

An audit of prostate cancer services in England and Wales

National Prostate Cancer Audit

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**12th Belgian Multidisciplinary
Meeting on Urological Cancers**



Conflicts of interest

I have no potential conflict of interest to report



Structure of presentation

- Audit environment – a bit of history
- Audit and research go hand-in-hand
- The three “Rs”
- Data sources
- Clinical epidemiology as the underlying methodological discipline
- ‘Real-world data’ to establish “drivers” of variation in care
- Examples of audit and research outputs
- Highlights





Audit environment -> a bit of history



1998: Clinical Effectiveness Unit established as an academic partnership between RCS and LSHTM



Key features:

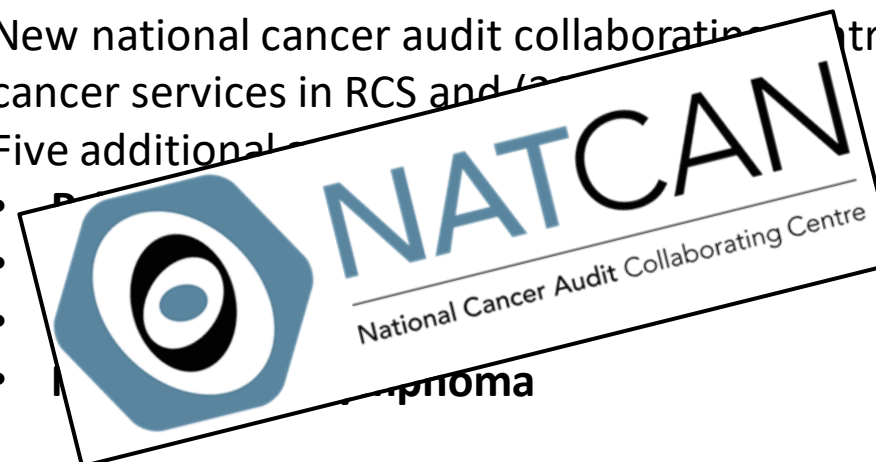
- Clinical – methodological collaboration
- Partnership with data providers
- Clinical epidemiological approach
- “Audit” and “research” go hand-in-hand
 - NHS and NIHR/MRC funded projects
- Use of national (existing and linked) datasets as much as possible (differences between England and Wales)
- All projects focus on the three “Rs”
 - Clinically **R**elevant
 - Methodologically **R**obust
 - Technically **R**igorous

CEU provides national cancer audits funded by NHS England and Welsh Government since 2006:

- Mastectomy and **B**reast Reconstruction Audit (2006-2011)
- **O**esophago-Gastric Cancer Audit (2006 ->)
- National **B**owel Cancer Audit (2010 ->)
- National **P**rostate Cancer Audit (2014 ->)
- **B**reast Cancer in Older Patients Audit (2016 ->)
- National **L**ung Cancer Audit (2022 ->)

New national cancer audit collaborative centre to strengthen cancer services in RCS and LSHTM

- Five additional collaborative centres to strengthen cancer services in RCS and LSHTM
- **P**ancreatic Cancer
 - **B**reast Cancer
 - **C**ervical Cancer
 - **E**ndometrial Cancer
 - **L**iver Cancer

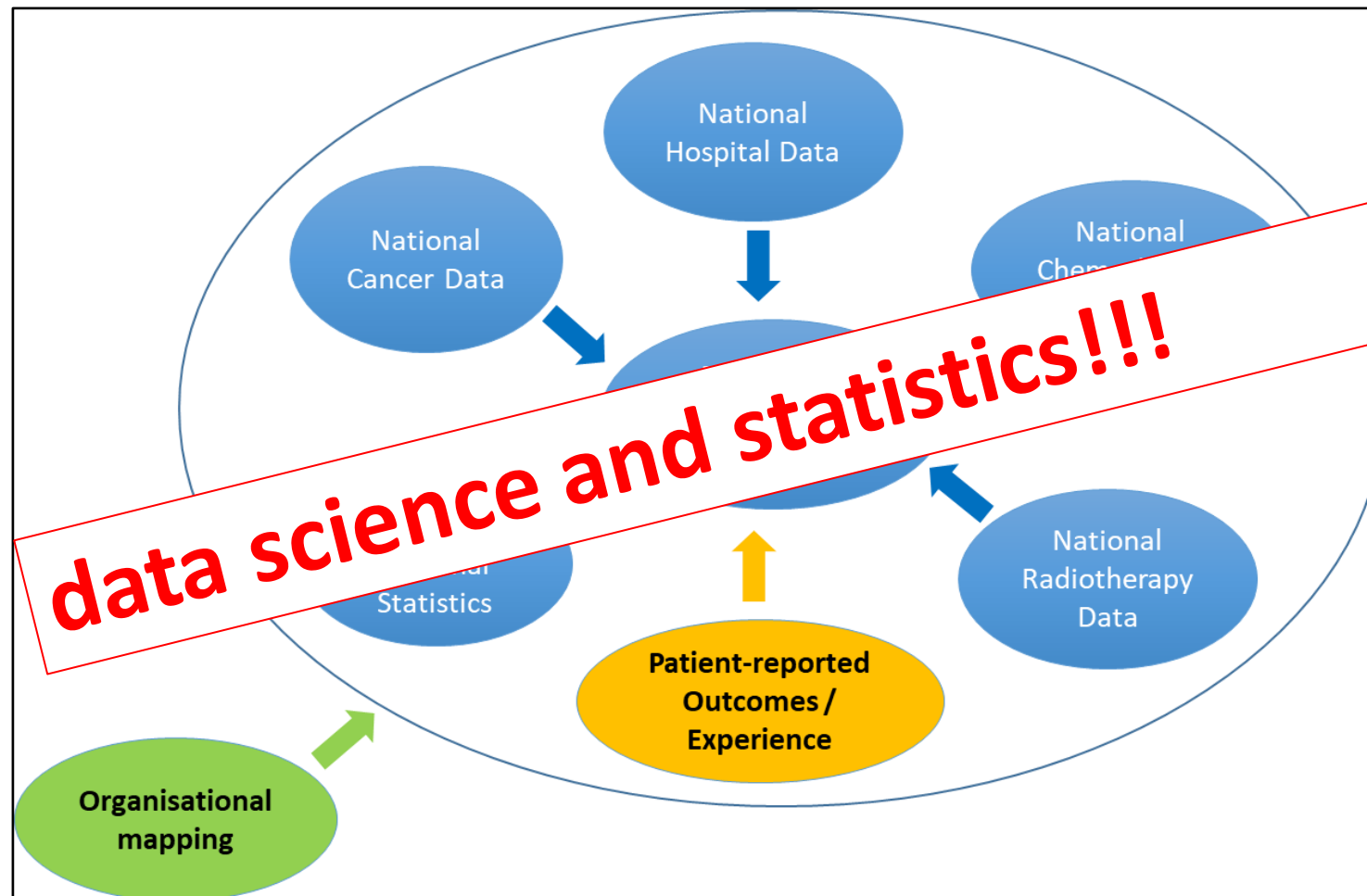




Data sources



Ongoing expansion of linked data resources



National data sets used by NPCA

Linked national cancer data sets
are **richer** than ever.

