

Economic and Health-Related Quality of Life Consequences of Imaging and Surveillance Schedule in Seminoma Testis

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BACKGROUND

- Risk of radiation exposure from standard computed tomography (CT) surveillance is a major concern in the management of stage I testicular cancer (seminoma testis) patients
- The TRISST trial (NCT00589537) randomized 669 men to 4 alternative surveillance schedules for the retroperitoneum: 7 CT scans over 5 years, 7 MRI scans over 5 years, 3 CT scans over 3 years or 3 MRI scans over 3 years
- The trial demonstrated that effective monitoring could be achieved with a reduced scan schedule or using Magnetic Resonance Imaging (MRI) instead of CT (Joffe et al, JCO 2022)

OBJECTIVES

- TRISST trial data was used to evaluate the economic consequences and health outcomes of different surveillance schedules in seminoma testicular patients in the UK

METHODS

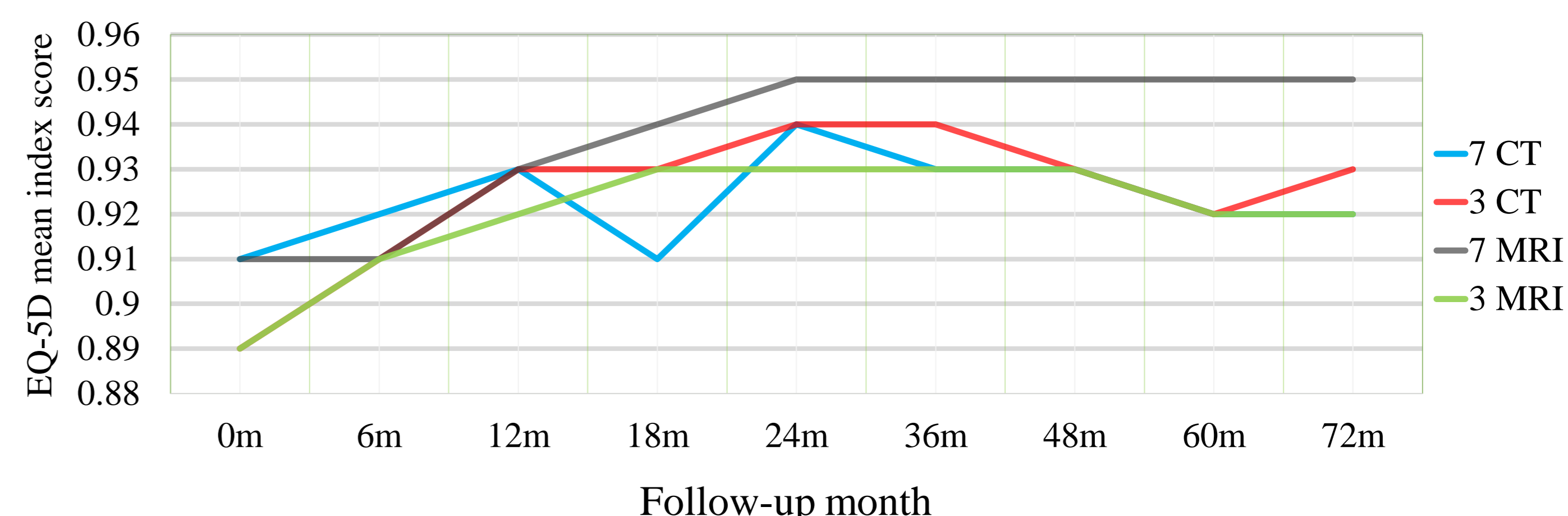
- Population:** individuals with seminoma testicular cancer in the UK
- Time Horizon:** over a period of 6 years after randomization
- Data:** TRISST trial data and published national sources for unit costs
- Analysis framework and perspective:** Within-trial economic analysis under a UK NHS and PSS perspective and with cost and benefits discounted at a rate of 3.5% per year (NICE, 2022)
- Cost-effectiveness outcomes and results:** quality-adjusted life-year (QALY); within-trial mean total costs; cost per QALY gained.
- Uncertainty:** probabilistic analysis using non-parametric bootstrap methods was used to evaluate statistical uncertainty and assess the probability of alternative strategies being cost-effective
- Health resource use and costs:**
 - Costs were estimated by multiplying health resources used in TRISST by respective unit cost (Table I)
 - Resources included: scans and tests, hospitalisation, treatment for relapse (chemo/radio/surgery) and more prevalent adverse events (i.e neutropenia)
 - Econometric models (Generalised Linear Models (GLMs)) were used to model overall total costs, adjusted by baseline covariates: age, rete testis invasion and tumour size

