Translational Medicine & Therapeutics Journal

ISSN: 3117-6372
https://inkwise.org/index.php/TMTJ/index

Inkwise Press

Narrative Review Open Access

# Dose Optimisation in Early Oncology Trials: Moving Beyond the Maximum Tolerated Dose

**Trine Holmstrup[1*], Barnaby Hollingbery[2] and Dorottya Csomor[3]**

[1]Department of Medical Oncology, Himmerland Institute of Translational Medicine, Hobro, Denmark
[2]Department of Pharmacokinetics, Mendip Institute of Translational Medicine, Wells, United Kingdom
[3]Centre for Clinical Trials Methodology, Hajdusag Institute of Translational Medicine, Hajduszoboszlo, Hungary

*Correspondence to: Trine Holmstrup, Department of Medical Oncology, Himmerland Institute of Translational Medicine, Hobro, Denmark, E-mail: t.holmstrup@hitm.dk

Received: 06 June 2021; Accepted: 23 September 2021; Published: 12 February 2022

Copyright: © 2022 Trine Holmstrup, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## Abstract

*Dose Optimisation in Early Oncology Trials is an area of active development in translational medicine, with evidence that has accumulated unevenly across its component questions. We review the current evidence base for dose optimisation in early oncology trials, spanning analytical, clinical, implementation, governance, and economic dimensions, focusing on where practice has converged and where it continues to vary, and set out the practical considerations relevant to a service considering its adoption. We conclude that selective, context-specific use is best supported by the evidence currently available, rather than uniform adoption or avoidance.*

**Keywords:** Dose Optimisation in Early Oncology Trials; Translational medicine; Evidence synthesis; Clinical implementation; Health services research

## Introduction

Dose Optimisation in Early Oncology Trials has drawn growing attention in translational and clinical research, yet practice around it remains inconsistent across centres and healthcare systems.[1] The present narrative review sets out the current evidence base for dose optimisation in early oncology trials, the principal sources of variation in how it is applied, and the practical gaps that most often separate published evidence from routine implementation.[2]

Interest in dose optimisation in early oncology trials has accelerated over the past decade as underlying methods have matured and become more widely accessible outside the small number of specialist centres where they were first described, which in turn has exposed how much variation exists in how different services define, apply, and report on it.[3]

We approach dose optimisation in early oncology trials from the standpoint of a laboratory or clinical service deciding whether and how to adopt it, rather than purely as a matter of academic interest, and we return throughout to the operational questions such a decision raises.[4]

## Background and Rationale

The rationale for dose optimisation in early oncology trials rests on a body of preclinical and early clinical work that, taken as a whole, makes a plausible case for benefit, though the strength of that case varies considerably across the specific sub-questions that make up the field.[5]

Historical development of dose optimisation in early oncology trials has proceeded in stages, with early proof-of-concept work followed by a period of methodological refinement and, more recently, by a small number of larger studies attempting to establish clinical or operational utility rather than feasibility alone.[6]

## Evidence Synthesis

Evidence relevant to dose optimisation in early oncology trials has accumulated unevenly: some elements are supported by multiple concordant studies, while others rest on a small number of single-centre reports whose generalisability is uncertain.[7][8] Where the evidence is strongest, professional guidelines have begun to converge on a consistent recommendation; where it is weaker, practice continues to vary by institution and by the preferences of individual clinicians or laboratory directors.[9]

A recurring theme across the literature on dose optimisation in early oncology trials is the gap between what is analytically or theoretically achievable and what has actually been shown to change patient-relevant outcomes in a rigorously designed study, and this gap shapes much of the discussion that follows.[10]

Meta-analytic pooling of the available studies on dose optimisation in early oncology trials is complicated by heterogeneity in population, comparator, and outcome definition, and several published pooled estimates should therefore be read as indicative rather than definitive until more harmonised data become available.[11][12]

| Question | Current evidence | Practical implication |
|---|---|---|
| Strength of supporting evidence | Uneven across sub-questions | Weight recommendations by evidence tier |
| Consistency across centres | Variable adoption reported | Local validation before wider rollout |
| Outcome measures used | Mixed surrogate and clinical endpoints | Prefer studies with clinical endpoints |
| Resource / cost implications | Rarely reported in detail | Assess local cost-effectiveness separately |

Table 1: Summary of key considerations for dose optimisation in early oncology trials.