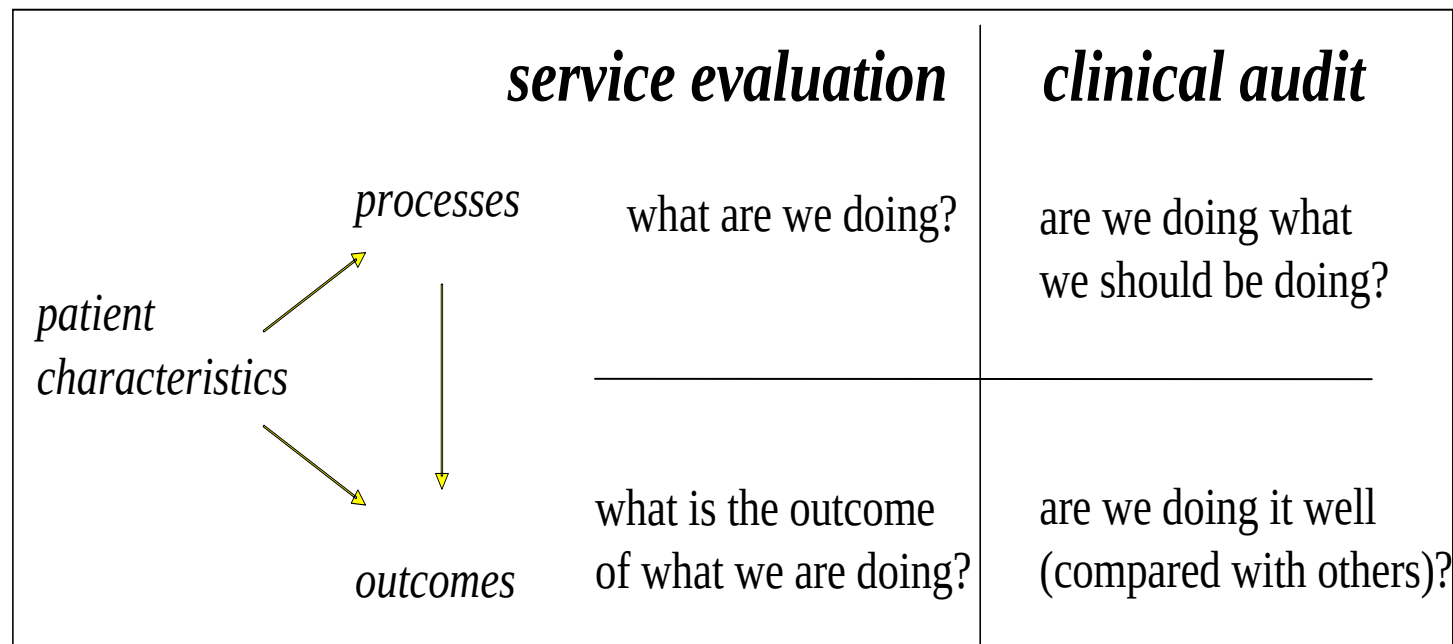
And **more timely** than ever:
‘Rapid’ cancer registration data
4-6 month lag

**Methodological development needed to
exploit their full potential**

- National Cancer Registrations
- Hospital Episode Statistics (HES)
- Cancer Outcomes and Services Dataset (COSD)
- Systemic Anti-Cancer Therapy (SACT) dataset
- National Radiotherapy Dataset (RTDS)
- Somatic Molecular Testing Data
- Medicines Dispensed in Primary Care (NHSBSA)
- Cancer Waiting Times (CWT)
- Diagnostic Imaging Dataset (DIDS)
- National Cancer Patient Experience Survey
- NPCA’s Organisational Survey
- Patient-reported Outcome Measures



Clinical epidemiology



“A better understanding of determinants of variation of practice and outcome guides quality improvement.”

'Real-world data' to establish drivers of variation in care

Handling missing data

Avoid loss of statistical power and selection bias

Indicator development

Accurately measure care by provider

Risk adjustment

Fair comparisons

Methods for reporting

Timely reliable feedback, statistical power



Understanding variation

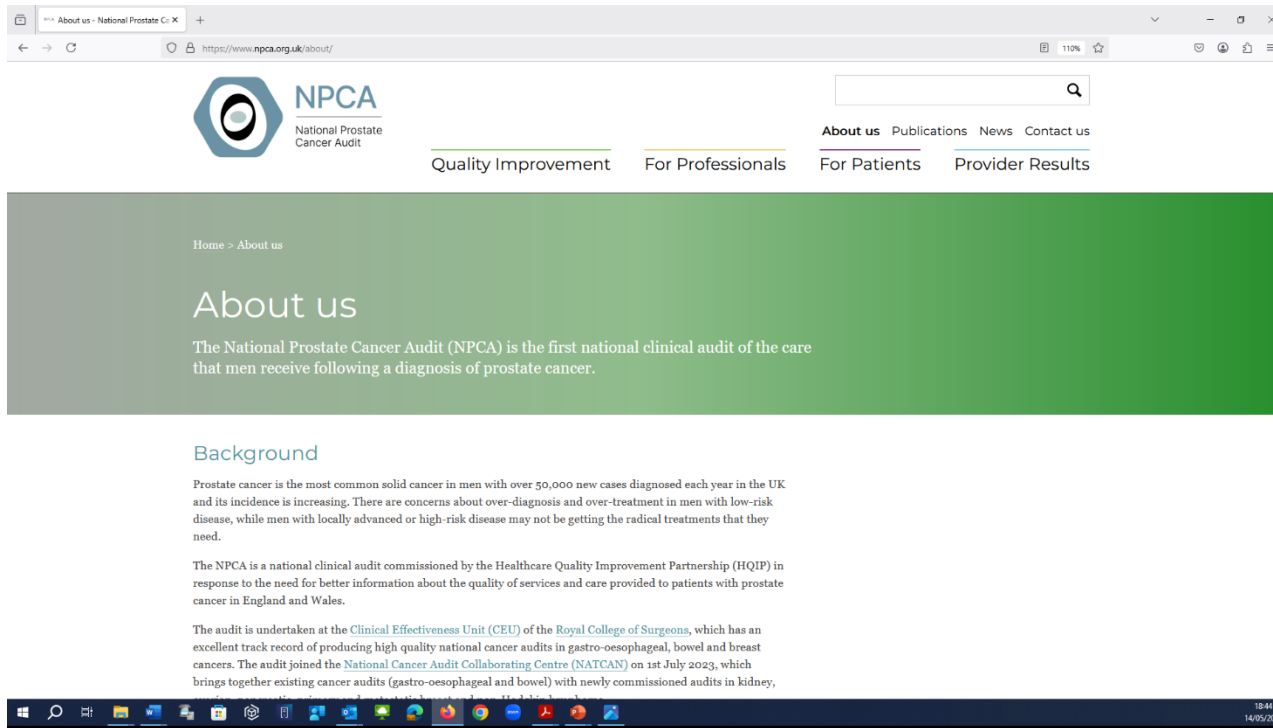
Establishing drivers of variation in care