Table I – Unit Costs

Service	Unit Cost (updated to 2021 value)	Source
Scan & Test	CT scan	£178
	MRI scan	£231
	Blood sample	£4
	Clinical investigation	£187
	X-ray Scans	£34
hospitalisation & surgery	Outpatient	£193
	hospitalisation-critical care per day	£1,276
	Other hospitalisations per day	£910
	Neutropenia-Adverse Effect	£3,582
	General Surgery	£8,331
Radiotherapy& Chemotherapy delivery	Radiotherapy –delivery	£124
	Radiotherapy –preparation	£739
	Chemotherapy-parental delivery	£414
	Chemotherapy-subsequent delivery	£346
Regimens Procurement	SAC-BEP-Procurement	£325
	EP-Procurement	£288
	VIP-Procurement	£342

- Health benefits:**
 - EQ-5D index scores from (participant reported) EQ-5D 3L questionnaires were estimated using UK population norms (Kind et al, CHE 1999)
 - Missingness was addressed via multiple imputations by chained equations, considering within and between participant correlation
 - As for costs, GLMs were used to model overall total benefits, adjusted by the same baseline covariates: age, rete testis invasion and tumour size
 - QALYs were obtained via multiple imputed EQ-5D index scores, and assumed to be 0 for timepoints after death for all deceased trial participants

Figure I – EQ-5D mean index scores over the trial follow-up period (after multiple imputation)



KEY RESULTS

- Most health resource consumption (76%) happened during the disease-free period, due to the small number of relapses (n=82, 12%)
- Marginal differences in QALYs across the follow-up period and between surveillance strategies (Figure I)
- Individuals undergoing 7 MRIs yielded, on average, slightly higher health benefits (5.20 QALYs) but at higher costs (£6,632, see Table II).
- Compared to 7 CTs, 7 MRIs was estimated to have 63% probability of being cost-effective at a cost-effectiveness threshold of £20k/QALY gained
- 3 MRIs had similar total costs and benefit to 7 CTs, whereas 3CTs was more expensive than 7 CTs and 3 MRIs, providing marginal additional benefits

Table II – Cost-effectiveness results summary

Strategy	Predicted Total Cost* (£, mean(sd))	Predicted Total QALYs* (mean(sd))	Incr. Costs	Incr. QALY	ICER (£/QALY gained) vs 7CT	Prob. CE (£20k/QALY gained)
3MRI	5,877 (392)	5.09 (0.05)	--	--	Dominated: slightly higher costs, and slightly less benefits	
3CT	6,213 (420)	5.11 (0.05)	--	--	Extendedly dominated: Higher ICER than 7 MRI	
7CT	5,877 (423)	5.10 (0.05)	--	--	--	37.30%
7MRI	6,632 (407)	5.20 (0.05)	755	0.10	7,858	62.70%

* Results were based on the total cost and benefits model prediction for each strategy

CONCLUSIONS

- Overall, small differences exist in total costs and total QALYs between different strategies. A 7-scan MRI schedule yielded more health benefits than other strategies but at higher costs
- Considering possible system capacity constraints with MRI, the reduced radiation exposure relative to CT scanning and non-inferiority for clinical outcomes in the primary trial analysis, indicates that a 3-scan MRI schedule may be the best option to replace the current CT-based longer surveillance practice

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