

Economic Evaluation of Focal Therapy Used in the Treatment of Prostate Cancer: A Systematic Review

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INTRODUCTION

- Focal therapy (FT) is a less-invasive alternative treatment to localized prostate cancer (PC) that targets a specific area containing the index lesion and thus minimizes the side effects associated with radical treatments
- FT is typically considered an option for men with low- to intermediate-risk PC. FT techniques can include high-intensity focused ultrasound (HIFU), cryotherapy, laser therapy and photodynamic therapy^{1,2}

OBJECTIVES

- The objective of this systematic literature review (SLR) was to assess the economic value of FT compared with traditional treatment in patients with PC

METHODS

- Embase® and MEDLINE® were systematically searched via Embase.com (from database inception until May 2023) to identify relevant English-language publications reporting the economic value of FT in patients with PC
- Searches were conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.³ The searches were not limited by study country
- Electronic searches were supplemented by bibliographic searches. Two independent reviewers performed initial screening of the title and abstract for each reference identified by the electronic database search. Two independent reviewers assessed each potentially relevant full-text publication. Any uncertainty regarding the inclusion of a publication was checked by a third reviewer

Table 1. PICOS table depicting inclusion criteria

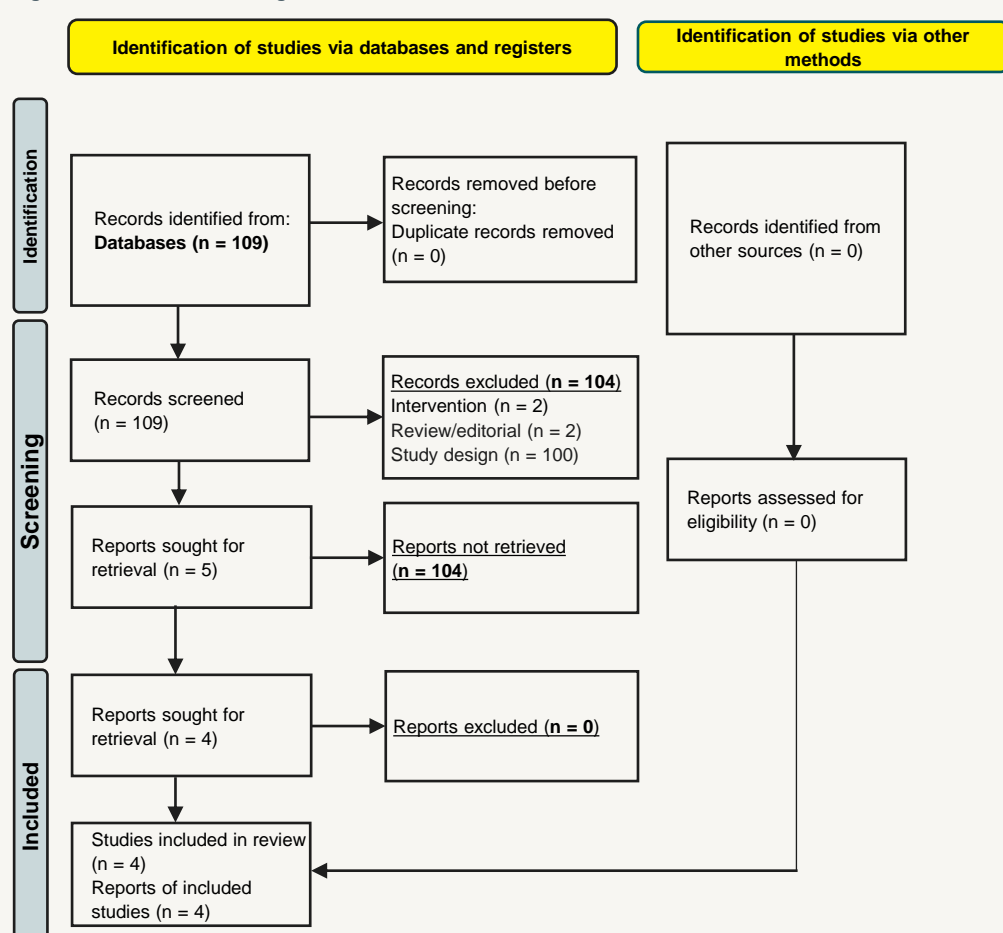
Parameters	Component of interest
Population	Patients with prostate cancer
Intervention	Focal therapy
Comparator	Any comparator
Outcome	Total costs, QALYs/LYs, ICER
Study design	Modelling studies, economic evaluation studies
Other parameters	<ul style="list-style-type: none"> No geographical limits on country were applied Language was limited to English only No publication time limit was applied

Key: ICER, incremental cost-effectiveness ratio, LY, life year; PICOS, population, intervention, comparator, outcome, study design; QALY, quality-adjusted life year.

