

Automation in Radiotherapy Clinical Workflow using an Event-Driven Framework

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PURPOSE

- Manual radiotherapy workflows, such as secondary dose verification, Aria CarePath task scheduling, and prescription change communications — are error-prone and could consume significant physics and dosimetry staff time.
- To improve the effectiveness and efficiency of radiotherapy clinical workflows, we developed and deployed three vendor-specific Event-Driven Framework (EDF) automation applications that reduce manual intervention and enhance communications among members of the care team for patients receiving radiation therapy at a high-volume academic cancer center (>13,000 RT patients/year).

METHODS AND MATERIALS

- EDF SureCalc – Automated Secondary Dose Verification**
Upon physician plan approval in Aria, EDF automatically exports DICOM-RT files, triggers MIM SureCalc secondary dose calculation, and uploads the PDF report to the patient record. Multi-site and urgent-start routing logic prevents duplicates and prioritizes time-sensitive cases. Figure 1 illustrates the automated clinical workflow.
- EDF Task Auto-Adjustment – CarePath Scheduling**
Triggered by new-start scheduling or CT simulation events, EDF computes and updates due dates for all open planning tasks using institution-defined rules based on treatment site, fractionation, and planning timeline. Figure 2 illustrates the automated clinical workflow.
- EDF eRx – Prescription Change Notification**
Detects Aria prescription modification events and immediately dispatches email + in-system notifications to the responsible dosimetry and RTT teams, including patient ID, physician, and modification timestamp. Due-time logic accounts for treatment-day urgency.

Figure 1. EDF-SureCalc clinical workflow illustration.

