opportunities to reduce risks through optimized QA strategies.

| Failure Mode                               | Primary Cause                                                     | Potential Effect                                                            | RPN (Risk Priority Number) |                    | % Reduction |
|--------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------|--------------------|-------------|
|                                            |                                                                   |                                                                             | Baseline                   | After Optimization |             |
| Small field delivery / TPS modeling errors | Inaccurate modeling, detector volume averaging, MU errors         | Dosimetric errors in SBRT and small fields, potential underdose or overdose | 321                        | 210                | 34%<br>↓    |
| MLC modeling errors                        | Incorrect MLC calibration, leaf transmission, dosimetric leaf gap | Dosimetric errors in IMRT/VMAT plans                                        | 155                        | 97                 | 37%<br>↓    |
| Plan deliverability failures               | Complex plan delivery limitations, parameter mismatches           | Inadequate target coverage or OAR overdose                                  | 194                        | 43                 | 78%<br>↓    |

**Table 1:** List of three PSQA-related key failure modes and their RPN scores with different PSQA implementation were listed.

## RESULTS & DISCUSSIONS

### Implementation Outcomes:

- Successful deployment across five clinical sites
- Integration of heterogeneous linac platforms and clinical software environments
- Development of standardized machine QA workflows
- Risk-based evaluation of PSQA implementation strategies

### Key Lessons Learned

- Local engagement is essential.

Site champions improved communication and supported smoother workflow transition.

- Standardization enables scalability

A unified QA framework reduced practice variability while accommodating different equipment platforms.

- Risk-based assessment supports QA optimization

FMEA provided a systematic approach to evaluate PSQA strategies and identify opportunities for improving patient safety.

## CONCLUSION

Enterprise-wide implementation of a web-based QA management platform is feasible across a complex, multi-clinic, multi-vendor radiation oncology environment.

Successful adoption requires:

- Multidisciplinary collaboration
- Workflow standardization
- Local stakeholder engagement
- Risk-based evaluation of QA strategies.

This experience provides a framework for institutions considering similar transitions toward centralized QA management.

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