Technical Innovations & Patient Support in Radiation Oncology 35 (2025) 100326

Contents lists available at ScienceDirect

Technical Innovations & Patient Support in Radiation Oncology

journal homepage: www.sciencedirect.com/journal/technical-innovations-and-patient-support-in-radiation-oncology

Pelvic stereotactic ablative body radiotherapy (SABR) reirradiation: UK SABR consortium guidance for use in routine clinical care☆

Elena Moreno-Olmedo [a,b], Kasia Owczarczyk [a,c], Eliot Chadwick [d], Peter Dickinson [a,e], Aileen Duffton [f], Bleddyn Jones [g], James S. Good [a,h], Fiona McDonald [i,j], Louise J. Murray [e,k], Thomas Rackley [l], Maxwell Robinson [b], Judith Sinclair [m], Thomas Strawson-Smith [n], Alison Tree [i,j], Yat Man Tsang [o], Anjali Zarkar [h], Christopher Dean [p], Patricia Díez [q], Matt Williams [r,s], Nicholas Andratschke [t], Rebecca Muirhead [b,*]

[a] Adaptive Radiotherapy Programme, Genesis Care, UK
[b] Oxford University Hospitals NHS Foundation Trust, Oxford, UK
[c] St Guy's and Thomas' NHS Foundation Trust, London, UK
[d] Nottingham University Hospitals NHS Trust, UK
[e] Leeds Teaching Hospitals NHS Trust, UK
[f] Institute of Cancer Sciences, University of Glasgow, UK
[g] Department of Oncology, University of Oxford, Oxford, UK
[h] University Hospital Birmingham NHS Foundation Trust, Birmingham, UK
[i] Royal Marsden NHS Foundation Trust, Sutton, UK
[j] The Institute of Cancer Research, London, UK
[k] Leeds Institute of Medical Research, University of Leeds, UK
[l] Velindre Cancer Services, Cardiff, UK
[m] Imperial College Healthcare NHS Trust, UK
[n] University Hospitals Bristol and Weston, UK
[o] Radiation Therapy Department, Mount Vernon Cancer Centre, Northwood, UK
[p] Barts Health NHS Trust, London, UK
[q] National Radiotherapy Trials Quality Assurance Group, Mount Vernon Cancer Centre, London, UK
[r] Computational Oncology Group, Imperial College London, London, UK
[s] Royal College of Radiologists, UK
[t] University Hospital Zurich, University of Zurich, Zurich, Switzerland

ARTICLE INFO

Keywords:
Reirradiation
Guidance
Stereotactic radiotherapy
SBRT
SABR

ABSTRACT

Stereotactic ablative body radiotherapy (SABR) is routinely used for the management of oligometastatic disease. Increasingly, there is overlap of targets or organs at risk with previous radiotherapy fields. As substantial variation in delivery of clinical practice exists, the UK SABR Consortium worked with a collaborative national group to develop pelvic SABR re-irradiation consensus guidelines. The scope of the guidance includes patient selection criteria, pre-treatment considerations, delineation guidelines, dose prescription, calculations of cumulative dose constraints, and optimal planning technique. This guidance is part of an ongoing national prospective audit in collaboration with the Royal College of Radiologists and EORTC ReCare.

Introduction

Pelvic stereotactic ablative body radiotherapy (SABR) re-irradiation is used in locally recurrent and oligometastatic disease, most commonly in prostate and colorectal cancer [1]. Target sites can include pelvic or inguinal lymph nodes, soft tissue deposits, the prostate or pelvic bones. The aims of treatment are different in each clinical case. For example, in prostate cancer, SABR can delay the introduction of androgen

☆ This article is part of a special issue entitled: 'Reirradiation' published in Technical Innovations & Patient Support in Radiation Oncology.

* Corresponding author at: Department of Oncology, Oxford University Hospitals NHS Foundation Trust, Churchill Hospital, Old Road, Oxford OX3 7LE, UK.
E-mail address: rebecca.muirhead@oncology.ox.ac.uk (R. Muirhead).

https://doi.org/10.1016/j.tipsro.2025.100326
Received 16 May 2025; Received in revised form 2 July 2025; Accepted 24 July 2025
Available online 5 August 2025

deprivation therapy (ADT) [2,3]. In locally recurrent rectal cancer (LRRC), SABR may be offered as an ablative alternative to total pelvic exenteration [4] or to avoid a switch to a palliative strategy [5].

