

TIME COSTS ASSOCIATED WITH RADIATION TREATMENT PLAN REVISIONS AND REWORKS: LARGE-SCALE OPERATIONAL DATA FROM A LARGE ACADEMIC CANCER CENTER

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Introduction

Plan evaluation, peer review, and quality assurance (QA) are essential steps of the planning process contributing to the delivery of safe and effective radiation therapy (RT). However, these steps can lead to increased plan revisions and plan reworks (occurring after initial plan approval), which are associated with higher resource utilization and potential treatment delays. Here, we evaluate the incidence and impact of revisions and reworks at a large academic cancer center.

Methods and Materials

From 2011–2018, time metrics of all planning process steps—including contouring, dosimetric planning, plan review, QA, revisions, and reworks—were captured in an electronic data system with integrated event triggering, notifying staff immediately following step completion. Data were captured to evaluate the effect of revisions and reworks on overall simulation to treatment start time, measured in working business days (excluding weekends and holidays).

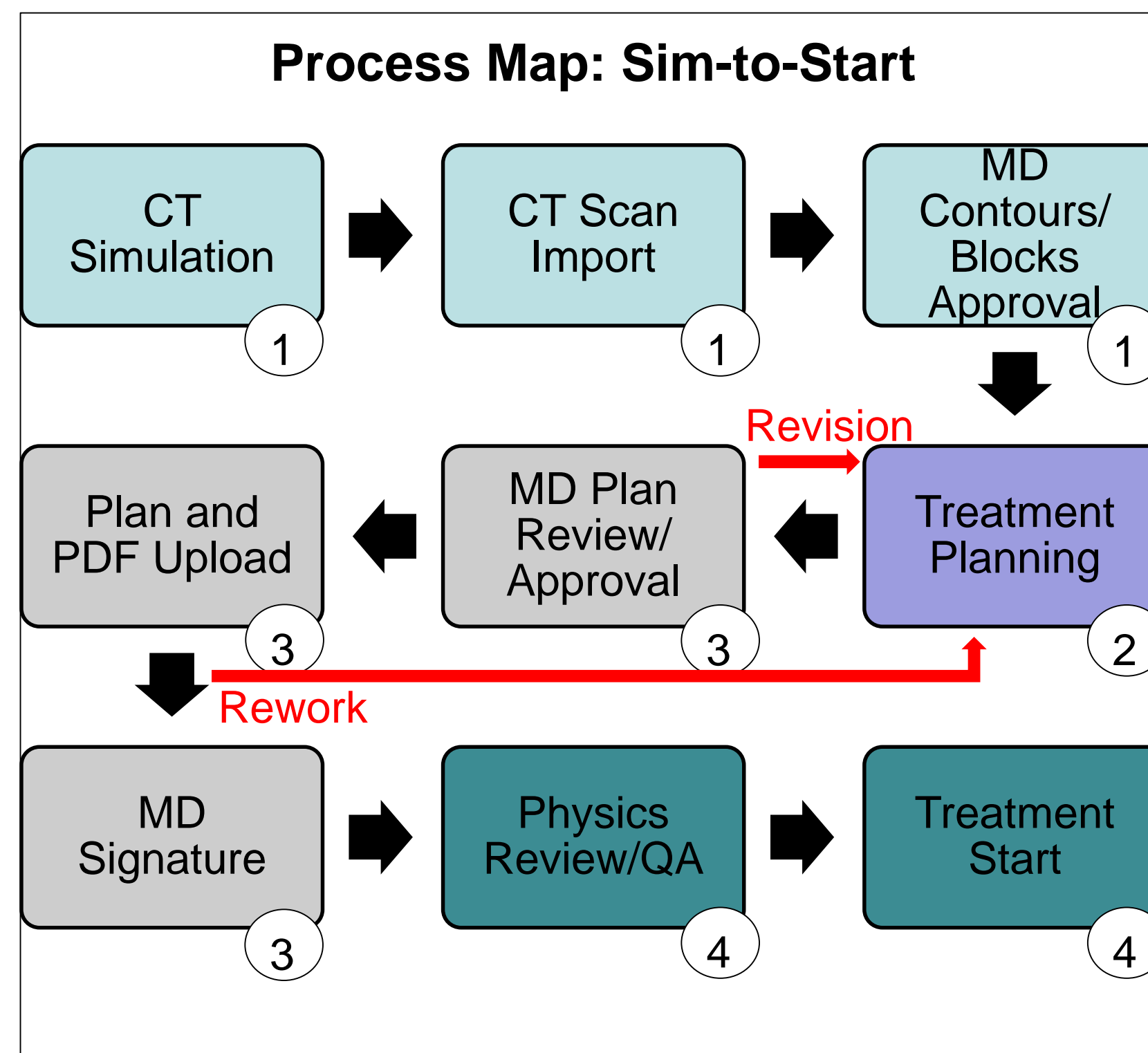


Fig. 1 Process map from simulation to treatment start.