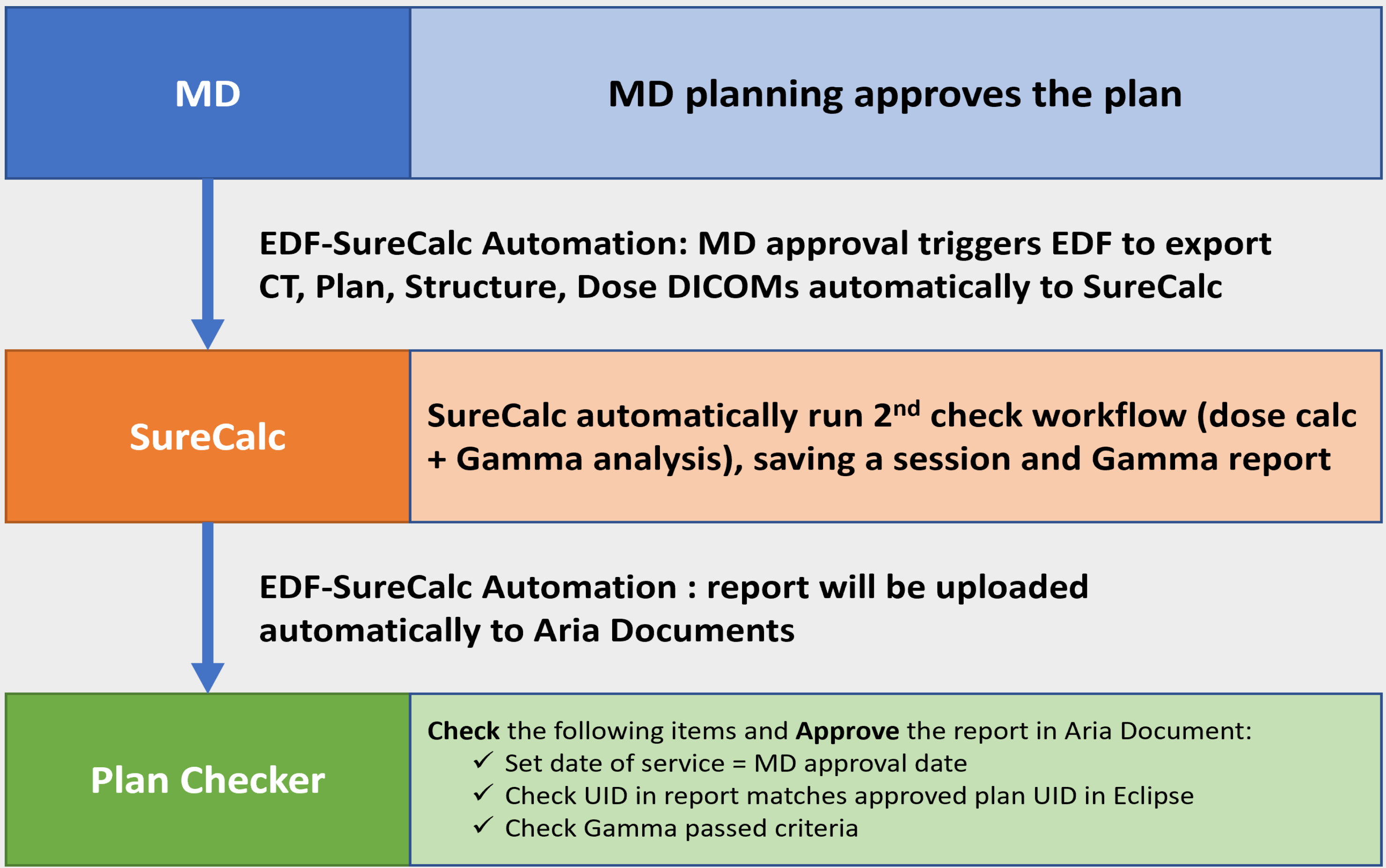
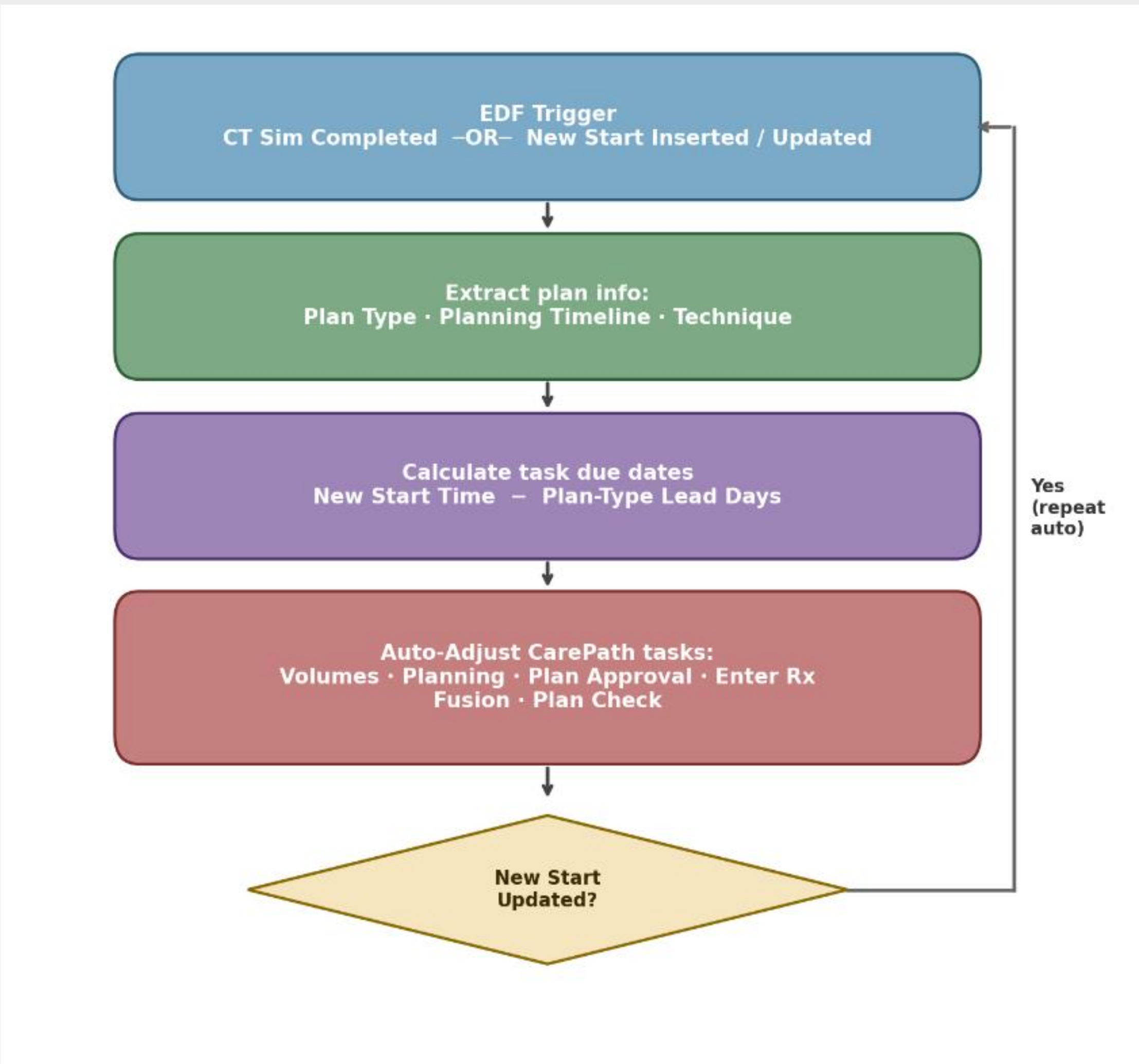


Figure 2. EDF Task Auto-Adjustment Clinical workflow illustration.