Drive local quality improvement

NPCA outputs

<https://www.npca.org.uk/>



Quality improvement goals:

- To improve timely diagnosis and treatment of high-risk prostate cancer
- To reduce potential over-treatment
- To reduce potential under-treatment
- To reduce short-term complications after radical prostate cancer surgery
- To reduce medium-term complications after radical prostate cancer surgery and radiotherapy

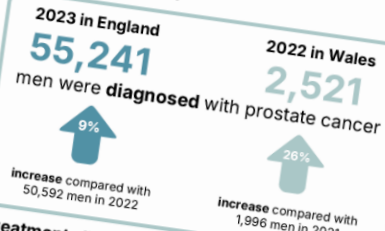
KEY MESSAGES and RECOMMENDATIONS

the-nation report

3. Infographic



Diagnosis & staging



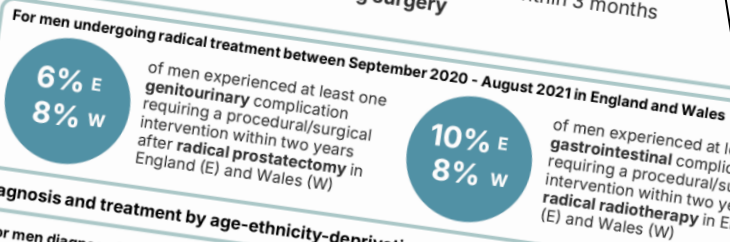
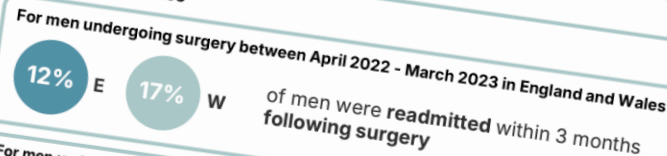
Disease presentation



Treatment allocation



Treatment outcomes



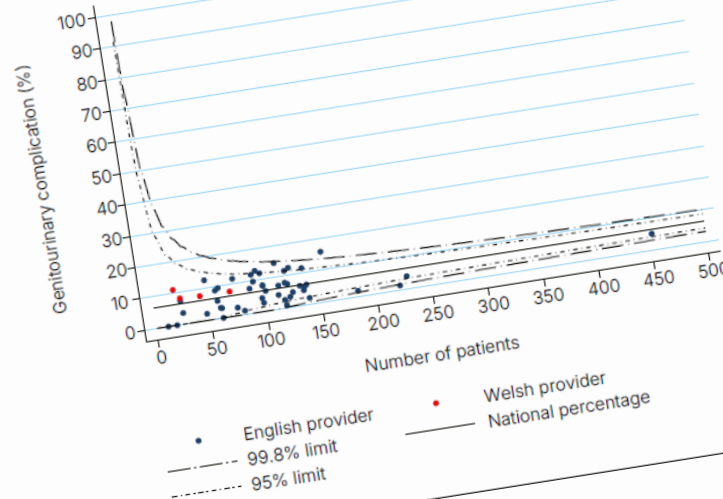
Diagnosis and treatment by age-ethnicity-deprivation



Performance indicators to compare “providers”

- Proportion of men diagnosed with metastatic disease
- Proportion of men undergoing radical prostatectomy

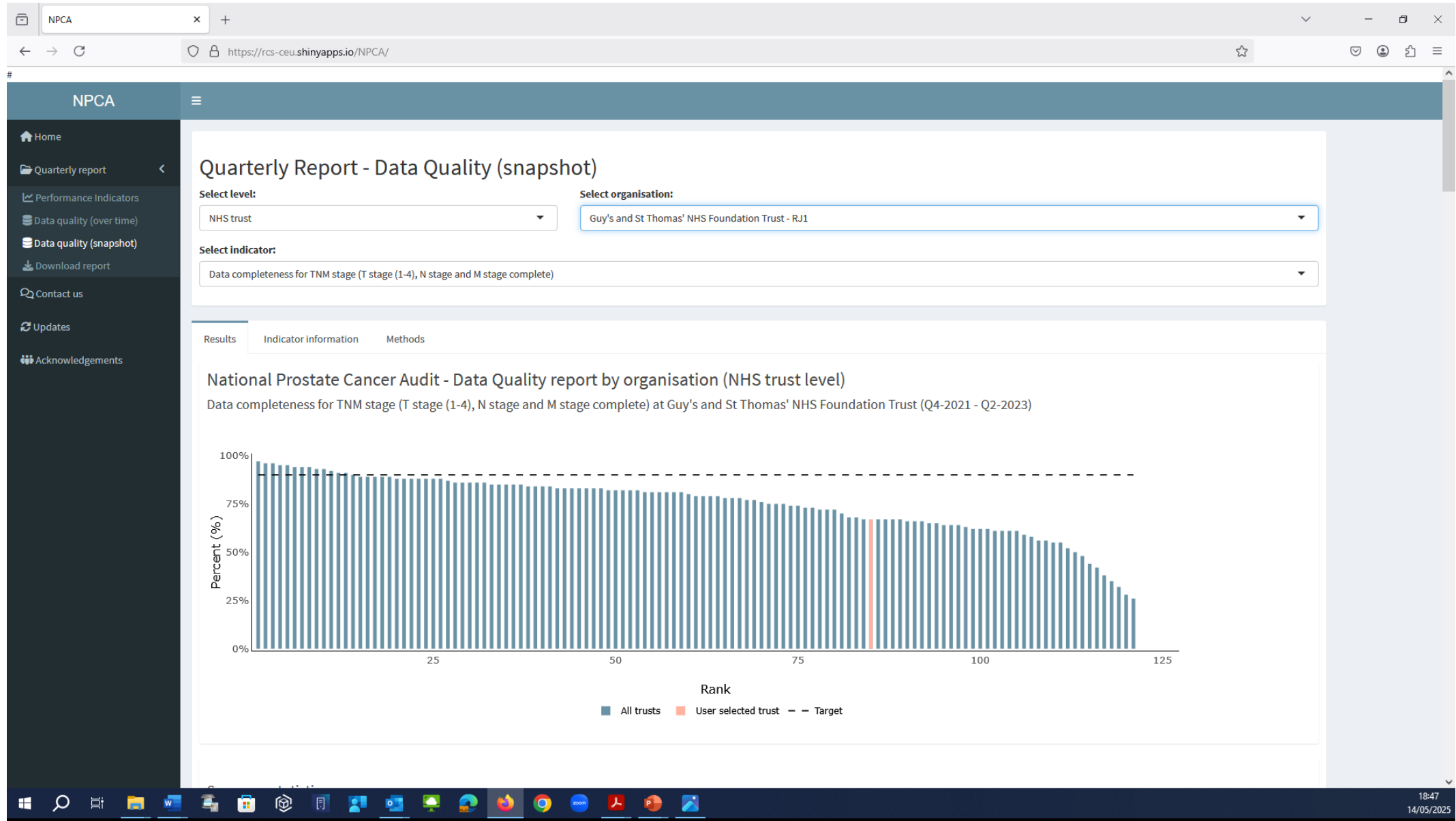
Figure 1. Adjusted funnel plot for the proportion of patients experiencing at least one genitourinary complication requiring a procedural/surgical intervention within 2 years of radical prostatectomy (surgery between 1st September 2020 and 31st August 2021) by surgical centre in England (n=47) and Wales (n=4)



