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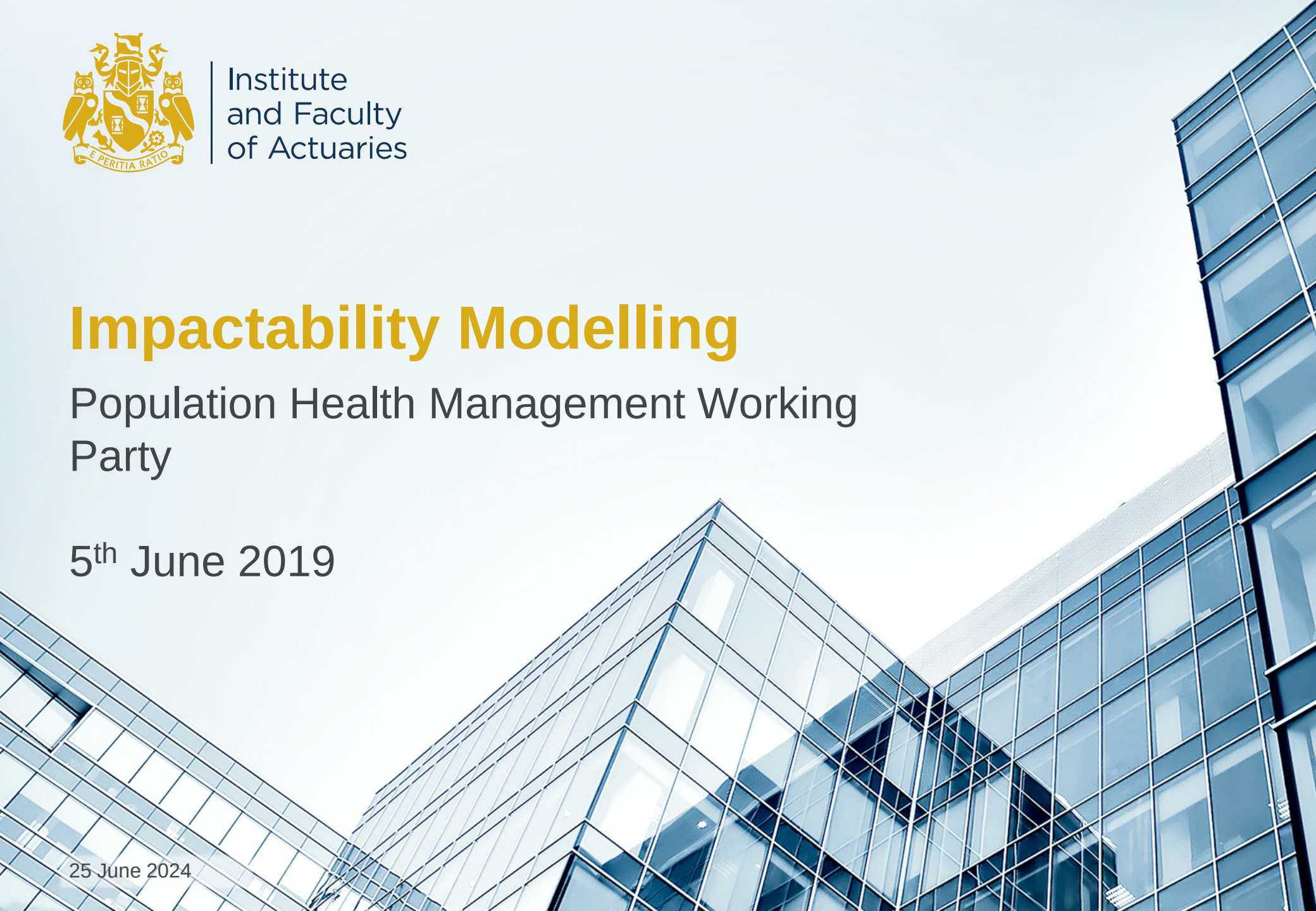
Impactability Modelling

Population Health Management Working Party

June 2019



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Impactability Modelling

Population Health Management Working Party

5th June 2019

25 June 2024

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Introduction

Background to the Working Party

Alpesh Shah

25 June 2024

Introduction & Background

- The changing NHS landscape
- Role of Population Health Management
- Genesis of the PHM working party
- Focus on Impactability
- How we have organised ourselves:
  - Definition
  - Methods & Models
  - Practical Challenges
  - Ethics and Patient View

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Definitions of Impactability

Overview, principles, problem statements

Joanne Buckle

25 June 2024

Overview in “layman’s terms”

IMPACTABILITY

Identifying groups of people who would benefit most from specific treatments, interventions and support as part of a Population Health Management strategy

What is Impactability modelling?

Impactability modelling allows a health system to identify the interventions or changes in care to which people are most likely to respond positively.

What are the benefits?

Impactability modelling enables care provision to be aligned to people’s needs in a way that achieves better health outcomes within limited health resources.

How does this relate to Risk Stratification?

Risk stratification identifies people most likely to experience adverse health outcomes; whereas impactability suggests which changes to care are most likely to lead to better health outcomes.

