Transforming Plan Finalization Through Automated Error Identification and Team-Based Solutions

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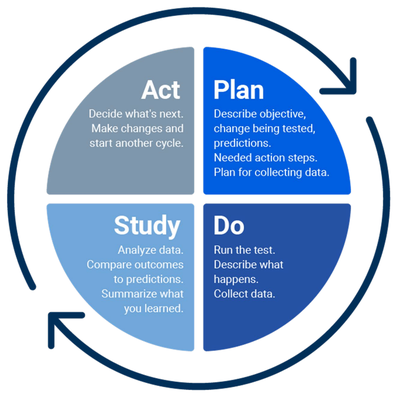
INTRODTUCTION

Medical Dosimetrists play a critical role in the accuracy and safety of radiation therapy treatment planning. The plan finalization process is complex and prone to human error, which can impact treatment quality and require additional physics review time. To improve reliability and efficiency, our physicist developed and implemented Chartist[1], a home-grown hybrid automated chart-review program.

PURPOSE

This project aims to analyze trends in plan finalization errors identified by Chartist[1]. Using these trends, we can implement targeted interventions to reduce errors utilizing the PSDA cycle (Plan, Study, Do, Act) quarterly. Thus, elevating the overall quality and consistency of dosimetry's plan finalization.

Figure 1.0 – PSDA Cycle



METHOD

Chartist[1] was used retrospectively and prospectively to identify the 5 most common dosimetry-errors during plan finalization. The dosimetry team categorized the error types, evaluated their root cause, and collaborated to design corrective strategies, including workflow updates, checklist optimization, education and planning-system template adjustments.

Figure 2.0 – 2025 4th Quarter Top 5 Errors

Error Count	Error Description
70	Only Appropriate Courses Active
46	Patient Data Not in TPD
38	Contours Handled Correctly
12	Overall Planning Approach Appropriate
12	Fields Named Correctly

The highest frequency error in the fourth quarter of 2025 was "Only Appropriate Courses Active." Chartist[1] completed 595 chart checks during this period, resulting in an 11.76% error rate related to non-active courses. The dosimetry team selected this issue as the primary improvement focus for the first quarter of 2026.
A retrospective review of Chartist[1] data from the remaining first three quarters revealed a consistent trend: the most frequent error across all three quarters was "Only Appropriate Courses Active.: This finding confirmed the need to prioritize targeted interventions aimed at reducing this specific error.

Figure 2.1 – 2025 1st Quarter Top 5 Errors

Error Count	Error Description
89	Only Appropriate Courses Active
32	Contours Handled Correctly
26	Patients Data Not in TPD
21	Fields Named Correctly
14	DRR's Present

Figure 2.2 – 2025 2nd Quarter Top 5 Errors

Error Count	Error Description
77	Only Appropriate Courses Active
38	Contours Handled Correctly
34	Patients Data Not in TPD
21	Fields Named Correctly
19	Rx Volume Meets Nomenclature Standard

Figure 2.3 – 2025 3rd Quarter Top 5 Errors

Error Count	Error Description
73	Only Appropriate Courses Active
30	Patient Data Not in TPD
25	Contours Handled Correctly
17	Fields Named Correctly
15	Rx Dose and Fx Match Plan

Collaboration between dosimetry and physics teams identified the need to update the outdated Photon Dosimetry Planning Assistant Document (PAD), which serves as a reference for dosimetrists during plan finalization. Although previously optional, the document was revised to incorporate key elements routinely reviewed during chart checks.

The updated PAD document was presented to the dosimetry team with the expectation that it would be used for all plan finalizations. However, by late February, it became clear that the document was not being used consistently. In response, the Dosimetry Team Leads and Physics Supervisor collaborated again and determined that implementing an Encounter in ARIA would provide a more reliable and accountable method for completing required plan-finalization tasks. The Encounter process ensures completion by requiring dosimetrists to actively verify and check off each item within ARIA before finalizing a plan.

RESULTS

Preliminary analysis shows that Chartist[1] consistently identifies recurring error trends during plan finalization, allowing the dosimetry team to prioritize the most frequent and high-impact issues. Using the PSDA cycle, we determined that the initial intervention would not produce a substantial reduction in errors; more meaningful results are anticipated by the end of the second quarter of 2026.
Early interventions have already led to measurable decreases in repeat errors and improved consistency in plan finalization. Of the 617 charts reviewed, 60 errors were recorded for "Only Appropriate Courses Active," resulting in an error rate of 9.72% for the first quarter of 2026 – representing a 2.04% reduction from the fourth quarter of 2025.

CONCLUSION

Integrating automated chart-check tools, such as Chartist[1], into the dosimetry workflow strengthens quality assurance by reducing preventable errors and promoting greater standardization. This approach adds measurable value by serving as a key mechanism for patient safety and quality oversight. Ongoing evaluation and iterative refinement further support safer, more efficient plan finalization, highlighting the importance of collaboration between dosimetry and physics in delivering high-quality, patient-centered care.

REFEERENCES

1. **Development of hybrid automated chart checking, data collection, and analysis system**
J Appl Clin Med Phys. 2025;26:e70161
DOI: 10.1002/acm2.70161
Edward L. Clouser Jr., Quan Chen, Daniel P. Harrington, Yi Rong, Courtney R. Buckey