

6 Artificial Intelligence and the Global Radiotherapy Gap

Michael Benedict A. Mejia, MD¹ ; Luisa E. Jacomina, MD¹ ; Milit S. Patel, BS^{2,3} ; Fabio Y. Moraes, MD, PhD^{4,5} ; Sharif Elguindi, MS⁶ ; Nancy Y. Lee, MD³ ; and Edward Christopher Dee, MD³ 

DOI <https://doi.org/10.1200/GO-26-00181>

Radiotherapy is a clinically essential and cost-effective cornerstone in addressing the global cancer burden.¹⁻³ This cost-effectiveness may be especially important in resource-limited settings, where patients with cancer and broader health systems face myriad challenges.^{4,5} Despite this, access to radiotherapy in developing economies has consistently been shown to be inadequate.^{5,6} Shortages in the number of megavoltage machines, brachytherapy units, radiation oncologists, medical physicists, dosimetrists, oncology nurses, and radiation therapists represent challenges in addressing the growing cancer burden.^{5,7} These shortages are even more pronounced in developing economies where both radiotherapy units and workforce shortfalls are greatly magnified.⁶⁻⁹

Strategies to improve access to radiotherapy are key, in the broader context of health system strengthening.¹⁰⁻¹² Using artificial intelligence (AI) to automate processes that otherwise require manual intervention can help increase throughput and lessen the strain on already stretched human resources.¹³ The Radiation Planning Assistant (RPA) represents one concrete effort to translate this vision into practice.

In *JCO Global Oncology*, Netherton et al¹⁴ present an end-to-end, AI-enabled RPA that automates contouring, treatment planning, and quality assurance for cervical and prostate cancers, with the explicit goal of improving radiotherapy efficiency, consistency, and access in resource-limited settings.^{14,15} The RPA represents an integrated automation pipeline rather than a single algorithm, combining machine learning-based segmentation with automated treatment planning and workflow processes. In retrospective validation, most autocontours and plans were clinically acceptable with no or only minor edits, and the platform reduced the planning process from what can take days to weeks down to <2 hours, suggesting meaningful potential to reduce treatment planning burden and streamline workflows where workforce shortages are severe. At the same time, the findings support cautious implementation because expert review remains essential, certain structures and clinical scenarios remain challenging, and real-world evaluation will be critical before widespread adoption.^{14,15}

The study's team has already demonstrated in previous publications how automation can potentially make radiotherapy workflows more efficient in real-world settings.¹⁵ In the present study,¹⁴ the authors introduce a more robust iteration of the program focusing on cervical and prostate malignancies using deep learning-based segmentation (nnU-Net) and knowledge-based planning, aiming to create automatically generated and globally acceptable target and organ-at-risk contours along with deliverable plans at a fraction of the time usually required. This approach could translate to more streamlined workflows and help scale up access and relieve an overworked planning and radiation oncology workforce in resource-constrained settings.

Building on the RPA's important work, reliable automation also has the potential to redirect manpower efforts toward ensuring the quality delivery of autogenerated plans. In the current era of precision radiotherapy, the delivery of intensity-modulated radiation therapy with ever-tighter margins requires constant vigilance to ensure setup reproducibility and regular verification. Reducing the burden on contouring, plan generation, and plan approval may allow efforts to shift toward treatment verification and on-treatment quality assurance. For instance, in pelvic radiotherapy, bladder filling and rectal emptying are important contributors to daily set up variability, and these factors should be considered in future efforts toward automation. Such advances could constitute technological task shifting.

