



Enhancing Efficiency in Beacon Treatment Planning through AI-Based Layout Generation



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BACKGROUND

Oncology clinical trial protocols are complex and require translation into structured treatment plans for electronic health record systems such as Epic Beacon – a workflow that is labor-intensive for clinical research nurses, pharmacists, and informatics teams. Research nurses spend countless hours creating these documents/plans outlining drug regimens, treatment labs, parameters, physician and nursing communication, toxicity management information, and dose modification rules aligned with the protocol.

OBJECTIVES

The identified gap in Beacon-specific AI publication underscores the need for formal evaluations comparing efficiency, error rates, and revision burden versus manual processes, and for publishing implementation outcomes to establish best practices

METHODS

We propose an AI-driven approach that automatically generates Beacon Treatment Plan layouts from protocol documents, producing standardized templates for submission to EPIC Willow/Beacon for treatment plan build. The system extracts and structures regimen components (agents, dosing, cycles, schedules), operational parameters (labs, pre-medications, supportive care, infusion instructions), nursing and physician communication, toxicity management strategies, and dose modification rules, aligned with Beacon configuration requirements to reduce manual transcription, variability, and errors and subsequently adjudicated by trial nurse coordinator for accuracy.

RESULTS

Early internal assessments indicate improved plan creation speed, fewer downstream configuration revisions, and clearer interdisciplinary communication, supporting the potential for faster research protocol activation in clinical practice. Two protocols with differing complexity were tested involving multiple arms and multiple regimens and treatment discipline (e.g., radiation therapy and infusion treatment). Ai produced standardized layout of the treatment plan, capturing all the categories in the submitted template (e.g., pre-treatment, support and emergency medication information, drug regimens: both investigational and standard of care drugs, including dosing, schedule, treatment parameters, toxicity guidance, dose modification) and included radiation therapy regimens to align/coordinate the beacon treatment plan with 100% alignment with both protocols and saving an average of 40% time spend compared to manual process.

Promising early assessment: Utilizing AI to generate Beacon Treatment Layout

1. Protocol 1 Lung Cancer Phase 3 Randomized Concurrent Chemoradiation trial with multiple chemo regimens, PKs
2. Protocol 2 Breast Cancer Phase 3 Randomized study oral drug regimen

Protocol Sample Acuity	Data Accuracy Beacon Categories Template (Inv Drug, Dose Mods, Pre-Meds, MD/RN Comms)	Time Saved (Manual v AI Assist)
Protocol 1 Moderate Acuity	100%	4hrs v 1.25hrs (31.2%)
Protocol 2 Simple Acuity	100%	1.5hrs v 0.75hrs (50%)

CONCLUSION

This early experience demonstrates that an AI-driven approach to generating Epic Beacon Plan layouts is both feasible and impactful, yielding standardized, protocol-aligned plans, reducing manual effort by approximate 40% and decreasing downstream revisions while maintaining clinical accuracy through human oversight. By integrating oncology specific NLP, structured regimen extraction and codified toxicity and dose-modification logic, this method streamlines trial build workflows and expected to support more timely activation of research protocols in clinical practice.

LIMITATIONS

As expected, the initial AI prompt required several iterations of fine tuning . Standardizing prompts with the two test protocols produced improved standardization of the information on the Beacon Treatment plan layouts.

IMPLICATIONS/FUTURE WORK

Integration of AI tools may enhance and expedite activation of oncology clinical trials. Future work will focus developing a protocol to test this idea to conduct formal comparative evaluations to define best practices and rigorously quantify safety, efficient and implementation outcomes.