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Workflow Optimization in Radiation Oncology, Ed. Colleen J. Fox and Reshma Munbodh.
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DESCRIPTION

This is the first edition of a 275-page edited book focused on workflow optimization in radiation oncology. The book consists of 16 well-crafted chapters written by 30 subject matter experts across the fields of radiation oncology, industrial engineering and business.

PURPOSE

This book addresses workflow optimization in radiation oncology and more specifically provides a theoretical framework for understanding and addressing operational challenges with cross-disciplinary insights. Theory is reinforced by practical examples of clinical implementation. Leading experts tackle both long standing and new issues, spanning topics from resource allocation to disruptive technology like artificial intelligence (AI) and the shifting expectations within the workforce. Although workflow optimization is critical to clinical operations, there is often a gap in the formal education of many radiation oncology team members. The editors address this knowledge gap by skillfully synthesizing current knowledge into a single book.

AUDIENCE

This book was written for healthcare professionals in radiation oncology who face many common challenges from resource allocation to workflow bottlenecks. While medical physicists are the primary authors, resulting in a bend towards technical topics like artificial intelligence and modeling, intersecting perspectives are provided from radiation oncologists, business leaders and industrial engineers that broaden the scope. Indeed, all subdisciplines within radiation oncology benefit from being equipped with the cross-disciplinary tools and expanded vocabulary covered in this book, as clinical workflows involve multiple stakeholders, and their diverse expertise is crucial for solving complex problems.

CONTENT / FEATURES

Radiation oncology is a complex, dynamic system that leverages the expertise of multiple subdisciplines and an array of sophisticated technology to deliver precise and timely patient care. The patient care pipeline has many control points and loops that conceptually are akin to an assembly line with commonality in the shared concerns of workflow robustness, efficiency and system design. While operations research is a mature topic in industry, there is a tremendous opportunity to apply the solutions to previously solved problems in healthcare while using this framework to innovatively address the unique complexities of radiation oncology. This book recognizes the reality that all clinics have resource and time constraints while providing theory backed by practical examples for informed workflow optimization. As workflows are optimized and bottlenecks removed, new directions are explored where team members can add value to the system. The book covers pertinent topics including those rapidly evolving topics. The editors have arranged the 16 chapters into two main sections: Theory and Clinical Implementation.

The first section of this book covers the basic theories of operations, workflows and systems in Chapters 1-6. Concepts from business and industrial engineering are contextualized with familiar examples from healthcare so that the reader can readily view existing clinical workflows through a new cognitive lens. Classic methodologies are discussed that were developed to characterize and design systems in industry, inclusive of tools for continuous

improvement and project management. System capacity and variability are explored in terms of expected delays, highlighting the potential benefits of standardization and centralization in clinical practice underpinned by a mathematical model. While classic methodology may be used to adapt systems disrupted by new technology like AI, here AI is presented as a potentially powerful tool that could be leveraged to characterize and optimize complex workflows.

Clinical implementation is the focus of the second section of this book in Chapters 7-16. The principles of operations research have been successfully applied to optimize workflows for treatment planning, patient scheduling, and staffing. There is recognition that resource allocation needs to adapt with the evolving demands of radiation therapy as trends shift towards greater automation in treatment planning, more frequent use of hypofractionation and the increasing need to account for cumulative dose over multiple treatment courses. Human time and effort can be reduced through AI contouring, knowledge-based planning and other efficiency gains, thereby allowing that effort to be redirected towards adaptive planning or new patient facing roles that can add value to the system yet create new challenges for workflow optimization. Equitable distribution of work is explored for medical physicists in tandem with insights into the current trends on career satisfaction in radiation oncology. The human element is incredibly important to system performance and ultimately patient care.

In conclusion, each chapter is independent with an introduction, numbered subsections and references. Given the overlap in topics, there are some duplicate references among chapters; however, each chapter is self-contained and well written. As a first edition, the breadth of topics covered is expansive, offering the reader substantial content to consider when evaluating clinical workflows. Potential is high for future editions given the dynamic nature of radiation oncology and the opportunity to consider systems more broadly, accounting for financial constraints attributable to referral patterns or insurance reimbursement. This book is a recommended read for medical physicists and other radiation oncology professionals.

ASSESSMENT / COMPARISON

Workflow optimization is broadly important in radiation oncology. This first-edition book covers the theory and implementation of workflow optimization with insights from experts in radiation oncology, industrial engineering and business. The content is organized into a logical flow so that key concepts are first introduced then later reinforced through practical examples, including well illustrated figures and instructive references.

Book Reviewer Biography:

Dr. Justin Roper is an Associate Professor of Radiation Oncology in the School of Medicine at Emory University in Atlanta, Georgia. He also holds an administrative role as Lead Clinical Physicist and an adjunct appointment in the Department of Nuclear Engineering and Medical Physics at the Georgia Institute of Technology. Dr. Roper is board certified in therapeutic radiologic physics by the American Board of Radiology.