

IMPLEMENTATION STRATEGY FOR ARTIFICIAL INTELLIGENCE IN RADIOTHERAPY: A MEDICAL PHYSICIST'S PERSPECTIVE

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INTRODUCTION

AI is increasingly integrated into radiotherapy workflows, particularly in auto-segmentation for organs-at-risk (OAR) contouring, offering improved consistency and efficiency. However, safe clinical implementation requires a structured approach involving validation, workflow integration, and quality assurance. Medical physicists play a key role in ensuring that AI tools are safely commissioned, standardized, and integrated into routine clinical practice.

OBJECTIVE

This study describes the implementation strategy for integrating MIM Protégé AI auto-segmentation into a clinical radiotherapy workflow at Sunway Medical Centre.

MATERIALS & METHODS

1 | COMMISSIONING AND VALIDATION

AI-generated contours were compared with physician-approved contours using pilot patient datasets. Key OARs were reviewed to evaluate contour accuracy and identify structures requiring manual correction before clinical use.

2 | STANDARDIZATION OF CONTOURING PRACTICE

A standardized contouring template was developed to define the minimum required set of OARs for each treatment site. This allowed consistent generation of essential structures and helped reduce variation among planners.

3 | WORKFLOW INTEGRATION

AI contouring was initiated immediately after CT simulation. Preliminary OAR contours were generated before physician review, allowing earlier preparation for treatment planning and improving overall workflow efficiency.

RESULTS & DISCUSSION

AI-assisted contouring resulted in:

- Approximately 60% reduction in contouring time
- Improved efficiency, especially for total body irradiation (TBI) workflows
- More consistent OAR contour generation and reduced inter-user variability among planners
- The greatest benefit was observed in complex cases requiring extensive OAR delineation, such as TBI, where whole-body contouring is traditionally time-consuming.

~60%

reduction in contouring time

AI auto-segmentation is not intended to replace clinical judgment. Instead, it provides a consistent and efficient starting point for contouring. Clinical review remains essential, particularly for structures with variable anatomy, poor soft-tissue contrast, or site-specific contouring requirements.

CONCLUSION

A structured implementation strategy ensures the safe, efficient, and effective integration of AI tools into clinical radiotherapy. Medical physicist leadership in validation, template standardization, and ongoing quality assurance is highly essential to maintaining clinical quality and patient safety while maximizing technological efficiency.

Reference

Hindocho, S., Zucker, K., Jena, R., Banfill, K., Mackay, K., Price, G., ... & Taylor, A. (2023). Artificial intelligence for radiotherapy auto-contouring: current use, perceptions of and barriers to implementation. *Clinical Oncology*, 35(4), 219-226.