RESULTS

- Of the 109 records screened, four studies were included in the review that met the PICOS criteria (Table 1) represented in the PRISMA flow diagram (Figure 1). Three of these studies were from the UK, and one was from France

Figure 1: PRISMA flow diagram



Key: PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

- Three studies conducted cost-utility analyses using Markov models, while one study conducted a cost-utility analysis but did not report model details (Table 2)
- A UK National Health Service perspective was adopted in two studies^{5,6}, and a French National Health Insurance perspective was reported in one.⁴ The model perspective was not reported in one study⁷
- Interventions assessed across these studies included cryotherapy (n = 3) and HIFU (n = 2)
- In France, focal HIFU was EUR 207,520 costlier and yielded 382 fewer quality-adjusted life years (QALYs) and hence was not cost-effective compared with active surveillance at a willingness-to-pay (WTP) threshold of EUR 30,000 per QALY⁴
- In the UK, HIFU was cost-effective compared with external beam radiotherapy (EBRT), with an incremental cost-effectiveness ratio (ICER) of GBP 2,915 per QALY at a WTP threshold of GBP 30,000 per QALY. However, EBRT dominated cryotherapy at the same WTP threshold⁶
- In another study, cryotherapy did not demonstrate cost-effectiveness compared with traditional treatments, partly due to a significant incidence of erectile dysfunction⁷
- For patients with recurrent PC following radiotherapy, cryotherapy was associated with lower cost and higher QALYs gained compared with both 20% deferred androgen deprivation therapy and immediate androgen deprivation therapy⁵ (Table 3)

Table 2: Key study characteristics

Author (year)	Intervention • Comparator	Key patient characteristics	Modelling technique	Model	Time horizon	Perspective	Price year	Discounting
Duroux (2018)	Focal HIFU Active surveillance	Patients with low- to intermediate-risk PC	Cost-utility	Markov multi-state model	10 years	French National Health Institute	2016	4% for both costs and QALYs
Boyd (2015)	Salvage cryotherapy Androgen deprivation therapy	Patients with radiation recurrent PC	Cost-utility	Markov model	36 years	UK National Health Service	2014	3.5% for both costs and QALYs
Hummel (2003)	Cryotherapy Standard treatment	Patients with early, localized PC	Cost-utility	NR	NR	NR	NR	NR
Ramsay (2015)	HIFU, cryotherapy Standard treatment	Patients with localized PC	Cost-utility	Markov chain simulation model	Lifetime	UK National Health Service	2011–2012	3.5% for both costs and QALYs

Key: EBRT, external beam radiotherapy; HIFU, high-intensity focused ultrasound; NR, not reported; PC, prostate cancer, QALY, quality-adjusted life year.

Table 3: Results of the included studies

Parameters	Duroux (2018)		Boyd (2015)		Hummel (2003)		Ramsay (2015)			
	Focal HIFU	Active surveillance	Salvage cryotherapy	ADT 20% deferred	ADT immediate	Cryo-therapy	Standard treatment	HIFU	Cryo-therapy	EBRT
QALYs	-	-	7.59	7.03	6.91	-	-	3.86	3.78	3.69
Incremental QALYs	-382	-	-	-0.56	-0.68	-	-	-	-	-
Total costs	-	-	GBP 62,150	GBP 91,869	GBP 100,914	-	-	GBP 19,860	GBP 23,010	GBP 19,363
Incremental costs	EUR 207,520	-	-	GBP 29,719	GBP 38,763	-	-	-	-	-
ICER	-	-	-	Salvage cryotherapy dominates	Salvage cryotherapy dominates	Not cost-effective	-	GBP 2,915	Dominated	-

Key: EBRT, external beam radiotherapy; HIFU, high-intensity focused ultrasound; ICER, incremental cost-effectiveness ratio; NR, not reported; QALY, quality-adjusted life year.

CONCLUSIONS

- The findings of this SLR suggest limited cost-effectiveness of FT techniques, owing to the higher cost compared with traditional treatments
- However, the scarcity of model-based economic evaluations and the variability in methods used in the identified studies renders a direct comparison inappropriate
- Additional evidence is required to reach definite conclusions about the economic feasibility of using FT in patients with PC

REFERENCES

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