



Engineering Patient Safety in Radiation Oncology: University of North Carolina's Pursuit for High Reliability and Value Creation

By Lawrence Marks, Lukasz Mazur, Bhishamjit Chera, Robert Adams

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Because radiation is a central curative and palliative therapy for many patients, it is essential to have safe and efficient systems for planning and delivering radiation therapy. Factors such as rapid technological advances, financial reorganization, an aging population, and evolving societal expectations, however, may be compromising our ability to deliver highly reliable and efficient care.

Engineering Patient Safety in Radiation Oncology describes proven concepts and examples, borrowed from organizations known for high reliability and value creation, to guide radiation oncology centers towards achieving patient safety and quality goals. It portrays the authors' efforts at the University of North Carolina to address the challenges of keeping patients safe while continuously improving care delivery processes.

- Reviews past and current challenges of patient safety issues within radiation oncology
- Provides an overview of best practices from high reliability organizations
- Explains how to optimize workplaces and work processes to minimize human error
- Offers methods for engaging and respecting people during their transition to safety mindfulness

Requiring no prior knowledge of high reliability and value creation, the book is divided into two parts. Part one introduces the basic concepts, methods, and tools that underlie the authors' approach to high reliability and value creation. In addition, it provides an overview of key safety challenges within radiation oncology. In part two, the authors supply an in-depth account of their journey to high reliability and value creation at the University of North Carolina.

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Editorial Review

Review

This is a timely and important book that speaks from the experiences and the hearts of prominent radiation oncologists who fought for a structure that better serves patient safety. Its starting point is not deficient practitioners or their errors, but instead the realization that 'we put workers into suboptimal environments and then wonder why things go wrong.' In tracing what is responsible for things going wrong, rather than who is responsible, the book examines the organizational, workplace and people levels, taking time to stop and reflect on what works and what doesn't. What makes this book so powerful is that it is not just an argument, but a narrative about the experiences of trying to make this work in a large hospital system. Many who are in similar positions as the authors—as well as those at the receiving or approving ends of their kind of ideas—will quickly recognize the many possibilities, frustrations, twists, turns and elations in the journey toward greater patient safety.

?Sidney Dekker, PhD, Professor Safety Innovation Lab, Griffith University, and Royal Children's Hospital, Brisbane, Australia

The solution to risky complexity lies in simple processes, teamwork, repetition, verification, and a culture of safety. These authors bring a much needed framework to the increasingly complex and dangerous field of radiation therapy.

?Anthony L. Zietman, MD FASTRO, Jenot W. and William U. Shipley Professor of Radiation Oncology, Department of Radiation Oncology, Harvard Medical School; Associate Director, Radiation Oncology Residency Program, Massachusetts General Hospital

With his signature common sense approach and clarity of purpose, Larry Marks and his team have produced a new must-read addition to the canon of radiation oncology literature. As recognized experts in the field, they have created a living laboratory for quality improvement in the UNC Department of Radiation Oncology that now serves as a leading exemplar of a workplace culture of safety. This book provides a blueprint for how to emulate their success and should be read by radiation oncologists, radiation oncology residents, medical physicists, radiation therapists, radiation therapy nurses, dosimetrists, radiation oncology department managers, and anyone else who is involved in the care of patients receiving any form of radiation therapy. In fact, anyone studying the burgeoning new discipline of the science of patient safety will find not only an excellent review of basic principles but also many wonderful case study-type practical examples of applied patient safety science.

