

Leadership-Driven, Multi-Physicist Teaching Model to Enhance Radiation Oncology Resident Physics Education and Faculty Development

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INNOVATION AND SIGNIFICANCE:

This is the first structured, outcome-based study specifically addressing medical physics education for radiation oncology residents while simultaneously advancing teaching development of clinical physicists, filling a critical gap in the education literature.

BACKGROUND AND PURPOSE:

- Teaching medical physics to radiation oncology residents is challenging due to their limited physics backgrounds, competing clinical demands, and variable learning motivation beyond preparation for the American Board of Radiology (ABR) exam.
- Clinical medical physicists serving as educators often lack formal training in pedagogy and must balance teaching with intensive clinical workloads.
- This work describes a leadership-driven, multi-physicist didactic course aimed at improving resident learning outcomes while fostering teaching skills and professional engagement among clinical physicists.

METHODS:

- A team-based physics teaching model was established with institutional support from departmental leadership, including the vice chair of education, residency program director, chief clinical physicist, and physics course director.
- The course curriculum, aligned with national guidelines, was refined annually, incorporating active learning strategies such as interactive Q&A sessions and board-style take-home quizzes.
- The volunteer clinical physicists were supported through shared curricular materials, archived lectures, and ABR exam resources (RAPHEX), with centralized scheduling to minimize conflicts and maximize participation.
- Program effectiveness was evaluated via anonymous resident surveys assessing overall course structure and individual instructor performance.

RESULTS:

- Over three years, 17–18 medical physicists delivered 34 lectures to cohorts of 10–14 radiation oncology residents.
- Resident satisfaction scores improved from 4.33/5 to 4.67/5, with gains in engagement, perceived clinical relevance, and confidence in applying physics concepts.
- Senior residents achieved 100% ABR physics examination pass rates, and resident evaluations meaningfully supported physicists' teaching portfolios and promotion.
- Participating physicists reported improved teaching confidence, greater ownership of resident education, and enhanced professional satisfaction.