Intervals

1. Contouring (CT Simulation → Contours/Blocks Approved)
2. Treatment Planning (Contours/Blocks Approved → Plan Ready for Review)
3. MD Plan Review (Ready for Review → MD Plan Signature)
4. QA (Plan Signed → Treatment Start)

Results

A total of 36, 514 episodes were captured, including 19,666 IMRT and 16,848 2D/3D plans. Median simulation-to-start time for 2D/3D plans and IMRT plans was 4 (IQR 3) and 7 (IQR 3) business days respectively [$p < .001$]. The overall incidence of revisions and reworks was 19.8% and 1.1%. In the absence of either, the overall median simulation-to-start time was 6 (IQR 4) business days. However, revisions resulted in an increase to 7 (IQR 3) business days [$p < .001$]; while reworks further increased time to 8 (IQR 5) business days [$p < .001$].

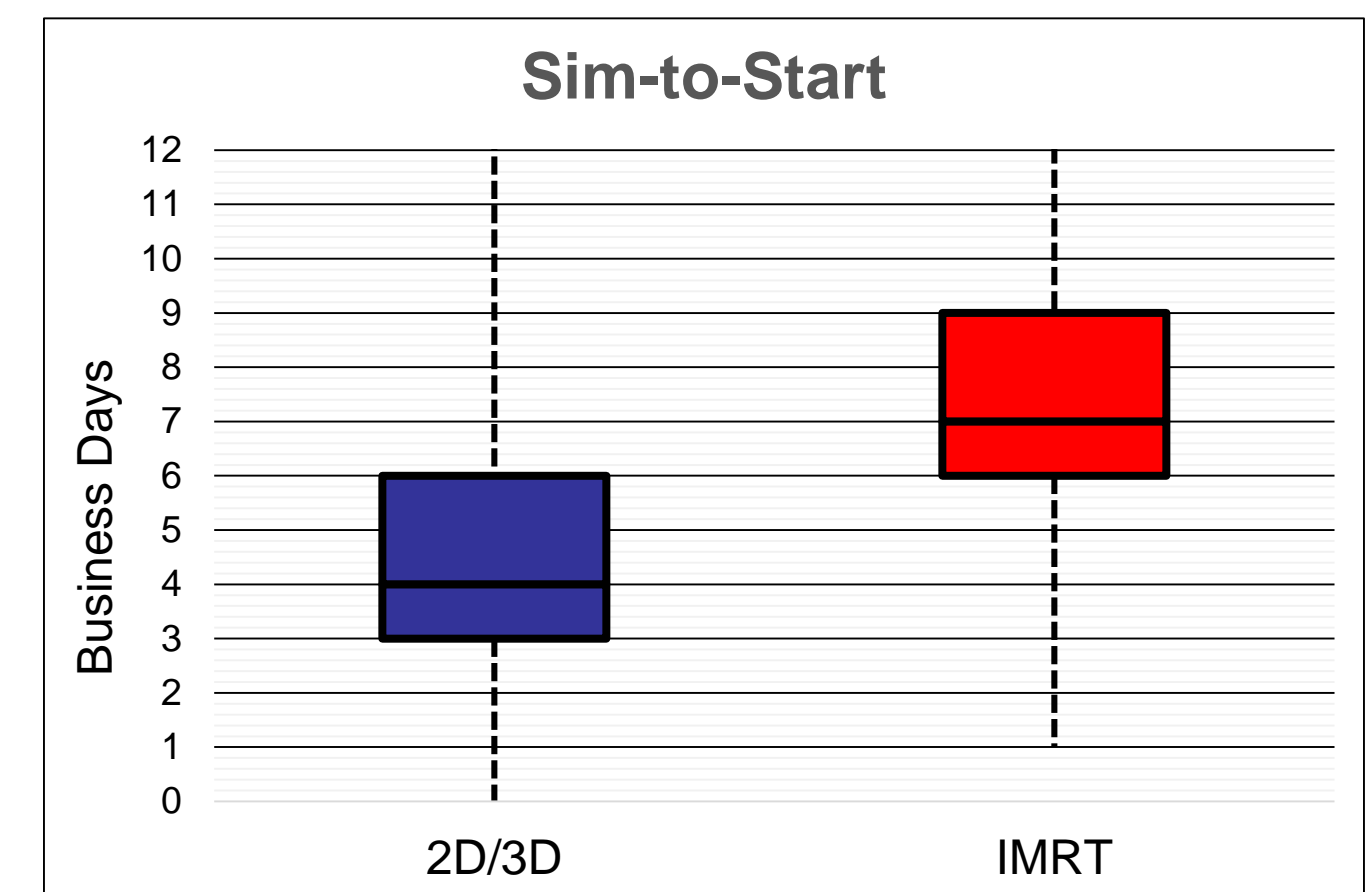


Fig. 2 Median simulation to treatment start for 2D/3D plans and IMRT plans.