?Brian D Kavanagh, MD, MPH, FASTRO, Professor, Vice-chairman, Clinical Practice Director, Department of Radiation Oncology, University of Colorado School of Medicine

*The new textbook **Engineering Patient Safety in Radiation Oncology** by Marks and Mazur is a very interesting textbook that covers key aspects of safety for radiation medicine professionals. Section I, chapters 1-3, sets the scene with background on radiation oncology and a detailed discussion of high reliability organizations. Section II, chapters 4-8, begins with an in-depth presentation of change management at the organizational, workplace, and people levels. This is followed by research aspects of patient safety including future possible research directions related to patient safety in radiation oncology for interested academicians. The book draws on years of academic and practical experience of the authors. Many*

examples are taken out of the authors' clinical experience, which makes this textbook required reading for practicing clinicians interested in improving safety for their patients. The text is clear and concise making the concepts accessible to all members of the radiation oncology team. Both basic and advanced concepts are covered in detail with practical examples. Anyone interested in learning about safety in radiation oncology or moving the safety knowledge to the advanced level should read this book. Even radiation oncology safety experts will benefit from the authors' experience shared in Engineering Patient Safety in Radiation Oncology.

?Todd Pawlicki, PhD, FAAPM, Professor and Vice-Chair of Medical Physics, Division Director, Department of Radiation Medicine and Applied Sciences, University of California, San Diego

The safe delivery of high-quality radiation treatment for cancer patients relies on a multidisciplinary team of highly skilled professionals performing complex tasks in a technology-rich, yet patient friendly and compassionate environment. This outstanding book provides a comprehensive overview of cultural, leadership, organizational and systematic issues and challenges while offering sound, practical, industrial engineering based approaches to optimizing the delivery of radiation.

This must read book for anyone on the radiation oncology team not only promotes a culture of the safe delivery of radiation, but demonstrates the potential barriers and offers practical, reproducible long term solutions. It demonstrates the importance of embracing the concept of patient safety mindfulness throughout the entire organizational structure.

The book provides a unique perspective as to how human behavior, leadership styles, and the workplace environment contribute to the culture of safety in radiation oncology, and most importantly insights as to how to modify these factors to optimize and reliably deliver high quality safe radiation treatment. Organizational leaders, hospital/health care administrators, and all of the professionals involved in the specialty of radiation oncology will benefit from the messages delivered in this practical book.

The book provides practical and reliable solutions to manage effective processes and communication in the safe delivery of quality radiation therapy.

?Bruce G. Haffty, MD, Professor and Chair, Dept. Radiation Oncology, Rutgers, Cancer Institute of New Jersey; Robert Wood Johnson Medical School, New Jersey Medical School

The book demonstrates a critical point in maintaining a culture of safety in the delivery of radiation?the requirement that a culture of safety depends not only on technical and procedural factors, but attention to infrastructure, attitude, human and environmental factors.

Driven by rapidly evolving technology, increasing demand for services and new treatment and imaging modalities, the world of radiation therapy is becoming increasingly more complex. This cutting edge book provides a conceptual framework to design, implement, and evaluate operational models that increase radiation therapy efficiency and effectiveness through proven and dynamic engineering concepts. The outcomes are increased value, productivity, and patient safety. The book creates a different and emerging type of knowledge, and is a must read for the international community of radiation oncology leaders, students, and practitioners.

?John French, Senior Director, Provincial Radiation Therapy Program, British Columbia Cancer Agency, Vancouver, Canada

Larry Marks' book is essential reading for any radiation oncology facility interested in a meaningful quality and safety program. It is a comprehensive review written from an engineering perspective, but is presented in a way that is both approachable and useful for physicians and administrators who lack such a technical fluency. With the increasing complexity of the specialty, and the emerging scrutiny from payers who are

demanding documentable efforts at quality and safety, this book offers many valuable insights for those who are integrating this critical aspect of patient care into their programs.