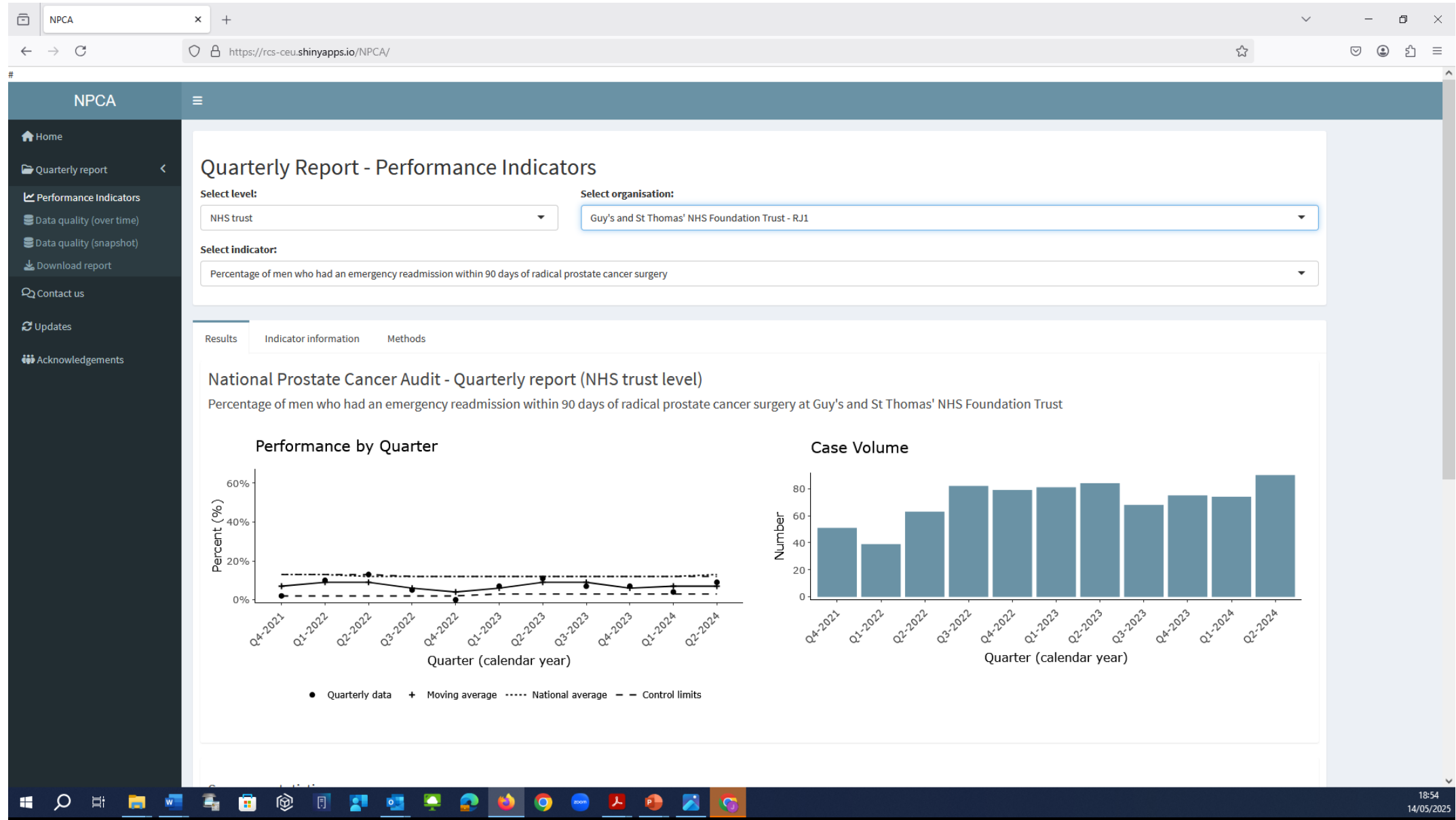
In England, 6% of men undergoing radical prostatectomy experienced a genitourinary (GU) complication within two years of treatment (Figure 1, surgical centre range 0-16%). In Wales, it was 8%.

Proportion of patients experiencing a severe GI complication within 2 years of radical prostate radiotherapy (derived from records of hospital admissions)

NPCA quarterly reporting



NPCA quarterly reporting



Handling missing data -> cancer stage

Imputation based on clinical assumptions:

- Men with a recorded N-stage and missing M-stage -> M0.
- Low/intermediate-risk men and missing M-stage -> M0.
- Low/intermediate-risk men with missing N-stage -> N0
- High-risk men with missing M-stage -> M0.

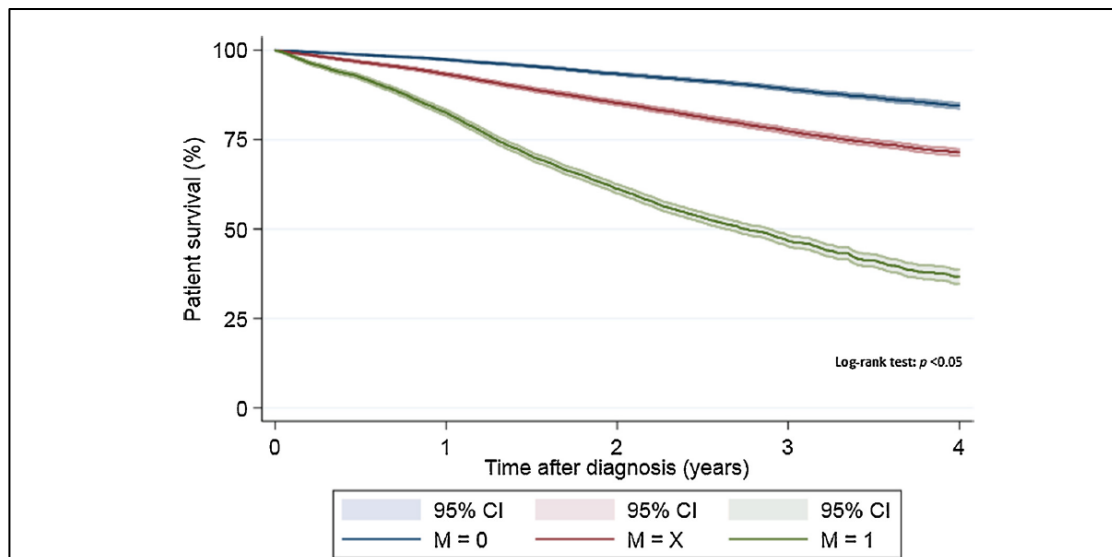


Fig. 3. Overall survival for men with high-risk disease (T3-4 or Gleason score ≥ 8) showing the distribution of M-stage (M1/M0/missing M).