The international Delphi consensus [6] underscored the complexity of pelvic SABR re-irradiation, revealing lack of consensus agreement in certain areas, particularly pertaining to cumulative organ at risk (OAR) dose-volume constraints. This is a result of the paucity and quality of published data, often highly heterogeneous, and predominantly retrospective single institution series [7,8]. The literature to date often has poorly described dosimetric planning details, as highlighted and addressed by the ESTRO/EORTC consensus publication on re-irradiation: definition, reporting and clinical decision-making [9]. In addition, there is often no longer-term follow-up and rarely quality of life data presented. Due to all these factors, despite pelvic SABR re-irradiation being routinely used, there is real equipoise regarding planning and delivery.

In response to these challenges, the UK SABR Consortium led the development of a guidance document for the routine delivery of pelvic SABR re-irradiation in the UK, by an experienced multi-disciplinary team. While these guidelines remain pragmatic given the paucity of available clinical evidence, they serve as a starting point toward harmonizing clinical implementation and practice. Standardisation will enable more consistent outcome auditing, development of practical, experience-based guidance and provide data to inform future clinical trials, following the precedent set by the early pioneers of SABR [10].

We aim to discuss the evolution of this guidance, highlight proposed planning and delivery details from the guidance in areas of clinical equipoise, and discuss future plans to measure the feasibility, safety and outcomes of the guidance.

Materials and methods

In 2015, National Health Service (NHS) England launched a Commissioning through Evaluation (CtE) program for the delivery of pelvic SABR re-irradiation for oligometastatic disease. The National Radiotherapy Trials Quality Assurance Group (RTTQA) SABR QA Program led the roll-out of SABR across NHS England, requiring the department and individual radiation oncologists to complete a series of tasks to attain full accreditation and be approved to deliver SABR in the NHS. Fig. 1 details the steps required. However, while the CtE program detailed strict criteria for eligibility of pelvic SABR re-irradiation and defined a dose (30 Gy in 5 fractions), planning guidance was minimal. It stated only that “standard SABR constraints should be considered absolute maximums and where an OAR had received a significant dose from the initial radiation course, a biological effective dose (BED) tolerance remaining calculation should be made and equivalent tolerance in 5 fractions determined”. During benchmarking and prospective planning assessment, no formal calculations of OAR cumulative constraints were mandated or performed. A subsequent survey performed of planning practice during CtE, reported different methods of addressing OAR constraints; both across different centres, but also between different clinicians within the same centre. Methods included the use of OAR dose-volume SABR constraints as for a radiation-naive pelvis; allowing for 30–50 % recovery from the initial radiation dose to OARs [6,8,11]; a cumulative constraint as per historic spinal cord data by Nieder et al. [12]; a maximum cumulative constraint published by Abusaris et al. [13]; and, finally, others calculated the dose they wished to be delivered to the target and worked back to identify the recovery required to allow for that [1,14].

Between 2015 and 2018, 8 centres delivered pelvic SABR re-irradiation to 185 patients fulfilling set criteria. Median age was 68 years with 61.1 % being male. The most treated pathology was prostate cancer (39.5 %), followed by colorectal cancer (28.6 %). In January 2021, CtE reported an estimated 92 % 1-year overall survival (OS) and 76 % 1-year local control (LC), with only 3.8 % grade 3 and no grade 4 or 5 toxicities observed. Although encouraging, the quality of the collected data was poor and there was significant heterogeneity of patients, sites and planning and delivery methods.

In 2021, pelvic SABR re-irradiation was commissioned for routine use by NHS England, but uncertainty remained regarding how this should be delivered. The UK SABR Consortium facilitate the safe implementation and ongoing delivery of SABR across the UK, one aspect of this is producing national guidance for each SABR indication. In accordance with the NICE guideline development framework [15], a multidisciplinary group conducted a scoping exercise, reviewing relevant evidence and surveying the eight CtE centres on the method of OAR calculation used during CtE. Draft guidance was circulated around members of the UK Consortium Committee (RM, CD, PD, PD, AD, JG, FM, TR, AT, TMT) with the addition of radiobiological expert (BJ). Following appropriate amendments, the guidance was reviewed and edited by a further group, including all those accredited in CtE and others planning to achieve accreditation (EC, LM, MR, JS, TS-S, AZ). The UK SABR Consortium Committee approved the final guidance, which was launched via an editorial in *Clinical Oncology* in 2023 [14]. Accredited centres and other interested UK centres were invited, by email, to adopt the guidelines and the guidance was presented at multiple national educational meetings to elicit feedback and encourage engagement.