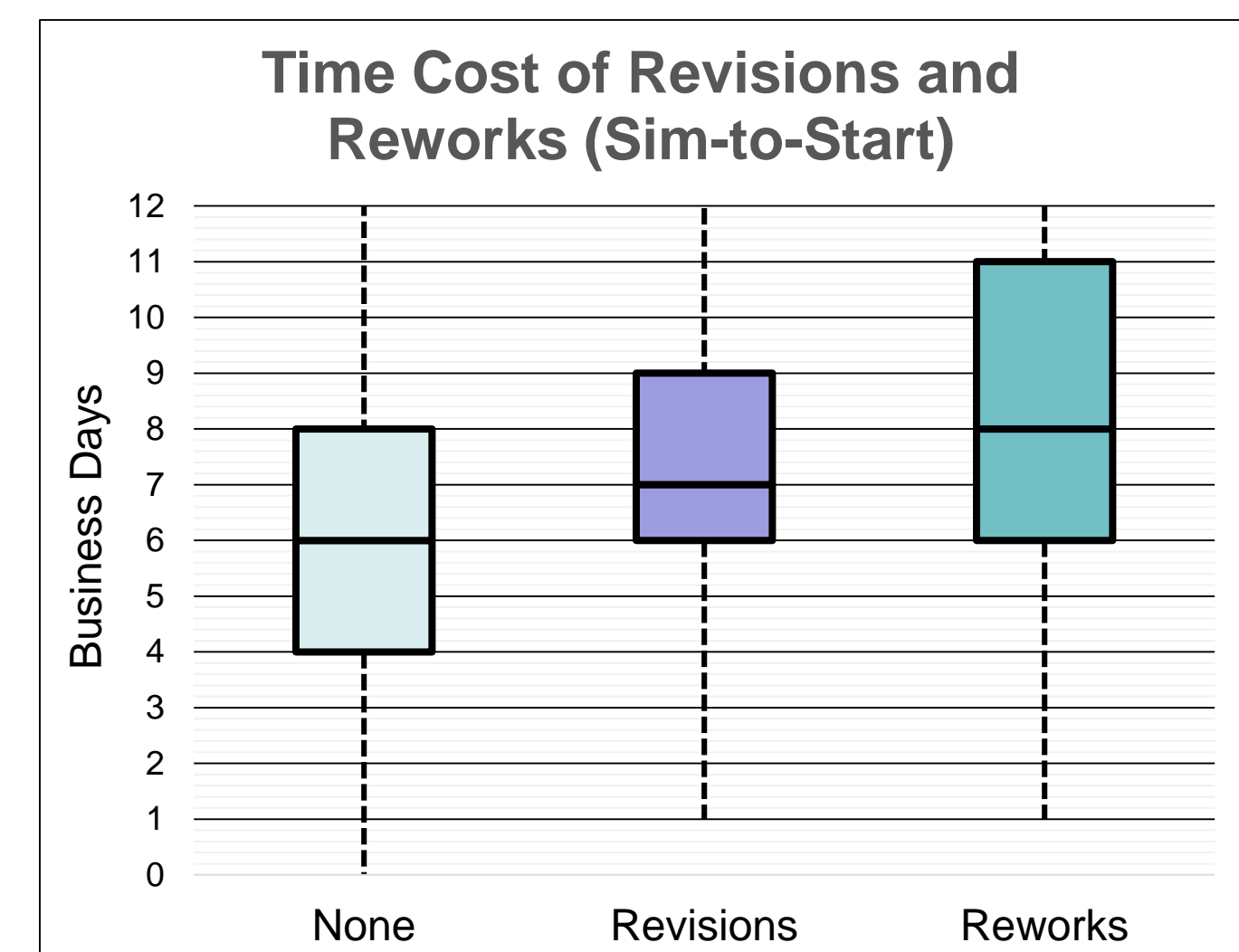


Fig. 3 Change in median simulation to treatment start (business days) for plan revisions and plan reworks.

Conclusion

While essential to high-quality radiation therapy, revisions and reworks can be resource-intensive additions to the planning process with the potential to delay treatment. In addition, the high incidence of revisions suggests that at least some instances are avoidable through upstream measures. Future efforts may elucidate the underlying causes of revisions and reworks, to drive quality improvement initiatives aimed at decreasing their occurrence. Further optimizing the planning workflow may contribute to safe and timely patient care.