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ELSEVIER

Imputation of missing prostate cancer stage in English cancer registry data based on clinical assumptions

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ARTICLE INFO

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Epidemiology
Cancer registry
Population-based

ABSTRACT

Background: Cancer stage can be missing in national cancer registry records. We explored whether missing prostate cancer stage can be imputed using specific clinical assumptions.

Methods: Prostate cancer patients diagnosed between 2010 and 2013 were identified in English cancer registry data and linked to administrative hospital and mortality data ($n = 139,807$). Missing staging items were imputed based on specific assumptions: men with recorded N-stage but missing M-stage have no distant metastases (M0); low/intermediate-risk men with missing N- and/or M-stage have no nodal disease (N0) or metastases; and high-risk men with missing M-stage have no metastases. We tested these clinical assumptions by comparing 4-year survival in men with the same recorded and imputed cancer stage. Multi-variable Cox regression was used to test the validity of the clinical assumptions and multiple imputation.

Results: Survival was similar for men with recorded N-stage but missing M-stage and corresponding men with M0 (89.5% vs 89.6%); for low/intermediate-risk men with missing M-stage and corresponding men with M0 (92.0% vs 93.1%); and for low/intermediate-risk men with missing N-stage and corresponding men with N0 (90.9% vs 93.7%). However, survival was different for high-risk men with missing M-stage and corresponding men with M0. Imputation based on clinical imputation performs as well as statistical multiple imputation.

Conclusion: Specific clinical assumptions can be used to impute missing information on nodal involvement and distant metastases in some patients with prostate cancer.

Indicator development -> complication of treatment

Four explicit criteria for development:

- Valid, precise, fair, technically feasible indicators

Complication of radical prostatectomy:

- Clinical data science to accurately 'phenotype' care ('stricture', 'incontinence' and 'other')
 - Clinician-driven forward-search using research publications, guidelines, clinical expertise
 - Data-driven backward-search captures additional common coding patterns to pick up idiosyncrasies in coding

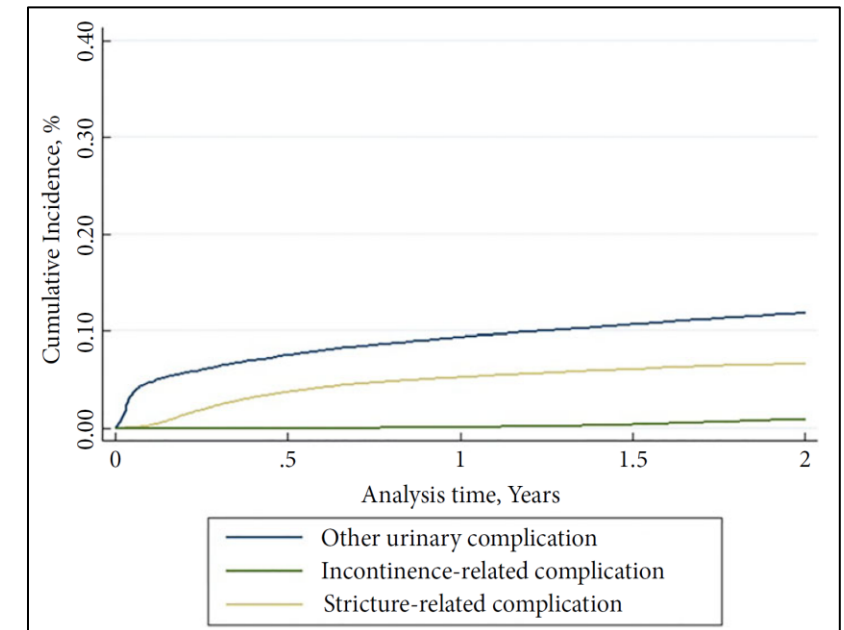
Quantifying severe urinary complications after radical prostatectomy: the development and validation of a surgical performance indicator using hospital administrative data

Arunan Sujenthiran*, Susan C. Charman*[†], Matthew Parry*, Julie Nossiter*, Ajay Aggarwal[‡], Prokar Dasgupta[‡], Heather Payne[§], Noel W. Clarke[‡], Paul Cathcart** and Jan van der Meulen[†]

*Clinical Effectiveness Unit, Royal College of Surgeons of England, [†]London School of Hygiene and Tropical Medicine,

[‡]MRC Centre for Transplantation, King's College London, [§]Department of Oncology, University College London Hospitals, London, [†]Department of Urology, Christie and Salford Royal NHS Foundation Trusts, Manchester, and

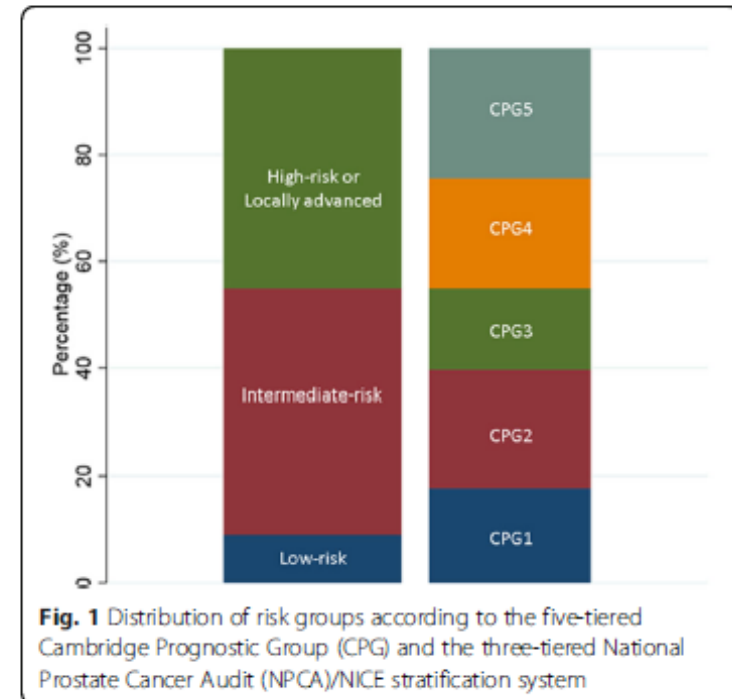
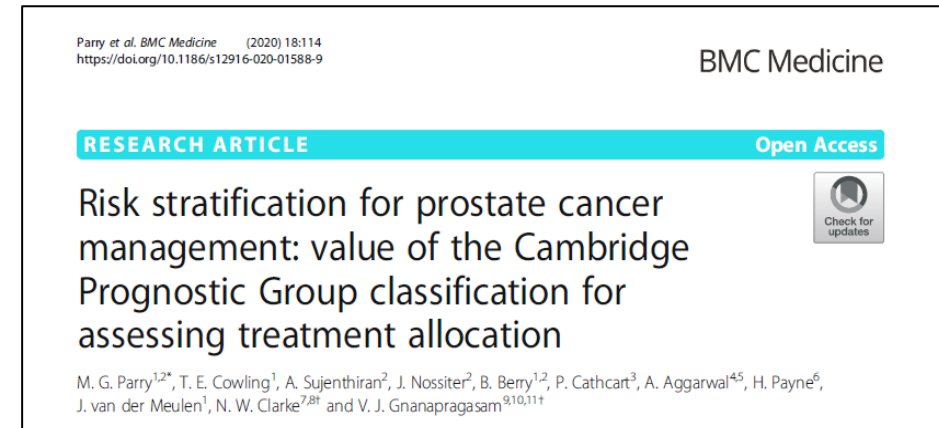
**Department of Urology, Guy's and St Thomas' NHS Foundation Trust, London, UK