Requirements for accreditation for delivery of SABR pelvic reirradiation:

1. A facility questionnaire to assess whether appropriate equipment and resources were in place for safe and effective delivery of SABR pelvic reirradiation.
2. A process document to assess whether suitable end-to-end processes were implemented for the safe and effective delivery of SABR pelvic reirradiation.
3. A remote end-to-end dosimetry audit to ensure an adequate planning and delivery process had been established for the accurate delivery of SABR.
4. Nodal contouring benchmarking case to assess each radiation oncologists’ ability to contour target volumes and associated organs at risk (OARs).
5. Nodal planning benchmarking case to ensure optimal planning techniques had been developed maximising dose to the target whilst sparing OARs.
6. Prospective outlining and planning review of the first 3 reirradiation clinical cases at each centre.

Fig. 1. Steps required for departmental and individual full accreditation to be approved to deliver SABR in NHS England.

Results

A summary of the guidance as published in 2022 is provided in Appendix A.

Highlights from guidance in areas of clinical equipoise

Dose prescription

Two different dose prescriptions are available for two distinct patient groups:

1 Limiting toxicity: Primarily for prostate cancer patients with available systemic options, where the goal is to delay ADT. Proposed dose is 30 Gy in 5 fractions.

This dose is based on the original CtE prescription.

2 Maximizing local control: Primarily for rectal and gynaecological cancer patients who are not for exenteration surgery due to ineligibility or patient choice. An isotoxic dose-escalation approach is recommended, using the cumulative OAR constraints outlined below, up to a maximum of 45 Gy in 5 fractions, if image verification is adequate [13,16–18]. Fig. 2 illustrates an isotoxic plan in a patient with LRRC.

Dose-escalation in rectal tumours is supported by modelling studies linking increased BED to longer tumour control [6,19]. For a tumour with an alpha/beta (α/β) ratio of 5 Gy, increasing the retreatment dose per fraction from 5.3 Gy to 6.4 Gy over 5 fractions is predicted to extend time to progression (TTP) by 33.7 %. Reducing it from 6.3 Gy to 5.7 Gy over 5 fractions shortens TTP by 17.5 %. Retrospective colorectal cancer studies also correlate higher BED with improved LC [4]. In keeping with findings from modelling studies, a cohort of 69 patients treated as per CtE, showed 30 Gy in 5 fractions was insufficient for LC, with 42.6 % having a local recurrence at death or last follow up and local relapse contributing to 58.3 % of deaths [4]. With the variation in relevant OARs in pelvic SABR re-irradiation, isotoxic dose-escalation (increasing dose until OAR constraints are met) is ideally placed to maximise dose without impacting toxicity. It has been delivered in prospective trials with improved cancer outcomes and maintained toxicity and quality of life [20,21]. A planning study in LRRC showed EQD_2 to $\geq$ 80 % of the PTV could be escalated from 43 Gy to 61 Gy without exceeding OAR limits [22]. As such, an option for a more ablative dose in this group where LC has such a significant effect on quality of life and survival, and where the alternative is pelvic exenteration was deemed acceptable.

Cumulative dose calculations

There is currently no high-quality clinical evidence or international consensus [6] on the optimal constraints for pelvic SABR re-irradiation. Limited data exist to support assumptions around tissue repair over time. It is also likely that the degree and timing of recovery is different for different organs. The approach outlined here is pragmatic and based on the most common method used in the CtE program [1].

- For patients with 6–18 months from their previous RT, a 30 % recovery may be incorporated into the original dose delivered when performing calculations for OAR dose-volume constraints.
- For patients with > 18 months from their previous RT, a 50 % recovery may be incorporated into the original dose delivered when performing calculations for OAR dose-volume constraints.

The 18-month threshold is derived from calculations using photon-based retreatment, based on spinal cord modelling work by Moore et al and Woolley et al. [23,24]. These suggest a moderate recovery between 6–18 months, with limited further recovery beyond 18 months. They have developed automated software which calculates proposed constraints using both standard factors (e.g. previous dose and time from previous radiotherapy) and additional risk factors of poor recovery (e.g., extensive prior pelvic surgery, diabetes, vasculopathies, advanced age or prior systemic therapy) by introducing a conservation factor. A comparison of their method and the method proposed in the guidance is presented in Appendix 3 within full guidance. The table within the guidance shows dose-volume constraints calculated by each model. Particularly in cases where minimising toxicity is key, a more conservative approach with less recovery may be appropriate.