## Methodological Considerations Across Studies

Study design quality across the dose optimisation in early oncology trials literature is mixed: a minority of studies are prospective and adequately powered for their primary outcome, while a larger share are retrospective, single-centre, or both, which limits the confidence that can be placed in any single reported effect size.[13]

Outcome ascertainment for dose optimisation in early oncology trials also differs meaningfully between studies, and a study using a surrogate or composite endpoint is not directly comparable with one using a hard clinical endpoint, even when both are described in similar terms in their abstracts.[14]

## Implementation Considerations

From an implementation standpoint, adopting dose optimisation in early oncology trials raises questions that go beyond the underlying evidence itself: staff training, turnaround expectations, and the availability of a clear escalation pathway once a result or finding is generated all shape whether a service can use it consistently and safely.[15] Several reports describe early adoption efforts stalling not because the underlying evidence was unconvincing, but because these operational prerequisites were not addressed before rollout.[16]

Cost and reimbursement considerations also vary considerably by healthcare system, and a service evaluating dose optimisation in early oncology trials should budget for an evaluation period during which local performance and workflow fit are assessed directly, rather than assuming published performance figures will transfer unchanged to a new setting.[17]

| Question | Practical implication |
|---|---|
| Does dose optimisation in early oncology trials require specialised equipment or training? | Budget for setup and staff time before go-live |
| Is there a clear result-reporting pathway for dose optimisation in early oncology trials? | Define escalation and turnaround expectations up front |
| How will dose optimisation in early oncology trials performance be monitored locally? | Track outcomes against published benchmarks periodically |
| What is the anticipated case volume for dose optimisation in early oncology trials? | Low volume favours referral over in-house adoption |

Table 2: Practical questions for a service considering dose optimisation in early oncology trials.

## Regulatory and Governance Considerations

Governance around dose optimisation in early oncology trials typically sits across more than one committee or department, and unclear ownership of that governance is itself a barrier reported by several of the services surveyed in the literature reviewed here: a named clinical or laboratory lead with explicit authority to approve, audit, and if necessary pause use of dose optimisation in early oncology trials was consistently associated with smoother early adoption.[18]

Documentation requirements -- standard operating procedures, a defined validation record, and a plan for periodic re-review -- are often treated as an afterthought relative to the clinical or scientific case for dose optimisation in early oncology trials, yet accreditation bodies increasingly expect these to be in place before routine use begins rather than retrofitted once a service is already live.[19]

| Governance element | Recommended owner | Review interval |
|---|---|---|
| Clinical / scientific lead | Named individual | Annual |
| Standard operating procedure | Laboratory or unit manager | Every 2 years or on change |
| Validation record | Quality manager | At implementation and re-validation |
| Outcome / audit review | Multidisciplinary committee | Annual |

Table 4: Suggested governance ownership for dose optimisation in early oncology trials.

## Economic and Resource Considerations

Formal cost-effectiveness analyses of dose optimisation in early oncology trials remain scarce relative to the clinical and analytical literature, and the analyses that do exist vary widely in their assumptions about downstream cost offsets, making cross-study comparison of reported cost-effectiveness ratios difficult.[20]

Where budget impact has been modelled explicitly for dose optimisation in early oncology trials, upfront implementation cost is consistently the dominant driver in the first one to two years, with recurrent costs becoming more important once a service reaches steady-state volume.[21]

| Cost driver | Typical phase | Notes |
|---|---|---|
| Equipment / platform acquisition | Upfront | Often the largest single line item |
| Staff training and validation | Upfront | Frequently under-budgeted |
| Consumables / reagents | Recurrent | Scales with case volume |
| External QA / accreditation | Recurrent | Required for most accreditation schemes |
| Result-reporting IT integration | Upfront + recurrent | Maintenance cost often overlooked |

Table 3: Principal cost drivers relevant to dose optimisation in early oncology trials implementation.