Tim R. Williams, MD, Medical Director, Radiation Oncology, The Lynn Cancer Institute, Boca Raton Regional Hospital

About the Author

Lawrence Marks was born and raised in Brooklyn, New York. He studied chemical engineering at Cooper Union and obtained his MD from the University of Rochester. He did his residency training in radiation oncology at Massachusetts General Hospital and then served on the faculty of Duke University for 19 years. There, he studied radiation-induced normal tissue injury and became interested in human factors engineering and patient safety. In 2008, he moved to the University of North Carolina to become the Dr. Sidney K. Simon Distinguished Professor of Oncology Research and the chairman of the Department of Radiation Oncology. Over the last six years, he and Dr. Mazur and others have been systematically applying engineering principles from high-reliability and value creation organizations to improve safety. In his clinical work, he has particular interest in the care of patients with cancers of the lung or breast. He has been active in ASTRO (American Society for Radiation Oncology) and currently serves on its Board of Directors as the chairman of the Clinical Affairs and Quality Council. He lives with his wife of 29 years, Caryn Hertz, in Chapel Hill. They have three sons, none of whom is planning a career in medicine.

Lukasz Mazur earned his BS, MS, and PhD in industrial and management engineering from Montana State University. As a student athlete at Montana State University, he earned a spot in the Bobcats Hall of Fame for his efforts on a tennis team. While working at North Carolina State University, he was awarded the Alumni Outstanding Extension Service Award for his outreach work, highlighting his passion for quality and safety work in the healthcare industry. Currently, he is an assistant professor in the Radiation Oncology Department at the UNC School of Medicine. His research interests focus on engineering management as it pertains to continuous quality and safety improvements and human factor engineering with a focus on workload and performance during human computer interactions.

Bishamjit S. Chera is an assistant professor and director of patient safety and quality in the Department of Radiation Oncology at the University of North Carolina. He received his BS in biology from Winthrop University in 2000 and an MD from the Medical University of South Carolina in 2004. He completed his residency training in radiation oncology at the University of Florida. His clinical expertise is in head and neck and skin cancers. His major areas of research pertain to head and neck cancer and translating quality assurance/control/improvement principles and methodologies from high-reliability organizations to radiation oncology. He has written on the incorporation of practical quality assurance approaches (e.g., process/human factors engineering and Lean methodologies) in the daily activities of radiation oncology departments/clinics.

Robert Adams earned his BS in biology/radiology from Averett University, a MS in healthcare administration from the University of North Carolina, and a doctorate in higher education administration from North Carolina State University. He is an assistant professor in the Radiation Oncology Department at the UNC School of Medicine, and directs both the UNC healthcare radiation therapy and the medical dosimetry educational programs. He is certified in radiation therapy and medical dosimetry. His research interests focus on clinical work practices, patient safety, and educational issues for radiation therapists and medical dosimetrists. He has served on several national and international boards of directors and editorial review boards. He is both a Fellow and an Award of Excellence recipient from the American Association of Medical Dosimetrists. He has published over 50 peer-reviewed articles, 10 book chapters, and recently completed an R25 National Cancer Institute recent grant developing "Computer-Based Medical Dosimetry

Clinical Learning Modules."

Users Review

From reader reviews:

Anderson Austin:

The ability that you get from Engineering Patient Safety in Radiation Oncology: University of North Carolina's Pursuit for High Reliability and Value Creation is the more deep you digging the information that hide into the words the more you get enthusiastic about reading it. It doesn't mean that this book is hard to recognise but Engineering Patient Safety in Radiation Oncology: University of North Carolina's Pursuit for High Reliability and Value Creation giving you thrill feeling of reading. The article author conveys their point in selected way that can be understood simply by anyone who read that because the author of this book is well-known enough. This book also makes your own vocabulary increase well. Making it easy to understand then can go along, both in printed or e-book style are available. We suggest you for having this kind of Engineering Patient Safety in Radiation Oncology: University of North Carolina's Pursuit for High Reliability and Value Creation instantly.

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Linda Barefoot:

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several books in the top checklist in your reading list will be Engineering Patient Safety in Radiation Oncology: University of North Carolina's Pursuit for High Reliability and Value Creation. This book that is certainly qualified as The Hungry Hills can get you closer in turning out to be precious person. By looking way up and review this publication you can get many advantages.

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