RESULTS

Figure 3 presented the total number of patients benefiting from June 2025 to June 2026 for each of the 3 automation tools.

Figure 3. Annual patient impact from June 2025 to June 2026 for the three EDF automation systems.

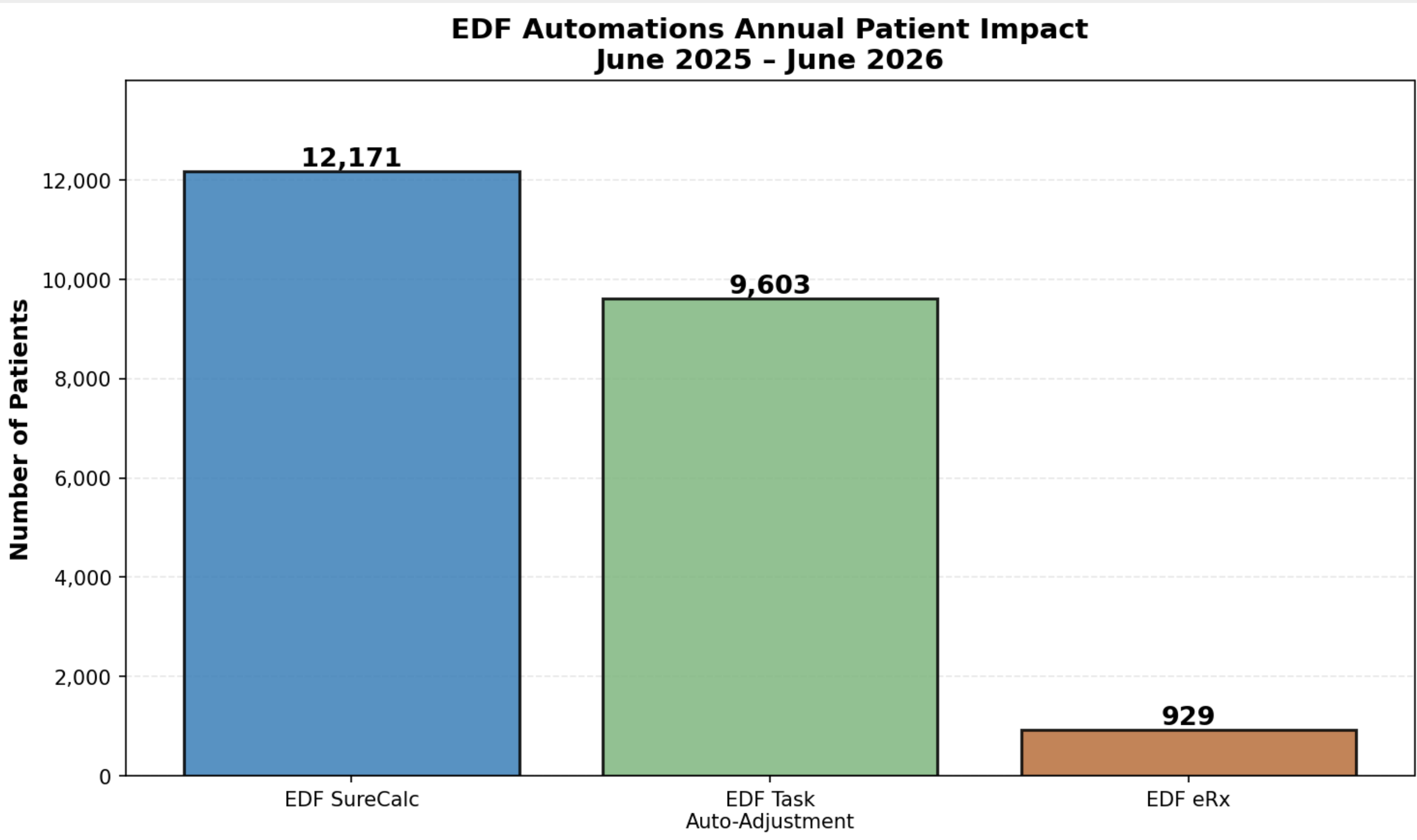
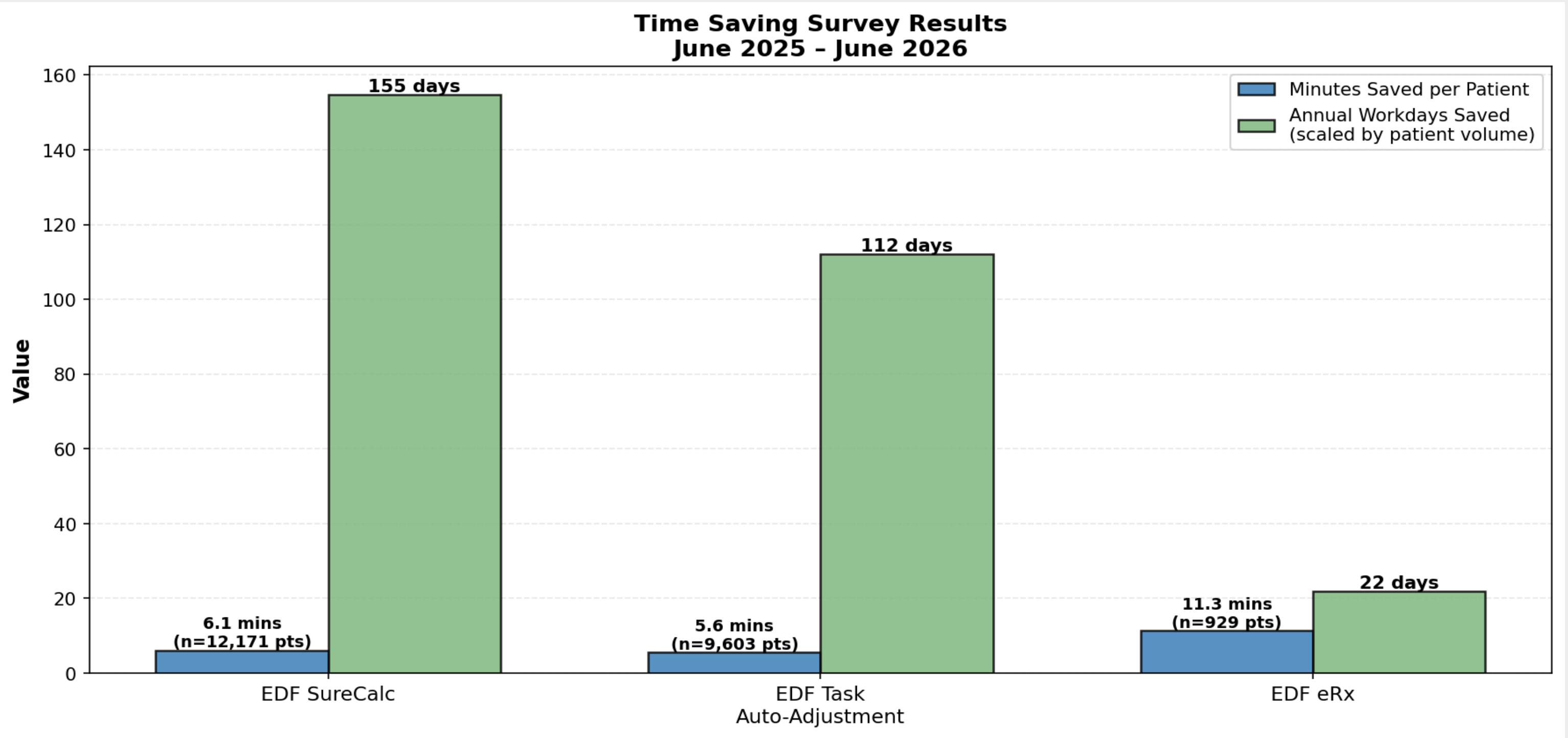