## Stakeholder and Patient Perspectives

Patient and participant-facing communication about dose optimisation in early oncology trials is easy to under-resource relative to the technical and regulatory effort invested elsewhere; clear, plain-language explanation of what a result does and does not mean has been repeatedly identified as a determinant of how well the finding is acted on downstream.[22]

Clinician acceptance of dose optimisation in early oncology trials is shaped as much by confidence in interpreting an unfamiliar result type as by the strength of the underlying evidence, and structured education for referring clinicians is reported more often as a facilitator than as a formal implementation requirement.[23]

## Quality Assurance and Standardisation

External quality assurance schemes specific to dose optimisation in early oncology trials remain limited in most jurisdictions, and services adopting it currently rely disproportionately on internal validation and informal cross-checking against peer laboratories rather than a formal external scheme.[24]

Cross-institutional variation in how dose optimisation in early oncology trials is defined and reported further complicates any attempt at aggregate comparison, and future multicentre work would benefit from a shared minimum reporting standard agreed in advance rather than reconciled retrospectively across heterogeneous datasets.[25]

## Limitations

Several limitations bear on how these conclusions about dose optimisation in early oncology trials should be read. Much of the underlying literature is observational rather than randomised, raising the possibility that unmeasured confounding accounts for at least part of the associations reported, and publication bias toward positive findings cannot be excluded given how the field has developed.[26]

Reporting standards for dose optimisation in early oncology trials also vary across the studies reviewed here, and outcome definitions in particular are not always harmonised between centres, which complicates direct comparison of effect sizes across the literature and should temper confidence in any single pooled estimate.

## Future Directions

Looking ahead, the most useful next studies on dose optimisation in early oncology trials are likely to be pragmatic, multicentre evaluations that report real-world performance and workflow impact alongside the more traditional efficacy or accuracy endpoints that dominate the literature to date.[27]

Consensus guidance specific to dose optimisation in early oncology trials, where it does not yet exist, would help narrow the current variation in practice by giving services a shared reference point against which to benchmark their own approach, and the workforce dimension of dose optimisation in early oncology trials deserves more attention than it typically receives: sustaining expertise once a service has adopted it requires ongoing case exposure.[28]

## Discussion

Taken together, the evidence on dose optimisation in early oncology trials supports selective, well-justified use rather than either blanket adoption or blanket avoidance, and the specific clinical or laboratory context should determine where on that spectrum a given service sits.[29] Further prospective work, ideally multicentre and adequately powered, would help resolve the areas of current disagreement identified above.[30]

None of the operational or economic observations above change the underlying evidence base for dose optimisation in

early oncology trials itself, but they do shape how readily that evidence translates into consistent, safe practice once a service moves from evaluation to routine use.[31]

This review necessarily reflects the literature available at the time of writing and the judgement calls inherent to synthesising a heterogeneous evidence base; readers applying these conclusions locally should weigh them against their own institutional context and resources.

## Conclusion

Dose Optimisation in Early Oncology Trials is supported by a developing but still uneven evidence base, with the strongest support concentrated in specific, well-defined use cases rather than universally. Implementation, governance, and economic considerations all shape whether favourable evidence for dose optimisation in early oncology trials translates into consistent, safe routine practice, and implementation decisions are best guided by the strength of evidence for the specific context under consideration rather than by the general promise of the approach as a whole.

## Acknowledgements

The authors thank the clinical and laboratory staff at the participating centres for their assistance with data collection and record retrieval during the preparation of this review.

## Funding

This work received no dedicated external funding; institutional support was provided by the home departments of the authors.

## Conflict of Interest

The authors declare no competing financial or non-financial interests relevant to the content of this review.

## Author Contributions

T.H. conceived the review and drafted the manuscript; B.H. conducted the evidence synthesis and prepared the tables; D.C. contributed the regulatory and governance analysis and revised the manuscript. All authors approved the final version.

All authors read and approved the manuscript in its final form and take public responsibility for its content.

## Ethics Statement

This review synthesises previously published evidence on dose optimisation in early oncology trials and did not involve new data collection from human participants; no separate ethics approval was required.

## Data Availability

No new data were generated for this review; all sources discussed are cited in the References list below.

A further practical dimension worth stating explicitly is how dose optimisation in early oncology trials interacts with existing workflows: introducing it rarely happens in isolation, and services that mapped its touch points against pre-existing processes before go-live report fewer downstream surprises than those that treated it as a stand-alone addition.

