

Budgetary impact of secondary care in a prostate cancer screening trial



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BACKGROUND

- Prostate Specific Antigen (PSA) testing can be used to screen asymptomatic men for prostate cancer
 - Uncertain effectiveness and cost-effectiveness – a recent review of 10 models found substantial variation in model structure and programme characteristics[1]
 - Current UK advice:** PSA testing should not be offered as a national screening programme but left to individuals to make an informed choice about testing[2]
 - The Cluster Randomised Trial of Testing for Prostate Cancer (CAP)[3] compared a UK population invited to be screened for prostate cancer using PSA testing with a population receiving usual care (relevant information provided to any man explicitly asking for advice about PSA testing)
 - At a median of 10 years follow-up., no significant difference in prostate cancer mortality was found[3]
 - Budget impact analysis (BIA) assesses affordability of investing in a new intervention at a population level[4]
 - Detailed resource-use data at the individual patient level in CAP facilitate a direct assessment of the short-term impact on secondary care costs of a PSA invitation
- Aim:** to assess potential budget impact of PSA screening to inform national screening programme decision makers

METHODS

- Men aged 50-69 randomised to receive either a PSA screening invitation plus usual care, or usual care only
- 573 UK GP practices in 8 centres (Sheffield, Newcastle, Bristol, Cardiff, Birmingham, Leicester, Cambridge and Leeds) from 2001–2009
- Hospital Episode Statistics (England)[5] and Patient Episode Database for Wales[6] admitted patient care and outpatient data obtained for all men in CAP
- NHS grouping software[7] used to assign Healthcare Resource Group (HRG) codes to each event (all causes)
- NHS reference costs (2013/14)[8] mapped to HRGs to derive a total secondary care cost per man per year.
- Mean cost differences between the arms derived on an annual basis for the first five years after randomisation
- Extrapolated to population level estimates using Office for National Statistics population counts[9], and inflated to 2019 costs[10].

PRELIMINARY RESULTS

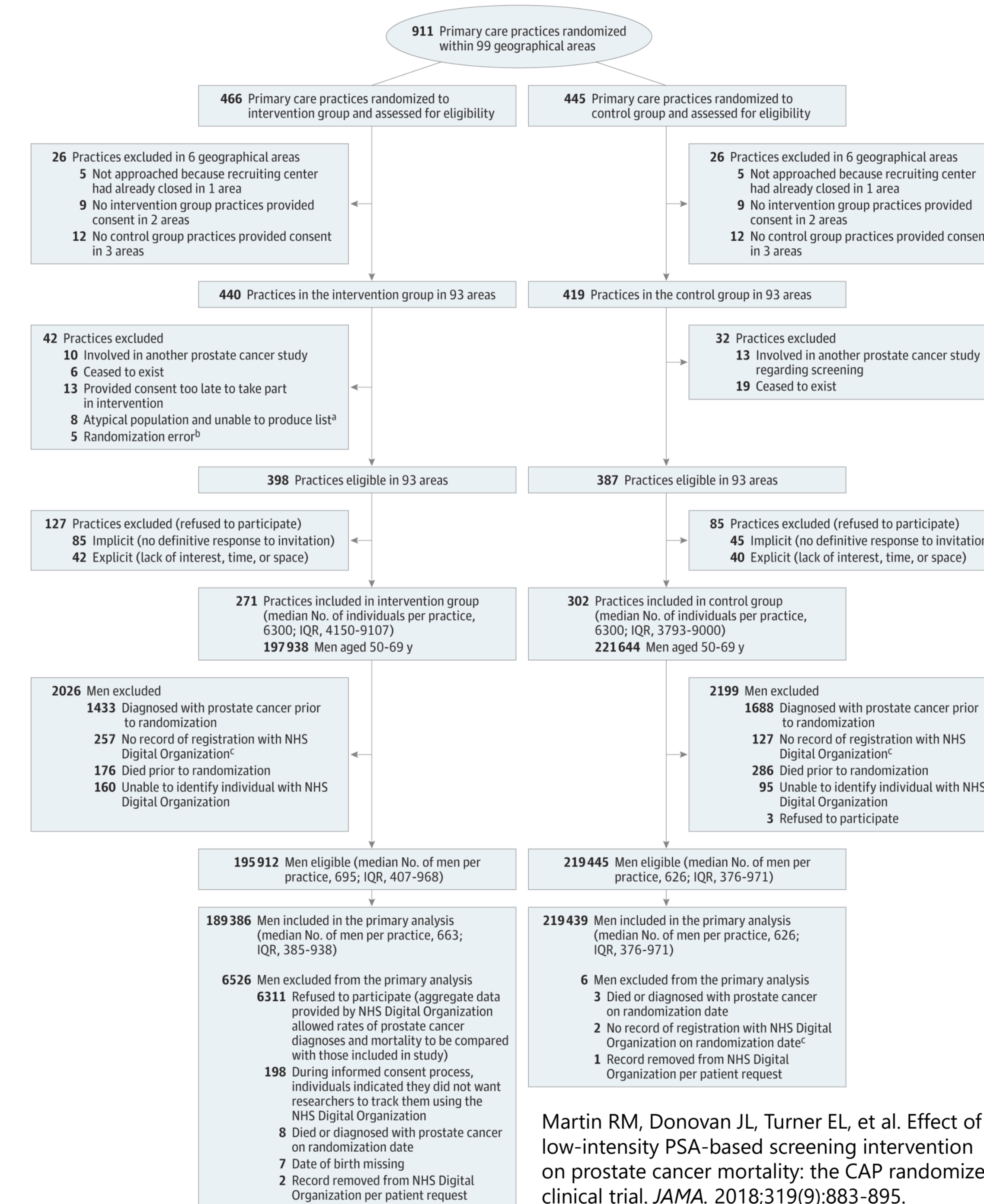
- In the first year post-randomisation, mean secondary care costs for men in the intervention arm ($n = 189,391$) were approximately £38 (95% confidence interval: £24-£51) higher than for men in the control arm ($n = 219,482$). See table below.
- Extrapolated to a population level, this suggests that the introduction of a single PSA screening invitation for all men aged from 50 to 69 (or a catchup programme) could lead to secondary care costs of £266 million in the first year.
- Neither the mean cost differences in years 2 to 5, nor the difference between arms when the whole 5 year period was considered, were significantly different between arms.