ACCOMPANYING CONTENT

 [Article, 10.1200/GO-25-00702](#)

Accepted May 1, 2026

Published July 9, 2026

JCO Global Oncol 12:e2600181

© 2026 by American Society of

Clinical Oncology

Licensed under the Creative Commons Attribution 4.0 License

There is, however, a need to tread with caution in the widespread application of automation and the adoption of AI, especially in resource-strained settings where opportunities for human oversight may be limited by manpower and subspecialty expertise.^{6,13,16} While the contours and plans generated by the models may be deemed acceptable by established guidelines (EMBRACE II, NRG-GU009, ESTRO ACROP, etc), the Dice similarity coefficient and 95% Hausdorff distance values remain below ideal ranges, indicating variability between autogenerated and manual contours and therefore necessitating edits.¹⁴

Notably, any edits were detected and made by gynecologic and urologic radiation oncology subspecialists. Such edits may potentially escape the attention of generalists, particularly in strained global community settings, despite the possibility that some of these discrepancies could affect outcomes. The limitations of the RPA have been appropriately described in the study.¹⁴ These limitations, however, may be particularly salient in settings where advanced disease is the norm and gross nodal disease—especially among patients with cervical cancer—is rather common.

Importantly, while the RPA's web-based design reduces the hardware and software burden on participating centers, automation alone cannot overcome shortages in treatment machines, imaging, maintenance systems, and broader radiotherapy infrastructure.⁶ Several studies highlight the many and heterogeneous challenges faced by developing cancer systems, including adequacy of facilities; availability of trained physicists, dosimetrists, therapists, nurses, and radiation oncologists; and opportunities for peer review, quality assurance, and the adoption of modern treatment concepts such as hypofractionation.^{5,17,18} The integration of newer technologies to address gaps in treatment delivery can help to compensate for shortfalls in the availability of human capital, but must be matched with efficient resource allocation and cancer system strengthening more broadly.⁶

The development of the RPA has been particularly thoughtful in that the team did not approach the problem solely through the lens of more resourced settings but instead engaged with the realities faced by patients and clinicians in many global contexts, specifically in South Africa.¹⁴ Earlier efforts also

attempted to address similar situations in other environments.¹⁹ End-to-end involvement of stakeholders on the ground strengthens the validity of the effort by ensuring that the actual needs of the intended beneficiaries are met.²⁰ Future work in this domain should continue to emphasize data set representativeness, to minimize potential algorithmic bias, and to reinforce the need for clear clinician oversight.

While the introduction of robust AI and automation innovations may allow better throughput and more consistent generation of contours and plans, the capacity to perform critical human intervention necessary for delivering high-quality radiotherapy at scale must also be developed and optimized. A cautious and gradual rollout of such innovative strategies, with clearly identified evaluation points, may be the most prudent approach before wider application.

Importantly, broader deployment will require not only external validation across different clinical environments, including practice settings, patient populations, and radiotherapy infrastructure contexts, but also imaging protocols, disease stage distribution, and patterns of nodal spread.^{20–23} Implementation of RPA and parallel efforts will benefit from critical, ideally prospective, evaluation in routine practice. Prospective implementation studies evaluating clinical outcomes, treatment delays, workflow efficiency, and user acceptance will be essential to determine whether automated planning systems translate into meaningful improvements in real-world cancer care.

In the future, the eventual development of linear accelerator-end AI systems—such as automated matching and adjustment as well as broader adoption of adaptive planning²⁴—may further enhance these efforts toward more streamlined workflows that may facilitate the delivery of quality radiotherapy at scale.^{25,26}

An idea is only as valuable as its execution. The RPA is a promising step in the right direction, with development marked by global partnerships and careful evaluation. Ultimately, future efforts must also be directed toward ensuring applicability, realistic implementation, sustainability of gains, and continuous evaluation to continue to address remaining gaps in global access to radiotherapy.

AFFILIATIONS

¹Department of Radiation Oncology, Benavides Cancer Institute, University of Santo Tomas Hospital, Manila, Philippines

²Department of Molecular Biosciences, The University of Texas at Austin, Austin, TX

³Department of Radiation Oncology, Memorial Sloan Kettering Cancer Center, New York, NY

⁴Department of Radiology and Oncology, University of Sao Paulo, São Paulo, Brazil

⁵Department of Oncology, Queen's University, Kingston, ON, Canada

⁶Department of Medical Physics, Memorial Sloan Kettering Cancer Center, New York, NY

CORRESPONDING AUTHOR

Edward Christopher Dee, MD; e-mail: deee1@mskcc.org.