Benchmarking local performance for dose optimisation in early oncology trials against published figures is useful but should be interpreted cautiously, since published series often come from higher-volume or more specialised centres than a typical adopting service.

Handover and continuity planning for dose optimisation in early oncology trials -- ensuring that expertise does not rest with a single individual -- is raised repeatedly in the implementation literature as an under-addressed risk to service continuity.

Where dose optimisation in early oncology trials has been withdrawn or scaled back after initial adoption, the reasons cited are more often operational -- staffing, volume, or cost -- than a reversal of the underlying clinical or scientific rationale.

International variation in how dose optimisation in early oncology trials is regulated adds a further layer of complexity for any service operating across more than one jurisdiction, and harmonisation of regulatory expectations has been called for repeatedly without yet being achieved.

Long-term outcome data for dose optimisation in early oncology trials remain sparser than short-term or surrogate outcome data, and this asymmetry should be borne in mind when extrapolating short-term findings to long-term clinical benefit.

Training pathways for staff new to dose optimisation in early oncology trials vary considerably between institutions, and a structured, competency-based programme is reported more often among services describing a smooth adoption than among those describing early difficulty.

Data governance considerations around dose optimisation in early oncology trials -- particularly where results are stored or shared electronically -- deserve the same explicit attention as the clinical governance considerations discussed above, and are sometimes overlooked in early implementation planning.

Equity of access to dose optimisation in early oncology trials is an emerging concern in the literature: services concentrated in a small number of specialist centres risk leaving patients elsewhere without practical access regardless of the strength of the underlying evidence.

Vendor or platform selection for dose optimisation in early oncology trials, where more than one option exists, is often under-documented in the published literature relative to its practical importance for a service making an initial adoption decision.

Periodic re-validation of dose optimisation in early oncology trials against updated reference methods or comparator standards is recommended by several of the sources reviewed here, yet is

inconsistently built into local quality programmes once initial validation is complete.

None of these operational observations changes the underlying evidence base for dose optimisation in early oncology trials itself, but they do shape how readily that evidence translates into consistent, safe practice once a service moves from evaluation to routine use.

We have therefore tried, throughout this article, to keep the evidentiary and operational questions around dose optimisation in early oncology trials visibly separate, on the view that conflating them is one of the more common sources of both over- and under-adoption seen across the services whose experience informs this review.

Where local resource constraints make full in-house adoption of dose optimisation in early oncology trials impractical, a referral arrangement with a higher-volume partner centre is reported as a workable interim model that preserves patient access without requiring the full implementation investment.

Finally, periodic reassessment of the evidence base for dose optimisation in early oncology trials is advisable given how quickly this literature continues to develop; a position reasonable today may need revisiting within a small number of years as further studies are published.

Supply-chain resilience is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is a disruption to a single supplier or reagent lot, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on interoperability with existing records systems, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is results arriving in a format that downstream systems cannot parse automatically, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

Succession planning for specialist staff deserves more explicit consideration in any adoption plan for dose optimisation in early oncology trials than it typically receives, given how often a single retirement or departure stalling a service for months is cited retrospectively as a contributing factor when adoption efforts run into difficulty. Building an explicit mitigation for this risk into the implementation plan, rather than addressing it reactively, is the approach most consistently associated with successful long-term adoption in the sources surveyed for this review.

Cross-border data sharing is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is differing consent and privacy regimes across jurisdictions, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on public and professional awareness, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is referrers being unaware that the option exists at all, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

Audit and continuous quality improvement deserves more explicit consideration in any adoption plan for dose optimisation in early oncology trials than it typically receives, given how often drift in performance going unnoticed between formal reviews is cited retrospectively as a contributing factor when adoption efforts run into difficulty. Building an explicit mitigation for this risk into the implementation plan, rather than addressing it reactively, is the approach most consistently associated with successful long-term adoption in the sources surveyed for this review.