Appendix 3 within the full guidance, demonstrates two examples of calculation of OAR constraints. Awareness of inaccuracies in the

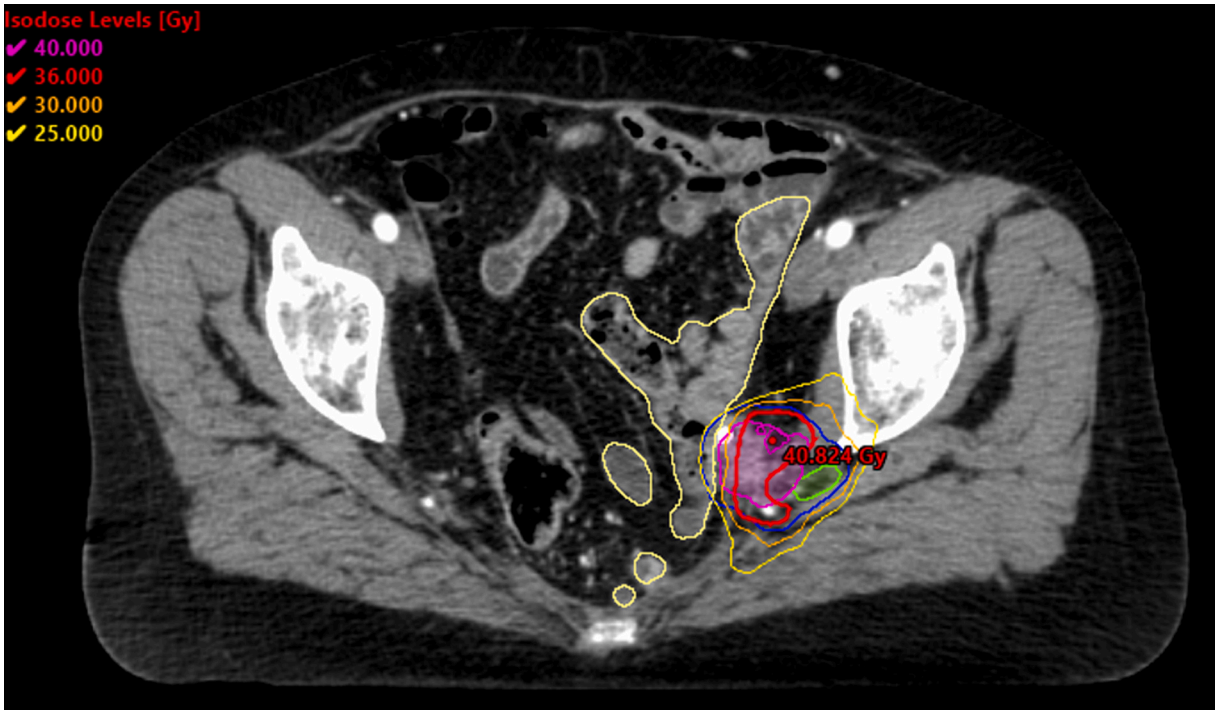

Fig. 2. Isotoxic plan to limited to prescription dose of 35 Gy in 5 fractions by small bowel and lumbosacral plexus. (GTV = magenta; Small bowel = yellow; Lumbosacral plexus = green).

assessment of cumulative doses is required, especially when there have been large deformations between treatment courses.

Discussion

Clinical context

This guidance represents a pragmatic, consensus-based national framework for the delivery of pelvic SABR re-irradiation. While it offers structured recommendations, clinical judgment remains central, and individual treatment decisions should be tailored to each patient's context. The guidance is intended to support both national and international colleagues, recognising that variations may be required in different clinical scenarios.