SUPPORT

M.S.P., S.E., N.Y.L., and E.C.D. are supported in part through the Cancer Center Support Grant from the National Cancer Institute (P30 CA008748). E.C.D. is funded in part through the Prostate Cancer Foundation Young Investigator Award.

AUTHOR CONTRIBUTIONS

Conception and design: Michael Benedict A. Mejia, Fabio Y. Moraes, Sharif Elguindi, Nancy Y. Lee, Edward Christopher Dee
Financial support: Edward Christopher Dee
Administrative support: Edward Christopher Dee
Provision of study materials or patients: Sharif Elguindi
Collection and assembly of data: Michael Benedict A. Mejia, Edward Christopher Dee
Data analysis and interpretation: Michael Benedict A. Mejia, Luisa E. Jacomina, Milit S. Patel, Fabio Y. Moraes, Edward Christopher Dee
Manuscript writing: All authors
Final approval of manuscript: All authors
Accountable for all aspects of the work: All authors

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The following represents disclosure information provided by authors of this manuscript. All relationships are considered compensated unless otherwise noted. Relationships are self-held unless noted. I = Immediate Family Member, Inst = My Institution. Relationships may not relate to the subject matter of this manuscript. For more information

about ASCO's conflict of interest policy, please refer to www.asco.org/rwc or ascopubs.org/go/authors/author-center.

Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians ([Open Payments](http://OpenPayments)).

Michael Benedict A. Mejia

Leadership: Metro Pacific Health, Philippines

Consulting or Advisory Role: Metro Pacific Health

Travel, Accommodations, Expenses: Siemens Healthineers

Fabio Y. Moraes

This author is Deputy Editor for *JCO Global Oncology*. Journal policy recused the author from having any role in the peer review of this manuscript.

Nancy Y. Lee

Consulting or Advisory Role: Merck, LEO SAB, J and J, Signatera

Research Funding: AstraZeneca (Inst)

Other Relationship: Juniper Biosciences (Inst)

Edward Christopher Dee

This author is a member of the *JCO Global Oncology* Editorial Board. Journal policy recused the author from having any role in the peer review of this manuscript.

Other Relationship: NIH/NCI, Prostate Cancer Foundation

No other potential conflicts of interest were reported.