DISCUSSION

- Introducing a PSA test for men aged 50-69 across England and Wales could lead to very high short-term costs arising from secondary care associated with treatment for prostate cancer
- Budgetary impact of a PSA testing regime also found to be substantial for the US Medicare population (>\$450 million per year)[11]
- Analysis does not take into account primary care, hospice care, or social care; overall costs will be higher.
- Study strengths: Large sample of men analysed at an individual patient level with benefits of randomisation preserved
- Limitations: management of prostate cancer in the NHS has altered since CAP started collecting data; based on single screen only
- Cost-effectiveness modelling using CAP data is ongoing
- Clinical trials collecting individual patient level resource-use data are ideal vehicles for assessing short-term budget impact.

CONCLUSION

Affordability should be assessed using contemporary healthcare resource-use data prior to any implementation of a PSA-based screening programme in the UK



	Intervention arm: Mean cost (95% CI)	Control arm: Mean cost (95% CI)	Cost difference Mean (95% CI)	Population level estimate
Programme: single screen aged 50-69 years old (population 7,012,201)				
	($n = 189,391$)	($n = 219,482$)		
Year 1	659 (650-669)	621 (612-630)	38 (24-51)	£266m
Year 2	689 (679-700)	673 (663-682)	17 (2-31)	£119m
Year 3	718 (707-729)	709 (700-719)	6 (-9 to 21)	£42m
Year 4	754 (743-765)	759 (749-770)	-6 (-22 to 10)	£-42m
Year 5	780 (769-792)	795 (784-806)	-16 (-33 to 0.5)	£-112m
All 5 years	3601 (3569-3634)	3559 (3529-3589)	38 (-9 to 84)	£266m

REFERENCES

- Sanghera S, Coast J, Martin RM, Donovan JL, Mohiuddin S. Cost-effectiveness of prostate cancer screening: a systematic review of decision-analytical models. *BMC cancer*. 2018;18(1):84.
- Public Health England. Prostate cancer risk management programme: overview. <https://www.gov.uk/guidance/prostate-cancer-risk-management-programme-overview>. Published 2016. Accessed 11 August 2020.
- Martin RM, Donovan JL, Turner EL, et al. Effect of a low-intensity PSA-based screening intervention on prostate cancer mortality: the CAP randomized clinical trial. *JAMA*. 2018;319(9):883-895.
- Sullivan SD, Mauskopf JA, Augustovski F, et al. Budget impact analysis—principles of good practice: report of the ISPOR 2012 Budget Impact Analysis Good Practice II Task Force. *Value in health*. 2014;17(1):5-14.
- NHS Digital. Hospital Episode Statistics (HES). <https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/hospital-episode-statistics>. Published 2019. Accessed 12 November 2020.
- NHS Wales. PEDW Data Online. <http://www.infoandstats.wales.nhs.uk/page.cfm?orgid=869&pid=40977>. Published 2020. Accessed 12 November 2020.
- Health and Social Care Information Centre. HRG4+ 2013/14 Reference Costs Grouper. <https://webarchive.nationalarchives.gov.uk/20171012081028/http://content.digital.nhs.uk/article/6227/Costing>. Published 2013. Accessed 6 July 2020.
- Department of Health and Social Care. NHS reference costs 2013 to 2014. <https://www.gov.uk/government/publications/nhs-reference-costs-2013-to-2014>. Published 2014. Accessed 4 August 2020.
- Office for National Statistics. Analysis of population estimates tool. <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/analysisofpopulationestimatetool>. Published 2019. Accessed 4 August 2020.
- Curtis L, Burns A. *Unit costs of health and social care* Kent: PSSRU; 2019.
- Ma X, Wang R, Long JB, et al. The cost implications of prostate cancer screening in the Medicare population. *Cancer*. 2014;120(1):96-102.

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Jones KH, Ford DV, Jones C, Dsilva R, Thompson S, Brooks CJ, Heaven MI, Thayer DS, McNerney CL, Lyons RA. A case study of the Secure Anonymous Information Linkage (SAIL) Gateway: a privacy protecting remote access system for health related research and evaluation. *Journal of Biomedical Informatics: special issue on medical data privacy* 2014.

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