The very recent publication of the DESTROY-1 trial, which had two cohorts where SABR re-irradiation was delivered to a variety of different sites to 121 lesions in 97 patients, including 49 lesions in the pelvis [25]. This phase I trial reported reaching the planned maximum tolerated dose (MTD) in two cohorts, one in patients who had previously received EQD2, α/β:3 $<$ 60 Gy treated in 50 Gy in 5 fractions, the other in patients having received EQD2, α/β:3 $>$ 60 Gy who received 45 Gy in 5 fractions. Seventeen of 121 lesions treated had dose levels dropped due to planning concerns. Toxicity was limited to grade 1–2 other than one pelvic and one skin grade 4 toxicity. This concurs with the aim of the guidance, that higher doses where clinically appropriate are safe and deliverable. The publication acknowledges the DESTROY-1 trial was designed 20 years ago and, as such, isotoxic re-irradiation and its potential benefits in this setting had not been developed. The guidance presented here builds on the DESTROY-1 trial, with more novel radiation techniques and allowing the delivery of lower prescription doses for those clinical cases where higher doses are unlikely to offer meaningful clinical benefit.

Limitations

Indications for SABR pelvic re-irradiation continue to evolve and more novel indications such as re-irradiation of locally recurrent prostate cancer, were not included during development of this guidance [26–28]. Clinical trials would, ideally, be conducted for each indication, however patient heterogeneity complicates trial design, requiring individualized dose prescriptions, treatment strategies, and outcome measures. Given these limitations, ongoing high-quality prospective data collection remains a preferable means of validating safety and efficacy. The unified adoption of this guidance across the UK will support these validation efforts.

Audit design

A national prospective audit was launched on publication of the guidance, led by Royal College of Radiologists (RCR) Clinical Oncology Quality Improvement and Audit Committee (COQIAC) [14]. The audit will assess feasibility and safety and report outcomes of pelvic SABR re-irradiation delivered using the guidance. Centres are prospectively collecting patient and tumour demographics, toxicity and outcome datapoints, as well as patient reported outcome measures at baseline and 1 year. The RCR will collect these datapoints in 2026 for interrogation. The dataset will also be designed in collaboration with ReCare (EORTC 2011-RP) to maximise collaborative efforts and learning (NCT03818503).

Future directions

The guidance aims to support harmonisation of treatment planning and delivery across centres in the UK, assess feasibility and safety, and generate data to inform future clinical trials and model-based approaches, including combined datasets for tumour control probability (TCP) and normal tissue complication probability (NTCP) modelling. The ongoing audit will be instrumental in identifying practice variation, challenges of reirradiation and highlight improvements to inform iterations of the guidance moving forward.

In parallel, multiple technical advances for treatment planning and delivery of reirradiation are on the horizon that will be discussed elsewhere in this issue, for example improved software with incorporation of summation of previous plans using different fractionations, use of deformable registration for planning and real-time adaptive radiotherapy (ART).

The challenges of trials in this setting is whether to include multiple histology's / sites, in a basket type trial which may offer less insights into a larger population, or have a specific question in a specific tumour group which will definitively answer a question in a small population such as the ongoing TORCH-R [NCT05628038] trial, which is investigating the optimal integration and sequencing of systemic therapies with SABR re-irradiation in locally recurrent rectal cancer. Ultimately, the validation of SABR re-irradiation through prospective international trials will be critical to establish its safety, efficacy, and generalisability across healthcare settings and the presented guidance and planned audit is an important step forward in establishing a population and a gold standard for future trials.

Conclusion

This guidance, written on behalf of the UK SABR Consortium, serves as a practical resource to facilitate consistent and pragmatic pelvic SABR re-irradiation. The planned audit will inform future iterations of this guidance, offer unique insight into critical OAR dose constraints and assumed recovery, and support and drive the development of clinical trials in this area.

Ethics and dissemination

The clinical guidance was developed by the UK SABR Consortium working group and approved by UK SABR Consortium.

Funding source(s)

Dr Tree is supported by a Cancer Research UK Radiation Research Centre of Excellence at The Institute of Cancer Research and The Royal Marsden NHS Foundation Trust (grant ref: A28724 and RRCOER-Jun24/100006) and a Cancer Research UK Programme Grant (ref: C33589/A28284).

Dr Tree and Dr McDonald acknowledge NHS funding to the NIHR Biomedical Research Centre at The Royal Marsden and The Institute of Cancer Research. The views expressed in this publication are those of the author(s) and not necessarily those of the NHS, the National Institute for Health Research or the Department of Health and Social Care.

PD acknowledges that the National Radiotherapy Trials Quality Assurance (RTTQA) Group is funded by the National Institute for Health and Care Research (NIHR).