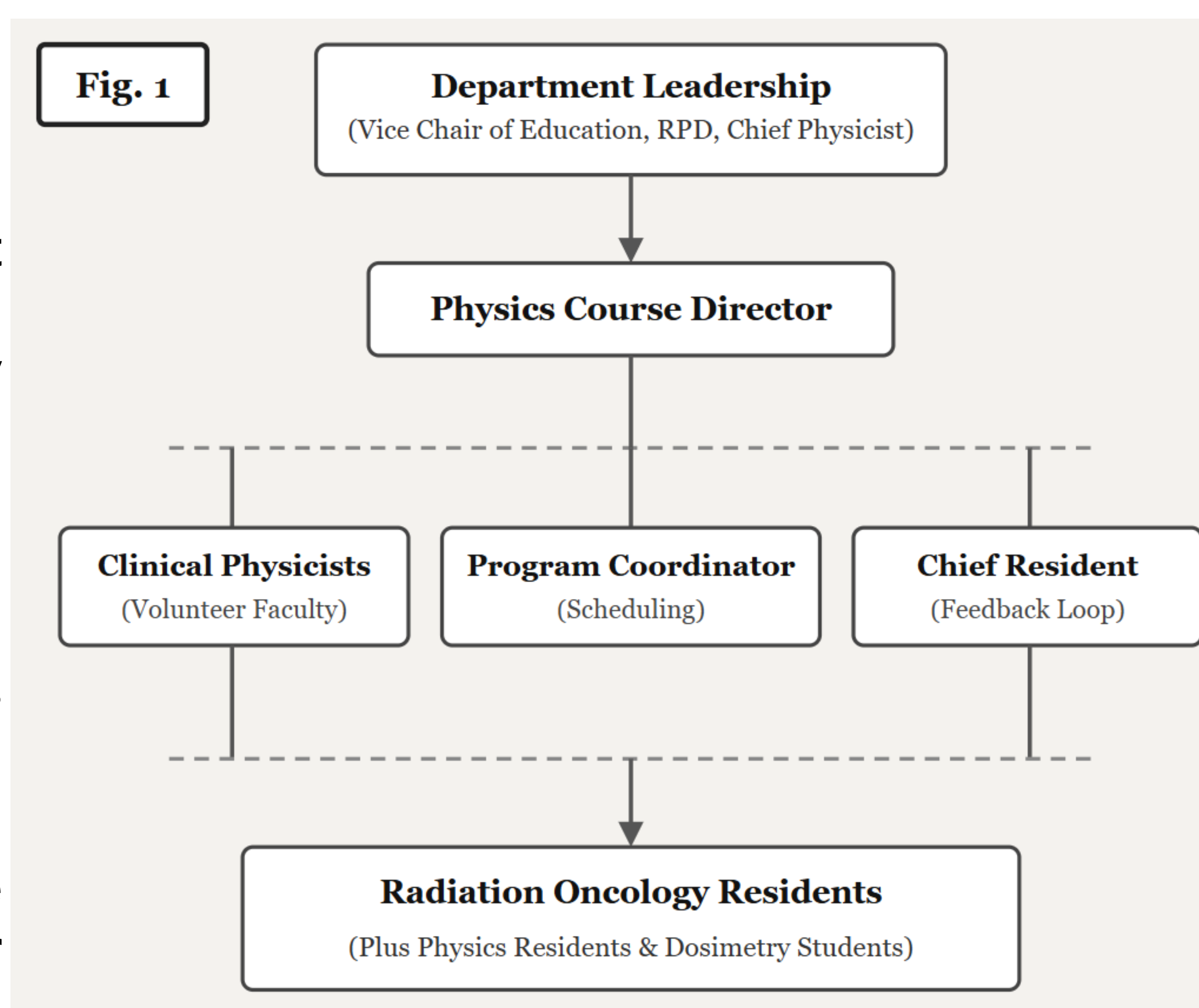


Fig. 1. Leadership-driven, team-based teaching framework with centralized scheduling and active communication.

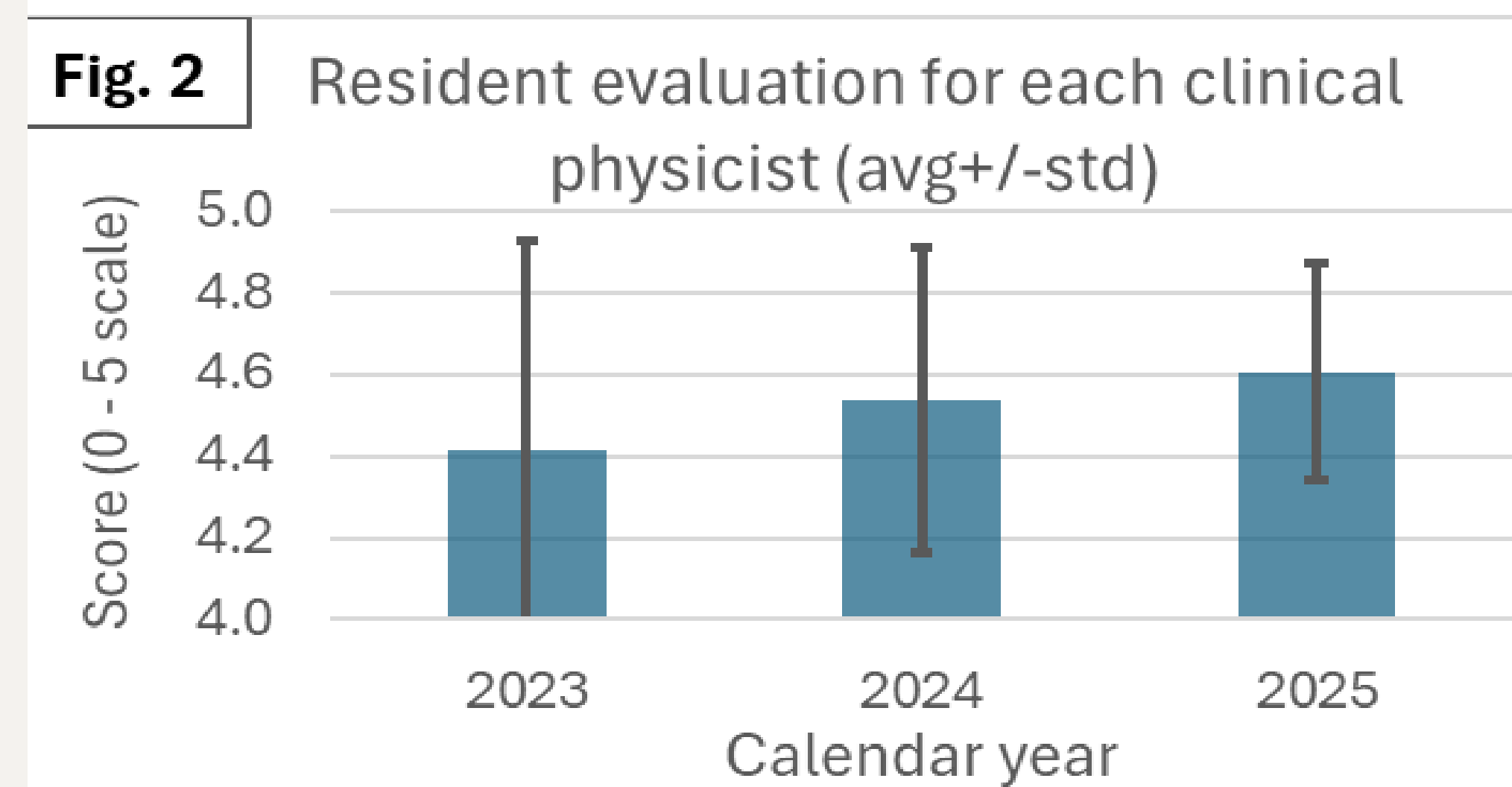


Fig. 2 Enhanced teaching skills and confidence among the clinical medical physicists.

CONCLUSIONS:

- A leadership-driven, multi-physicist teaching model strengthens resident physics education while advancing clinical physicist development, promoting measurable outcomes and a sustainable culture of mentorship and faculty engagement.