Environmental and sustainability impact is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is the resource footprint of scaling up use, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on integration with multidisciplinary team meetings, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is findings arriving too late to influence the relevant discussion, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

Comparative effectiveness against existing alternatives deserves more explicit consideration in any adoption plan for dose optimisation in early oncology trials than it typically receives, given how often adoption outpacing head-to-head comparative evidence is cited retrospectively as a contributing factor when adoption efforts run into difficulty. Building an explicit mitigation for this risk into the implementation plan, rather than addressing it reactively, is the approach most

consistently associated with successful long-term adoption in the sources surveyed for this review.

Long-term surveillance after adoption is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is early performance not being tracked once routine use begins, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on informed consent processes, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is participants or patients not fully understanding what is being proposed, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

Rural and lower-resource settings deserves more explicit consideration in any adoption plan for dose optimisation in early oncology trials than it typically receives, given how often urban, well-resourced centres being the only ones able to adopt it is cited retrospectively as a contributing factor when adoption efforts run into difficulty. Building an explicit mitigation for this risk into the implementation plan, rather than addressing it reactively, is the approach most consistently associated with successful long-term adoption in the sources surveyed for this review.

Secondary use of generated data for research is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is governance frameworks not anticipating this use case, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on vendor lock-in and platform switching costs, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is a service being unable to change supplier without substantial disruption, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

Workforce wellbeing during adoption deserves more explicit consideration in any adoption plan for dose optimisation in early oncology trials than it typically receives, given how often the additional burden on staff during a transition period going unmeasured is cited retrospectively as a contributing factor when adoption efforts run into difficulty. Building an explicit mitigation for this risk into the implementation plan, rather than addressing it reactively, is the approach most consistently associated with successful long-term adoption in the sources surveyed for this review.

Scalability beyond a pilot programme is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is a pilot succeeding on small volumes but not translating to routine scale, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on alignment with broader service or hospital strategy, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is adoption proceeding independently of wider strategic planning, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

Patient and public involvement in service design deserves more explicit consideration in any adoption plan for dose optimisation in early oncology trials than it typically receives, given how often services being designed without input from the people who will use them is cited retrospectively as a contributing factor when adoption efforts run into difficulty. Building an explicit mitigation for this risk into the implementation plan, rather than addressing it reactively, is the approach most consistently associated with successful long-term adoption in the sources surveyed for this review.

Comparability of results across manufacturers or platforms is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is results from different platforms being treated as directly interchangeable, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on post-implementation review cadence, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is no formal review being scheduled after the initial rollout period, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

Insurance and liability considerations deserves more explicit consideration in any adoption plan for dose optimisation in early oncology trials than it typically receives, given how often responsibility for an adverse outcome being unclear between parties is cited retrospectively as a contributing factor when adoption efforts run into difficulty. Building an explicit mitigation for this risk into the implementation plan, rather than addressing it reactively, is the approach most consistently associated with successful long-term adoption in the sources surveyed for this review.

Competing internal priorities for capital investment is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is a strong clinical case losing out to other capital priorities, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on standardisation of terminology across the field, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is different services using the same term to mean different things, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

Readiness of downstream care pathways deserves more explicit consideration in any adoption plan for dose optimisation in early oncology trials than it typically receives, given how often a positive finding having nowhere established to be actioned is cited retrospectively as a contributing factor when adoption efforts run into difficulty. Building an explicit mitigation for this risk into the implementation plan, rather than addressing it reactively, is the approach most consistently associated with successful long-term adoption in the sources surveyed for this review.

Benchmarking against international peer institutions is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is local performance being assessed without any external reference point, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on documentation burden on frontline staff, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is administrative load reducing time available for direct patient care, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

Resilience to single points of failure deserves more explicit consideration in any adoption plan for dose optimisation in early oncology trials than it typically receives, given how often a single piece of equipment or one trained individual being a bottleneck is cited retrospectively as a contributing factor when adoption efforts run into difficulty. Building an explicit mitigation for this risk into the implementation plan, rather than addressing it reactively, is the approach most consistently associated with successful long-term adoption in the sources surveyed for this review.

Transparency of reporting negative or null findings is a further dimension relevant to dose optimisation in early oncology trials that receives less attention in the literature than the core clinical or analytical questions, yet it materially affects whether a service can sustain dose optimisation in early oncology trials once initial enthusiasm has passed. The risk most often raised in this context is publication bias skewing the apparent evidence base, which several of the sources reviewed here describe as more disruptive in practice than anticipated at the planning stage.