LM is an Associate Professor funded by Yorkshire Cancer Research (award number L389LM). LM would also like to acknowledge Cancer Research UK funding for the Leeds Radiotherapy Research Centre of Excellence (RadNet; C19942/A28832).

Aileen Duffton is funded by the Beatson Cancer Charity, Glasgow, UK.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Dr Tree also declares research funding from Elekta®, Varian® and Accuray® and honoraria or travel assistance from Elekta®, Accuray®

and Janssen®. Dr. Tree is the Chair of the MR linac consortium.

Acknowledgements

We thank all the multidisciplinary teams from participating centres and collaborators from The Royal College of Radiologists and the EORTC/ESTRO ReCare Team.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tipsro.2025.100326.

References

[1] https://www.england.nhs.uk/publication/clinical-commissioning-policy-stereotactic-ablative-radiotherapy-sabr-for-patients-with-previously-irradiated-locally-recurrent-primary-pelvic-tumours-all-ages/ [Internet]. 2021 [cited 2025 Mar 19]. NHS England. Clinical Commissioning Policy: stereotactic ablative radiotherapy (SABR) for patients with previously irradiated, locally recurrent primary pelvic tumours (all ages) 202Available from: https://www.england.nhs.uk/publication/clinical-commissioning-policy-stereotactic-ablative-radiotherapy-sabr-for-patients-with-previously-irradiated-locally-recurrent-primary-pelvic-tumours-all-ages/.

[2] Phillips R, Shi WY, Deek M, Radwan N, Lim SJ, Antonarakis ES, et al. Outcomes of Observation vs Stereotactic Ablative Radiation for Oligometastatic Prostate Cancer: the ORIOLE phase 2 Randomized Clinical Trial. JAMA Oncol 2020;6(5):650.

[3] Ost P, Reynders D, Decaestecker K, Fonteyne V, Lumen N, De Bruycker A, et al. Surveillance or metastasis-directed therapy for oligometastatic prostate cancer recurrence (STOMP): Five-year results of a randomized phase II trial. J Clin Oncol 2020. Feb 20;38(6_suppl):10–10.

[4] Johnstone P, Okonta L, Aitken K, Holmes J, Harrison M, Harji D, et al. A multicentre retrospective review of SABR reirradiation in rectal cancer recurrence. Radiother Oncol 2021;162:1–6.

[5] Glynne-Jones R, Wyrwicz L, Tiret E, Brown G, Rödel C, Cervantes A, et al. Rectal cancer: ESMO Clinical Practice guidelines for diagnosis, treatment and follow-up. Ann Oncol 2017;28:iv22–40.

[6] Slevin F, Aitken K, Alongi F, Arcangeli S, Chadwick E, Chang AR, et al. An international Delphi consensus for pelvic stereotactic ablative radiotherapy re-irradiation. Radiother Oncol 2021;1(164):104–14.

[7] Willmann J, Balermpas P, Rimner A, Appelt AL, Vasquez Osorio EM, Rønde HS, et al. Ongoing prospective studies on reirradiation: a systematic review of a clinical trials database. Radiother Oncol 2025;1:202.

[8] Murray LJ, Lilley J, Hawkins MA, Henry AM, Dickinson P, Sebag-Montefiore D. Pelvic re-irradiation using stereotactic ablative radiotherapy (SABR): a systematic review. Radiother Oncol 2017;125(2):213–22.

[9] Andratschke N, Willmann J, Phd TL, Leeds) ;, Andratschke N, Willmann J, et al. European Society for Radiotherapy and Oncology and European Organisation for Research and Treatment of Cancer consensus on re-irradiation: definition, reporting, and clinical decision making [Internet]. Vol. 23, Policy Review Lancet Oncol. 2022. Available from: www.thelancet.com/oncology.

[10] Timmerman R. A Story of Hypofractionation and the Table on the Wall. Vol. 112, International Journal of Radiation Oncology Biology Physics. Elsevier Inc.; 2022. p. 4–21.

[11] Nix M, Gregory S, Aldred M, Aspin L, Lilley J, Al-Qaisieh B, et al. Dose summation and image registration strategies for radiobiologically and anatomically corrected dose accumulation in pelvic re-irradiation. Acta Oncol (Madr) 2022;61(1):64–72.

[12] Nieder C, Grosu AL, Andratschke NH, Molls M. Update of human spinal cord reirradiation tolerance based on additional data from 38 patients. Int J Radiat Oncol Biol Phys 2006;66(5):1446–9.