Risk adjustment – stratification based on cancer stage

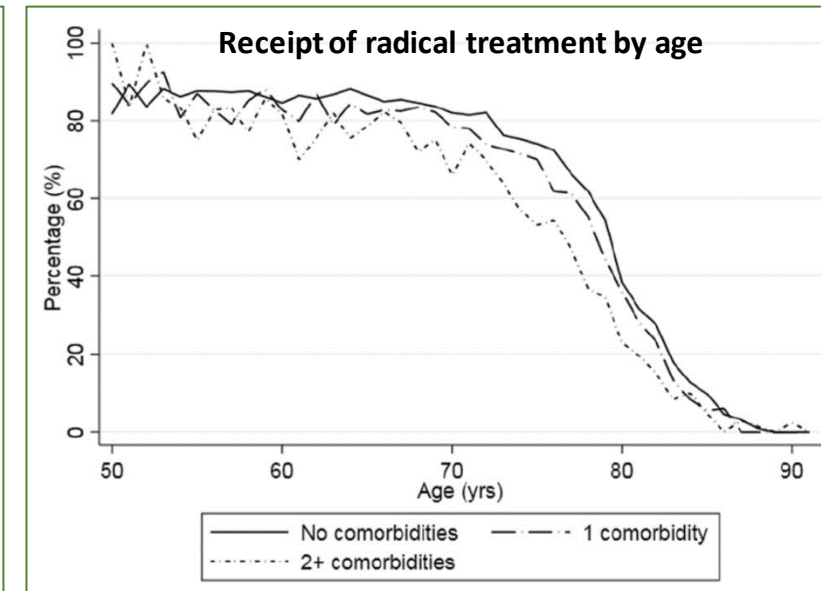
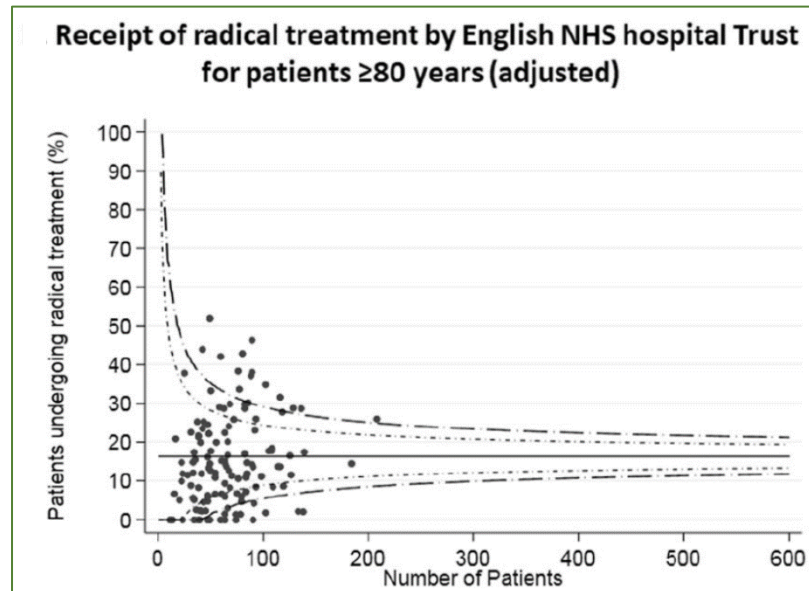
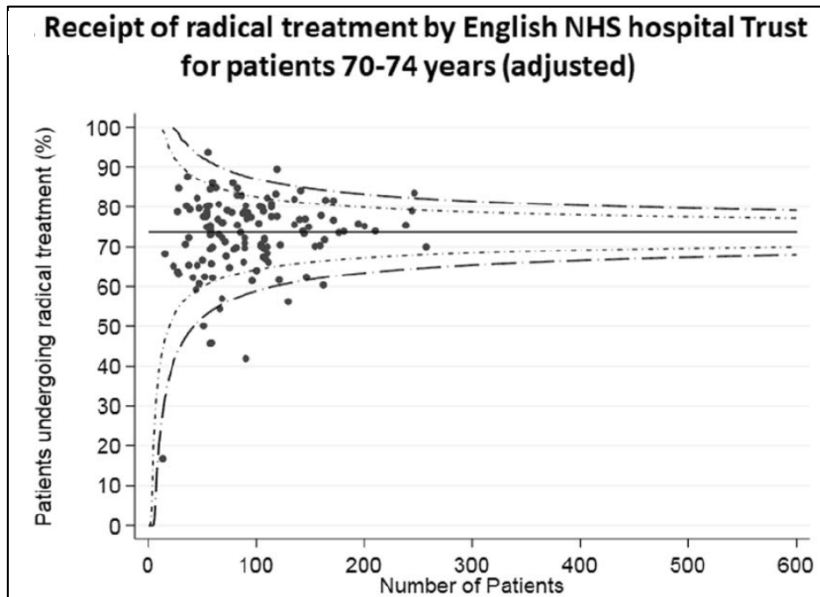
Comparing 3-tiered NPCA classification to 5-tiered CPG classification

- CPG classification: 5 risk groups equal in size.
 - CPG reveals differences in treatment practice in men
 - with intermediate-risk disease (CPG2 and CPG3)
 - with high-risk disease (CPG4 and CPG5)
- not visible with 3-tiered risk classification.