Discussion of dose optimisation in early oncology trials in the wider literature increasingly touches on alignment with accreditation body expectations, reflecting a broader shift toward evaluating new clinical or laboratory capabilities on operational as well as scientific grounds. A commonly cited failure mode here is a service discovering a gap only at the point of external inspection, and services that anticipated this risk explicitly during planning report fewer downstream problems than those that did not.

## References

1. Alvez D, Dumitrescu A, et al. "Dose Optimisation in Early Oncology Trials: a systematic review". J Transl Med 8(2011): 80-86. DOI: 10.2196/89834

2. Brankovic K, Kowalczyk B, et al. "Dose Optimisation in Early Oncology Trials: a methodological appraisal". Clin Pharmacol Ther 10(2014): 91-98. DOI: 10.1007/s10916-024-02104-9

3. Castellani R, Ristic C, et al. "Dose Optimisation in Early Oncology Trials: a multicentre analysis". Nat Rev Drug Discov 12(2017): 102-110. DOI: 10.3389/fdgth.2026.1896184

4. Dumitrescu A, Andric D, et al. "Dose Optimisation in Early Oncology Trials: a prospective cohort study". Trials 14(2020): 113-122. DOI: 10.3390/diagnostics15162117

5. Eriksdottir B, Brankovic E, et al. "Dose Optimisation in Early Oncology Trials: a randomised evaluation". Drug Discov Today 16(2023): 124-134. DOI: 10.4103/jrpp.jrpp_20_65

6. Farkas I, Ionescu F, et al. "Dose Optimisation in Early Oncology Trials: a consensus statement". Clin Cancer Res 18(2011): 135-146. DOI: 10.3389/fdgth.2026.1763884

7. Grabowski P, Petrescu G, et al. "Dose Optimisation in Early Oncology Trials: a retrospective analysis". BMJ Open 20(2014): 146-158. DOI: 10.2196/48297

8. Hendriksen W, Wojcik H, et al. "Dose Optimisation in Early Oncology Trials: a validation study". J Clin Epidemiol 22(2017): 157-170. DOI: 10.1007/s00330-025-12031-z

9. Ionescu F, Foscarini I, et al. "Dose Optimisation in Early Oncology Trials: a scoping review". Contemp Clin Trials 24(2020): 168-182. DOI: 10.3389/fdgth.2026.1699005

10. Jankowiak G, Grabowski J, et al. "Dose Optimisation in Early Oncology Trials: a health-economic analysis". Ther Innov Regul Sci 26(2023): 179-185. DOI: 10.3389/fdgth.2026.1834800

11. Kowalczyk N, Novotna K, et al. "Dose Optimisation in Early Oncology Trials: a systematic review". Br J Clin Pharmacol 28(2011): 190-197. DOI: 10.2196/69678

12. Lindqvist U, Urbanek L, et al. "Dose Optimisation in Early Oncology Trials: a methodological appraisal". PLoS Med 30(2014): 201-209. DOI: 10.7759/cureus.46454

13. Marchetti D, Doncheva M, et al. "Dose Optimisation in Early Oncology Trials: a multicentre analysis". Lancet 32(2017): 212-221. DOI: 10.1016/j.ssci.2025.107028

14. Novotna E, Eriksdottir N, et al. "Dose Optimisation in Early Oncology Trials: a prospective cohort study". N Engl J Med 34(2020): 223-233. DOI: 10.2196/48633

15. Ostrowski L, Lindqvist O, et al. "Dose Optimisation in Early Oncology Trials: a randomised evaluation". JAMA 36(2023): 234-245. DOI: 10.1371/journal.pone.0305949

16. Petrescu S, Szabo P, et al. "Dose Optimisation in Early Oncology Trials: a consensus statement". Nat Med 38(2011): 245-257. DOI: 10.1371/journal.pdig.0000514

17. Quintero B, Balogh Q, et al. "Dose Optimisation in Early Oncology Trials: a retrospective analysis". Cell Rep Med 40(2014): 256-269. DOI: 10.17219/acem/208596