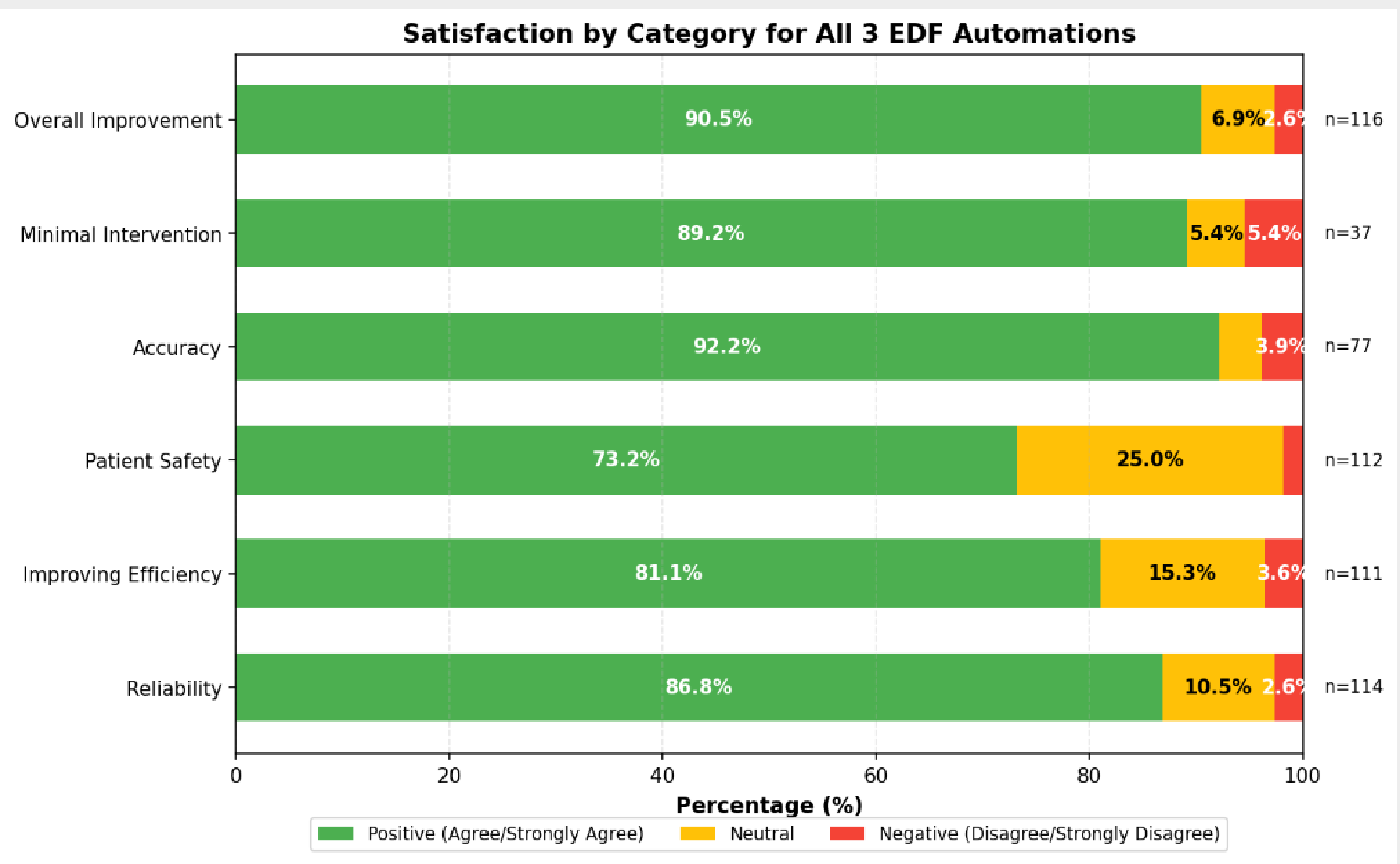
Figure 4 illustrates the survey-reported time savings for all three EDF automation tools, displayed as a grouped bar chart for each tool: average minutes saved per patient (blue bars) and projected annual workdays saved (green bars).

Figure 4. Time savings survey results for all three EDF automation systems.



- A total of 40 clinical staff completed the EDF Clinical Workflow Automations survey, comprising 20 dosimetrists (50%), 11 non-planner physicists (27.5%), and 9 planner physicists (22.5%). The survey assessed six satisfaction categories: Reliability, Efficiency, Patient Safety, Improvement, Accuracy, and Minimal Intervention.
- Figure 5** displays satisfaction results by category, combining responses across all three EDF automation systems. Overall, all categories demonstrated strong positive satisfaction across the combined EDF automations, with the majority of ratings above 80% positive responses and zero to minimal negative feedback.

Figure 5. Survey results of all three EDF automation tools per survey category



CONCLUSIONS

- Three EDF automations successfully designed, implemented, and evaluated at a high-volume academic cancer center (>13,000 RT patients/year).
- 289 combined annual workdays saved (~1.2 FTE), enabling staff reallocation toward higher-value clinical activities.
- High user satisfaction (82.9% positive overall) with near-zero negative responses.
- All 3 tools share a common EDF architecture — rapid deployment and direct transferability to other Varian Aria institutions.
- Future work: expand automation to additional workflow domains and conduct prospective controlled patient safety outcome evaluations.

ACKNOWLEDGEMENT

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