Understanding variation

Potential “under-treatment” of men with locally advanced prostate cancer



Prostate Cancer and Prostatic Diseases (2023) 26:257–263;

Matthew G. Parry^{1,2}, Jemma M. Boyle^{1,2}, Julie Nossiter², Melanie Morris^{1,2}, Arunan Sujenthiran², Brendan Berry^{1,2}, Paul Cathcart³, Ajay Aggarwal^{4,5}, Jan van der Meulen^{1,8}, Heather Payne^{6,8} and Noel W. Clarke^{7,8}

“Service mapping”

Table 1 Services provided by NHS hospitals in England and Wales, grouped according to the latent class analysis

Services provided	Group 1 (n=85)		Group 2 (n=31)		Group 3 (n=22)		All (n=138)	
Clinical nurse specialist attending all prostate cancer clinics	85	(100%)	0	(0.0%)	22	(100%)	107	(77.5%)
Advanced prostate cancer clinical nurse specialist	84	(98.8%)	19	(61.3%)	22	(100%)	125	(90.6%)
Sexual function services	84	(98.8%)	19	(65.5%) Missing 2	0	(0.0%)	103	(75.7%) Missing 2
Continence services	73	(85.9%)	24	(82.8%) Missing 2	14	(63.6%)	111	(81.6%) Missing 2
Psychological counselling	66	(78.6%) Missing 1	19	(65.5%) Missing 2	8	(38.1%) Missing 1	93	(69.4%) Missing 4
Genetic counselling	32	(38.1%) Missing 1	6	(20.7%) Missing 2	3	(14.3%) Missing 1	41	(30.6%) Missing 2
Oncogeriatric services	13	(15.3%)	0	(0.0%) Missing 2	2	(9.1%)	15	(11.0%) Missing 2

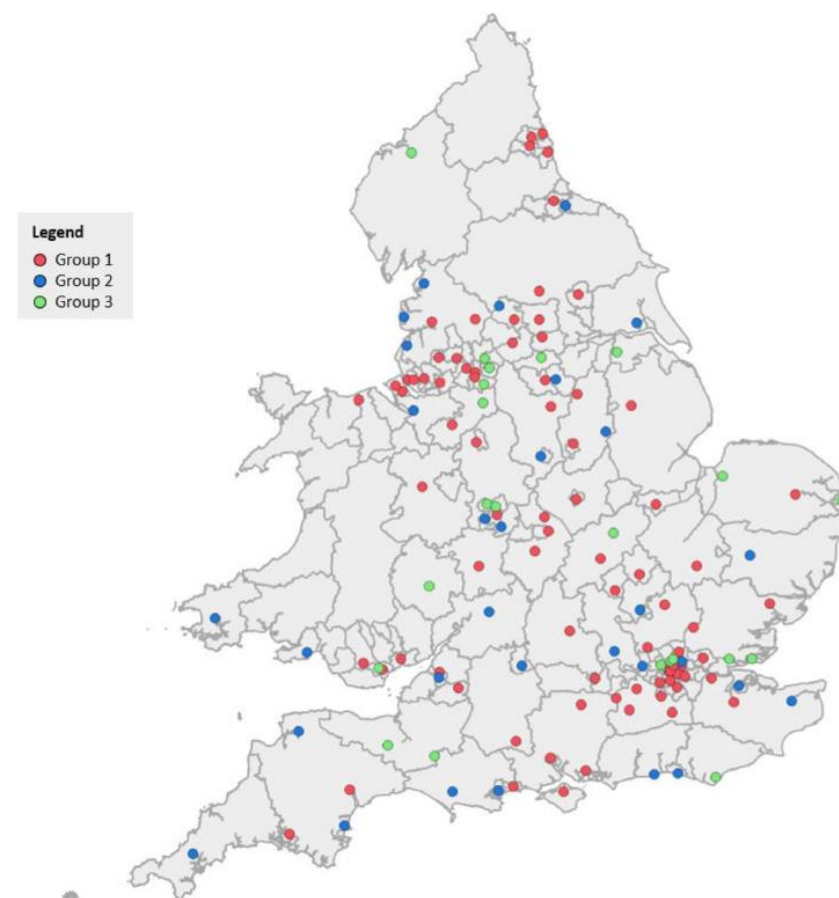
%=percentage of hospitals with available data.
NHS, National Health Service.

Open access
Original research

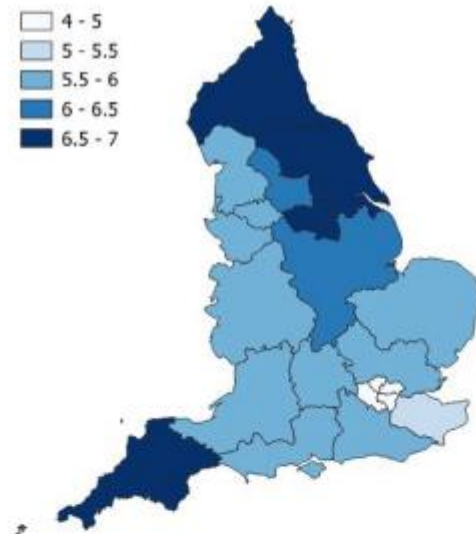
BMJ Open Organisation and delivery of supportive services for patients with prostate cancer in the National Health Service in England and Wales: a national cross-sectional hospital survey and latent class analysis

Joanna Dodkins^{1,2}, Adrian Cook¹, Melanie Morris³, Julie Nossiter^{1,2}, Steve Prust⁴, Steve Waller⁴, Jan van der Meulen^{1,2}, Ajay Aggarwal^{1,2,5}, Noel Clarke^{1,6}, Heather Ann Payne^{1,7}

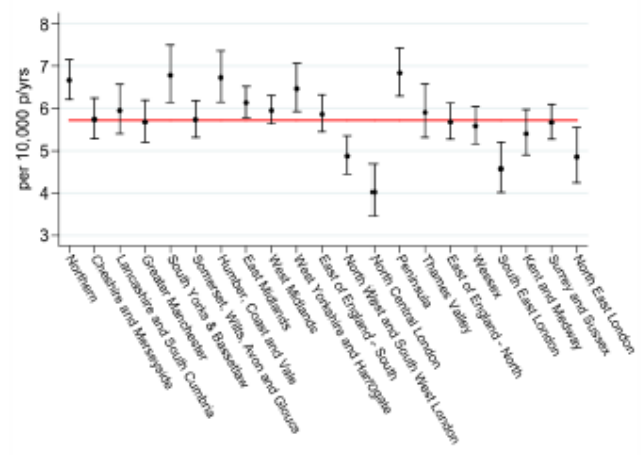
BMJ Open: first published as 10.1136/bmjopen-2023-071674