[13] Abusaris H, Hoogeman M, Nuyttens JJ. Re-irradiation: outcome, cumulative dose and toxicity in patients retreated with stereotactic radiotherapy in the abdominal or pelvic region. Technol Cancer Res Treat 2012;11(6):591–7.

[14] Muirhead R, Dean C, Díez P, Williams M, McDonald F. Launch of the UK SABR Consortium Pelvic Stereotactic Ablative Radiotherapy Re-irradiation Guidelines and National Audit. Vol. 35, Clinical Oncology. Elsevier Ltd; 2023. p. 29–32.

[15] Developing NICE guidelines: the manual (PMG20). London: NICE; 2022. [Internet]. 2022 [cited 2025 Mar 31]. Available from: https://www.nice.org.uk/process/pmg20.

[16] Kim MS, Choi C, Yoo S, Cho C, Seo Y, Ji Y, et al. Stereotactic body radiation therapy in patients with pelvic recurrence from rectal carcinoma. Jpn J Clin Oncol 2008;38(10):695–700.

[17] DeFoe S, Bernard M, Rwigema JC, Heron D, Ozhasoglu C, Burton S. Stereotactic body radiotherapy for the treatment of presacral recurrences from rectal cancers. J Cancer Res Ther 2011;7(4):408.

[18] Yazici G. Salvage stereotactic body radiosurgery in the management of recurrent gynecological cancer. Int J Hematol Oncol 2013;23(1):7–12.

[19] Park HJ, Chang AR, Seo Y, Cho CK, Jang WI, Kim MS, et al. Stereotactic body radiotherapy for recurrent or oligometastatic uterine cervix cancer: a cooperative study of the korean radiation oncology group (KROG 14-11). Anticancer Res 2015;35(9):5103–10.

[20] Kerkmeijer LGW, Groen VH, Pos FJ, Haustermans K, Monninkhof EM, Smeenk RJ, et al. Focal boost to the Intraprostatic tumor in external beam radiotherapy for patients with localized prostate cancer: results from the FLAME randomized phase III trial. J Clin Oncol 2021;39(7):787–96.

[21] Haslett K, Bayman N, Franks K, Groom N, Harden SV, Harris C, et al. Isotoxic intensity modulated radiation therapy in stage III non-small cell lung cancer: a feasibility study. Int J Radiat Oncol Biol Phys 2021;109(5):1341–8.

[22] Robinson M, O'Cathail S, Duffton A, Aitken K, Muirhead R. Potential for isotoxic re-irradiation stereotactic ablative body radiotherapy in locally recurrent rectal cancer. Clin Oncol 2022;34(9):571–7.

[23] Moore JW, Woolley TE, Hopewell JW, Jones B. Further development of spinal cord retreatment dose estimation: including radiotherapy with protons and light ions. Int J Radiat Biol 2021;97(12):1657–66.

[24] Woolley TE, Belmonte-Beitia J, Calvo GF, Hopewell JW, Gaffney EA, Jones B. Changes in the retreatment radiation tolerance of the spinal cord with time after the initial treatment. Int J Radiat Biol 2018;94(6):515–31.

[25] Deodato F, Pezzulla D, Cilla S, Romano C, Re A, Fanelli M, et al. Stereotactic Reirradiation: Final Results From a Phase 1 Dose Escalation Trial (DESTROY-1). International Journal of Radiation Oncology*Biology*Physics. 2025 May.

[26] Greco C, Pares O, Pimentel N, Louro V, Nunes B, Kociolek J, et al. Health-related quality of life of salvage prostate reirradiation using stereotactic ablative radiotherapy with urethral-sparing. Front Oncol 2022;6:12.

[27] Pasquier D, Lacornerie T, Supiot S, Pommier P, Quivrin M, Simon JM, et al. The safety and efficacy of salvage stereotactic radiation therapy in patients with intraprostatic tumor recurrence after previous external radiation therapy: phase 1 results from the GETUG-AFU 31 Study. Eur Urol Oncol 2023;6(4):399–405.

[28] Archer P, Marvaso G, Detti B, Colombo F, Francolini G, Vandendorpe B, et al. Salvage stereotactic reirradiation for local recurrence in the prostatic bed after prostatectomy: a retrospective multicenter study. Eur Urol Oncol 2023;6(3):303–10.