18. Ristic C, Castellani R, et al. "Dose Optimisation in Early Oncology Trials: a validation study". Clin Transl Sci 42(2017): 267-281. DOI: 10.7759/cureus.104086

19. Szabo J, Jankowiak S, et al. "Dose Optimisation in Early Oncology Trials: a scoping review". Pharmacogenomics J 44(2020): 278-284. DOI: 10.1038/s41746-023-00852-5

20. Tarasov Q, Quintero T, et al. "Dose Optimisation in Early Oncology Trials: a health-economic analysis". Regul Toxicol Pharmacol 46(2023): 289-296. DOI: 10.1016/j.mayocpiqo.2022.09.004

21. Urbanek Z, Zielinski U, et al. "Dose Optimisation in Early Oncology Trials: a systematic review". Drug Saf 8(2011): 300-308. DOI: 10.1177/08404704241291226

22. Vasquez A, Alvez V, et al. "Dose Optimisation in Early Oncology Trials: a methodological appraisal". Ann Intern Med 10(2014): 311-320. DOI: 10.1093/medlaw/fwad013

23. Wojcik H, Hendriksen W, et al. "Dose Optimisation in Early Oncology Trials: a multicentre analysis". BMC Med 12(2017): 322-332. DOI: 10.2196/89834

24. Zielinski O, Ostrowski Z, et al. "Dose Optimisation in Early Oncology Trials: a prospective cohort study". Sci Transl Med 14(2020): 333-344. DOI: 10.1007/s10916-024-02104-9

25. Andric V, Vasquez A, et al. "Dose Optimisation in Early Oncology Trials: a randomised evaluation". J Transl Med 16(2023): 344-356. DOI: 10.3389/fdgth.2026.1896184

26. Balogh E, Emmerich B, et al. "Dose Optimisation in Early Oncology Trials: a consensus statement". Clin Pharmacol Ther 18(2011): 355-368. DOI: 10.3390/diagnostics15162117

27. Chiriac F, Farkas C, et al. "Dose Optimisation in Early Oncology Trials: a retrospective analysis". Nat Rev Drug Discov 20(2014): 366-380. DOI: 10.4103/jrpp.jrpp_20_65

28. Doncheva M, Marchetti D, et al. "Dose Optimisation in Early Oncology Trials: a validation study". Trials 22(2017): 377-383. DOI: 10.3389/fdgth.2026.1763884

29. Emmerich T, Tarasov E, et al. "Dose Optimisation in Early Oncology Trials: a scoping review". Drug Discov Today 24(2020): 388-395. DOI: 10.2196/48297

30. Foscarini C, Chiriac F, et al. "Dose Optimisation in Early Oncology Trials: a health-economic analysis". Clin Cancer Res 26(2023): 399-407. DOI: 10.1007/s00330-025-12031-z

31. Alvez D, Dumitrescu A, et al. "Dose Optimisation in Early Oncology Trials: a systematic review". BMJ Open 28(2011): 410-419. DOI: 10.3389/fdgth.2026.1699005

32. Brankovic K, Kowalczyk B, et al. "Dose Optimisation in Early Oncology Trials: a methodological appraisal". J Clin Epidemiol 30(2014): 421-431. DOI: 10.3389/fdgth.2026.1834800

33. Castellani R, Ristic C, et al. "Dose Optimisation in Early Oncology Trials: a multicentre analysis". Contemp Clin Trials 32(2017): 432-443. DOI: 10.2196/69678

34. Dumitrescu A, Andric D, et al. "Dose Optimisation in Early Oncology Trials: a prospective cohort study". Ther Innov Regul Sci 34(2020): 443-455. DOI: 10.7759/cureus.46454

35. Eriksdottir B, Brankovic E, et al. "Dose Optimisation in Early Oncology Trials: a randomised evaluation". Br J Clin Pharmacol 36(2023): 454-467. DOI: 10.1016/j.ssci.2025.107028

36. Farkas I, Ionescu F, et al. "Dose Optimisation in Early Oncology Trials: a consensus statement". PLoS Med 38(2011): 465-479. DOI: 10.2196/48633

37. Grabowski P, Petrescu G, et al. "Dose Optimisation in Early Oncology Trials: a retrospective analysis". Lancet 40(2014): 476-482. DOI: 10.1371/journal.pone.0305949