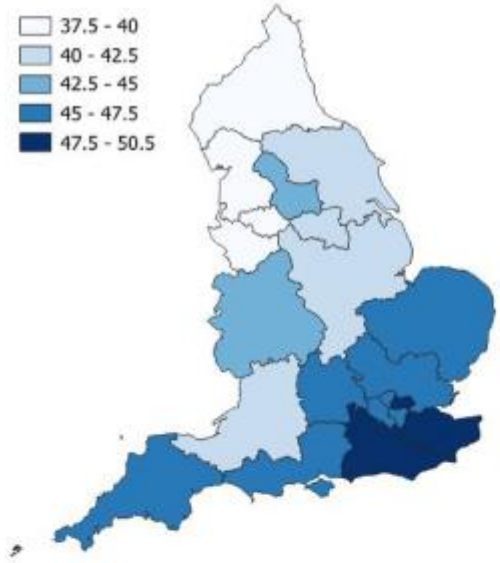
Annual incidence
per 10,000 men



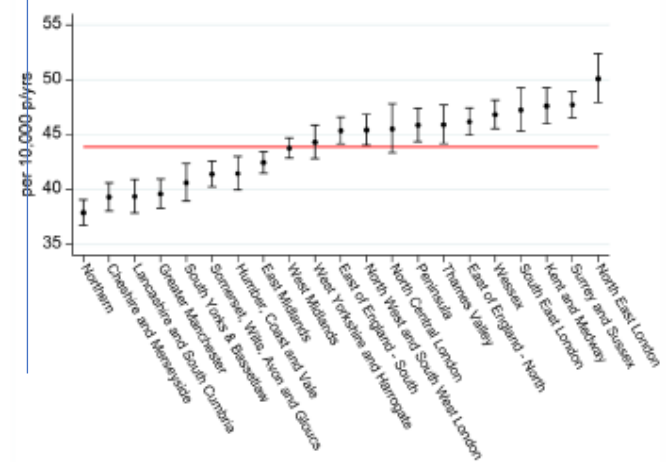
Metastatic prostate cancer



Inequalities



Prostate cancer overall



Open access

Original research

BMJ Oncology

Geographic, socioeconomic and demographic inequalities in the incidence of metastatic prostate cancer at time of diagnosis in England: a population-based evaluation

Joanna Dodkins ^{1,2} Adrian Cook,² Emily Mayne,² Marina Parry,² Julie Nossiter,^{1,2} Heather Payne,³ Thomas E Cowling,^{1,2} Alison Tree,^{4,5} Ajay Aggarwal ^{1,2,6}, Noel Clarke,⁷ Jan van der Meulen^{1,2}

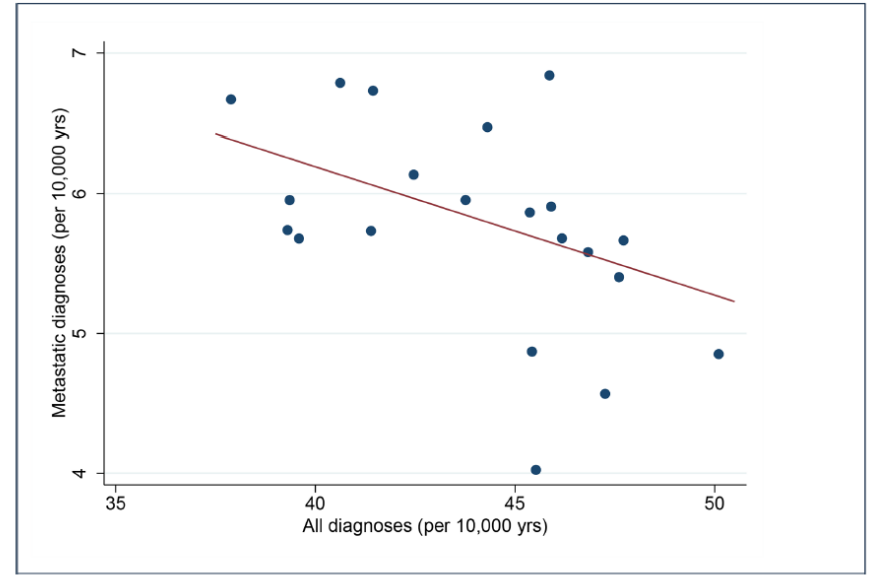


Figure 2 Association between the annual incidence of prostate cancer metastatic at the time of diagnosis and the incidence of prostate cancer overall incidence, adjusted for neighbourhood-based measures of ethnicity and socioeconomic deprivation (per 10 000 men). The figure shows results for 21 geographic areas ('Cancer Alliances'), with fitted line from linear regression model weighted according to population size ($p < 0.0001$).

Quality improvement cancer services

NATCAN level

- QI activities: flexible and responsive
- Links with existing national initiatives
- Supported by academic partners
- **Audit level (following publication of reports)**
- “Local action plans” supported by targeted communication strategy
- “QI tools for” local teams to identify “good practice” / “areas of weakness”
- National programme of QI workshops / webinars
- Social media profile (via NATCAN resources) using range of channels

Innovation

- “Closing the audit cycle”, based on “rapid data” following the “plan-do-study-act” approach
- NPCA will focus on proportion of men with M1 disease receiving systemic treatment intensification therapy
- Part of a development and research programme of QI methods

Highlights

Research and development platform

Externally funded
National perspective
International collaborations

Patient-Public Involvement Forums

One for each audit
Linked with patient charities

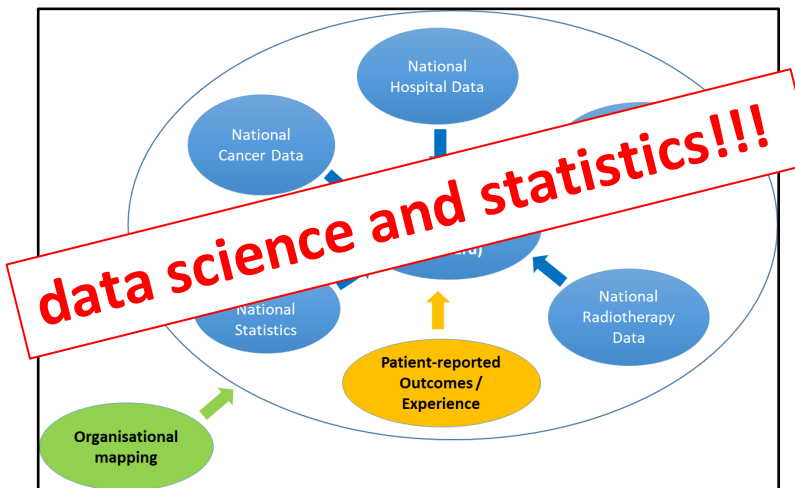
Formal advice and support network

Clinical Reference Groups
Technical advisory group
Academic links

Web-site development

Audit “dashboards”
Data visualisation

Ongoing expansion of linked data resources



Targeted communication strategy

Providers / clinicians
Professional organisations
Patients and charities
Commissioners
Regulators

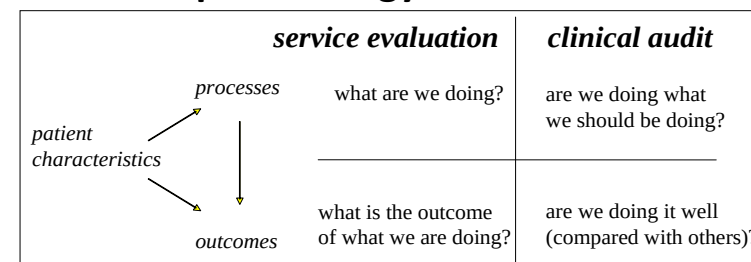
Audit and QI informed by research

Strengthens validity
Enhances credibility

Methodological development

Development of key performance indicators
Quarterly reporting
Methods for “fair” comparisons of hospitals

Clinical epidemiology -> QI



Innovative quality improvement

Continuous monitoring – control charts
Modified “plan-do-study-act” cycles

<https://www.npca.org.uk>

<https://www.natcan.org.uk>