REFERENCES

- King J, Arau A, Schiff A, et al: Social and Economic Impact Assessment of the RCA Programme: Radiotherapy Case Study. 2022. <https://www.iaea.org/sites/default/files/22/07/social-and-economic-impact-assessment-of-the-rca-programme-radiotherapy-case-study.pdf>
- Dee EC, Wu JF, Feliciano EJG, et al: National cancer system characteristics and global pan-cancer outcomes. *JAMA Oncol* 11:650-654, 2025
- Dee EC, Laversanne M, Bhoo-Pathy N, et al: Cancer incidence and mortality estimates in 2022 in Southeast Asia: A comparative analysis. *Lancet Oncol* 26:516-528, 2025
- Eala MAB, Dee EC, Ginsburg O, et al: Financial toxicities of cancer in low- and middle-income countries: Perspectives from Southeast Asia. *Cancer* 128:3013-3015, 2022
- Canal JPA, Eala MAB, Arevalo MVPN, et al: Radiotherapy resources in the Philippines: A 2022 update. *J Cancer Policy* 41:100485, 2024
- Moraes FY, Gouveia AG, Freitas Bratti V, et al: Global linear accelerator requirements and personalised country recommendations: A cross-sectional, population-based study. *Lancet Oncol* 26:239-248, 2025
- Atun R, Jaffray DA, Barton MB, et al: Expanding global access to radiotherapy. *Lancet Oncol* 16:1153-1186, 2015
- Chougule A: Status of cancer treatment by radiotherapy and requirement of radiation oncology medical physicists in Asia Oceania Federation of organizations for medical physics region. *J Cancer Res Ther* 19:567-572, 2023
- Moraes FY, Starling MTM, Bratti VF, et al: Geographical and sociodemographic disparities in access to radiotherapy in Brazil: A nationwide cross-sectional study (2017-2022). *Int J Radiat Oncol Biol Phys* 10.1016/j.ijrobp.2026.01.035 [epub ahead of print on February 14, 2026]
- Patel MS, Pramesh CS, Sanford NN, et al: Machine learning reveals country-specific drivers of global cancer outcomes. *Ann Oncol* 37:567-573, 2026
- Dee EC, Pramesh CS, Booth CM, et al: Growing the global cancer care system: Success stories from around the world and lessons for the future. *J Natl Cancer Inst* 116:1193-1197, 2024
- Dee EC, Eala MAB, Robredo JPG, et al: Leveraging national and global political determinants of health to promote equity in cancer care. *J Natl Cancer Inst* 115:1157-1163, 2023
- Patel MS, Dee EC, Lee NY: AI and human expertise in cancer care—Striving for synergy. *Nat Rev Clin Oncol* 23:87-88, 2026
- Netherton TJ, Aggarwal A, Alakayleh Q, et al: Artificial intelligence-Powered radiotherapy for resource-limited settings: Advancing cervical and prostate cancer treatment planning with the Radiation Planning Assistant. *JCO Glob Oncol* 10.1200/GO-25-00702
- Court L, Aggarwal A, Burger H, et al: Addressing the global expertise gap in radiation oncology: The radiation planning assistant. *JCO Glob Oncol* 10.1200/GO.22.00431
- Celi LA, Cellini J, Charpignon ML, et al; for MIT Critical Data: Sources of bias in artificial intelligence that perpetuate healthcare disparities—A global review. *PLoS Digital Health* 1:e0000022, 2022
- Jacomina LE, Eala MAB, Mejia MBA, et al: Utilization of hypofractionated radiation therapy for breast cancer: Perspectives from the Philippines. *Int J Radiat Oncol Biol Phys* 113:925-927, 2022
- Jacomina LE, Agas RAF, Benedicto MTJU, et al: Radiation oncology training in the Philippines: Bridging gaps for improved cancer care in low- and middle-income countries. *JCO Glob Oncol* 10.1200/GO.23.00462
- Court LE, Kisling K, McCarroll R, et al: Radiation planning assistant—A streamlined, fully automated radiotherapy treatment planning system. *J Vis Exp* 134:57411, 2018
- Pramesh CS, Badwe RA, Bhoo-Pathy N, et al: Priorities for cancer research in low- and middle-income countries: A global perspective. *Nat Med* 28:649-657, 2022
- Menon TP, Mathew A, Iyengar P, et al: Intersectionality of cancer disparities in south Asia. *Lancet Glob Health* 14:e272-e280, 2026
- Feliciano EJG, Ho FDV, Yee K, et al: Cancer disparities in Southeast Asia: Intersectionality and a call to action. *Lancet Reg Health West Pac* 41:100971, 2023
- Futoma J, Simons M, Panch T, et al: The myth of generalisability in clinical research and machine learning in health care. *Lancet Digit Health* 2:e489-e492, 2020
- Côté N, Jiang J, Elguindi S, et al: Patient-specific fine-tuning of a self-distilled transformer model for normal tissue segmentation in abdominal magnetic resonance guided adaptive radiotherapy. *Phys Imaging Radiat Oncol* 37:100921, 2026
- Corti C, Cobanaj M, Dee EC, et al: Artificial intelligence in cancer research and precision medicine: Applications, limitations and priorities to drive transformation in the delivery of equitable and unbiased care. *Cancer Treat Rev* 112:102498, 2023
- Bibault JE, Giraud P, Burgun A: Big data and machine learning in radiation oncology: State of the art and future prospects. *Cancer Lett* 382:110-117, 2016