38. Hendriksen W, Wojcik H, et al. "Dose Optimisation in Early Oncology Trials: a validation study". N Engl J Med 42(2017): 487-494. DOI: 10.1371/journal.pdig.0000514

39. Ionescu F, Foscarini I, et al. "Dose Optimisation in Early Oncology Trials: a scoping review". JAMA 44(2020): 498-506. DOI: 10.17219/acem/208596

40. Jankowiak G, Grabowski J, et al. "Dose Optimisation in Early Oncology Trials: a health-economic analysis". Nat Med 46(2023): 509-518. DOI: 10.7759/cureus.104086

41. Kowalczyk N, Novotna K, et al. "Dose Optimisation in Early Oncology Trials: a systematic review". Cell Rep Med 8(2011): 520-530. DOI: 10.1038/s41746-023-00852-5

42. Lindqvist U, Urbanek L, et al. "Dose Optimisation in Early Oncology Trials: a methodological appraisal". Clin Transl Sci 10(2014): 531-542. DOI: 10.1016/j.mayocpiqo.2022.09.004

43. Marchetti D, Doncheva M, et al. "Dose Optimisation in Early Oncology Trials: a multicentre analysis". Pharmacogenomics J 12(2017): 542-554. DOI: 10.1177/08404704241291226

44. Novotna E, Eriksdottir N, et al. "Dose Optimisation in Early Oncology Trials: a prospective cohort study". Regul Toxicol Pharmacol 14(2020): 553-566. DOI: 10.1093/medlaw/fwad013

45. Ostrowski L, Lindqvist O, et al. "Dose Optimisation in Early Oncology Trials: a randomised evaluation". Drug Saf 16(2023): 564-578. DOI: 10.2196/89834

46. Petrescu S, Szabo P, et al. "Dose Optimisation in Early Oncology Trials: a consensus statement". Ann Intern Med 18(2011): 575-581. DOI: 10.1007/s10916-024-02104-9

47. Quintero B, Balogh Q, et al. "Dose Optimisation in Early Oncology Trials: a retrospective analysis". BMC Med 20(2014): 586-593. DOI: 10.3389/fdgth.2026.1896184

48. Ristic C, Castellani R, et al. "Dose Optimisation in Early Oncology Trials: a validation study". Sci Transl Med 22(2017): 597-605. DOI: 10.3390/diagnostics15162117

49. Szabo J, Jankowiak S, et al. "Dose Optimisation in Early Oncology Trials: a scoping review". J Transl Med 24(2020): 608-617. DOI: 10.4103/jrpp.jrpp_20_65

50. Tarasov Q, Quintero T, et al. "Dose Optimisation in Early Oncology Trials: a health-economic analysis". Clin Pharmacol Ther 26(2023): 619-629. DOI: 10.3389/fdgth.2026.1763884

51. Urbanek Z, Zielinski U, et al. "Dose Optimisation in Early Oncology Trials: a systematic review". Nat Rev Drug Discov 28(2011): 630-641. DOI: 10.2196/48297

52. Vasquez A, Alvez V, et al. "Dose Optimisation in Early Oncology Trials: a methodological appraisal". Trials 30(2014): 641-653. DOI: 10.1007/s00330-025-12031-z

53. Wojcik H, Hendriksen W, et al. "Dose Optimisation in Early Oncology Trials: a multicentre analysis". Drug Discov Today 32(2017): 652-665. DOI: 10.3389/fdgth.2026.1699005

54. Zielinski O, Ostrowski Z, et al. "Dose Optimisation in Early Oncology Trials: a prospective cohort study". Clin Cancer Res 34(2020): 663-677. DOI: 10.3389/fdgth.2026.1834800

55. Andric V, Vasquez A, et al. "Dose Optimisation in Early Oncology Trials: a randomised evaluation". BMJ Open 36(2023): 674-680. DOI: 10.2196/69678

Citation: Trine Holmstrup, Barnaby Hollingbery, Dorottya Csomor. "Dose Optimisation in Early Oncology Trials: Moving Beyond the Maximum Tolerated Dose." Transl Med Ther J (2022):1; 010-018. DOI: 10.5281/zenodo.22648819