Our technical definition: *“Impactability modelling measures the degree to which different sub-populations will benefit from a range of interventions and supports using this information to tailor appropriate interventions, within agreed boundaries, to optimise the ‘value’ gained from resources spent”*

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Principles that define impactability modelling

Cohorts	Focused on population-defined cohorts likely to be predictive of future risk of sub-optimal health outcomes, rather than just disease-defined. These could include socio-economic groups.
Time dimension	Time frames ranging from short term (1 year) to decades
Outcomes	Incorporates a range of outcomes, rather than just resource-use/financial, for example, healthy life years, mortality, quality of care (at an individual and population level), staff/ patient satisfaction improvements
Policy driven	Facilitates achievement of overall policy goals for health service, such as “equal opportunity for equal need”
Distributions not just mean	Incorporates consideration of the distribution of outcomes, rather than just shifting the mean outcome
Evaluation methodology	Up-front incorporation of evaluation of intervention, along with consideration of appropriate methodology, tools and data required to overcome issues such as regression to the mean, selection bias, sample size etc.
Ethics dimension	Incorporate of patient-preference or patient willingness, as well as clinically-defined need

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Example problem statements that would benefit from impactability modelling

Generic Statements

- We would like to understand which sub-populations are most likely to benefit from different health and care pathways, while considering the impact on inequality of outcomes.
- We would like to identify gaps in care for different sub-populations and identify the best ways to fill those gaps.
- We have an intervention and we want to understand the relative impact for different population groups. For example, we might want to understand the financial or other cost-benefit for prescribing a certain drug to one group of patients versus a group with different characteristics or risk factors.
- We want to understand the clinical value gain overall and the distribution of the clinical value gain from targeting a set of tailored interventions to groups sub-divided according to socio-economic characteristics.

Specific Statements

- What is the likely capacity of a specific set of patients at risk of AF, hypertension, hyperlipidaemia to benefit clinically from anti-coagulants? What is the financial RoI over a specified time period?
- We want help in deciding which patients will benefit from statins versus another intervention?
- If we want to offer gripped slippers to a group at risk of frailty, how do we decide which sub-groups are at greatest risk or who will benefit most?
- If we have three potential care pathways for chronic depression as a co-morbidity, how can we effectively match each care pathway to the set of people most likely to benefit and understand the impact on overall clinical outcomes, as well as distribution of outcomes in each cohort and across cohorts?

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Methods & Models

Data-driven, applying actuarial skillset

David Beddows

25 June 2024

Methods for impactability modelling

Many potential approaches

"Traditional" Approaches

Prioritise patients with:

- high gap score
- high weighted gap score.
- one or more ambulatory care sensitive conditions

De-prioritise patients with:

- stable characteristics
- extremely high risk

Impactable moments

- e.g. post discharge from hospital

"Data-driven" / Statistical Approaches

- Risk stratification / risk scores
- Rising risk score (rate of change of risk score)
- Comparing service utilisation, risk characteristics and condition severity against benchmarks
- Data science methods: clustering; decision trees; neural networks.

Other

Questionnaires/frameworks for assessing individual patients, e.g.:

- Patient Activation Measure
- ANGEL score

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Methods for impactability modelling

Pros and cons of the various approaches

"Traditional" Approaches

Pros

- Widely accepted
- Clinicians know how to do it
- Patients trust

Cons

- Time consuming
- Data quality
- Cognitive biases

"Data-driven" / Statistical Approaches

Pros

- Objective
- Quicker than working through all the individual medical records
- Proactive
- Better population health outcomes

Cons

- Requires high quality data
- Requires new/more technology
- Bias in data and model
- Questionable predictive accuracy

Considering the actuarial skillset, the WP is naturally focussing on the data-driven/statistical methods

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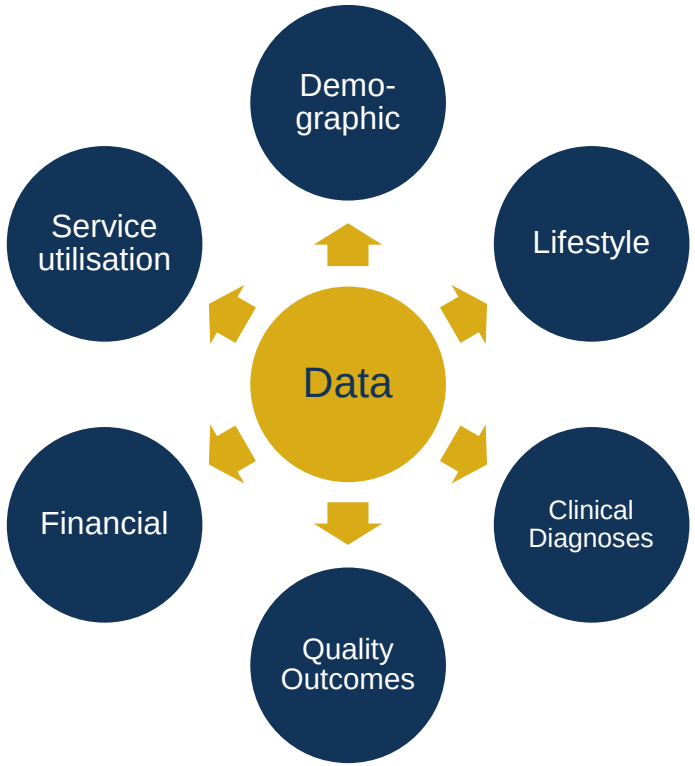
Data for impactability modelling

Current health policies and advances in technology offer opportunities to develop more “data-driven” methods



Many data sources

- payers
  - clinical commissioners, Local Authorities, national government
- providers
  - Hospitals, GPs, Social services, voluntary sector
- patients

Desirable characteristics

- patient-level data
- includes many care settings
- predictive of impactability
- sufficient longitudinal view
- control group
- relevant to objectives of an intervention
- available

Challenges to address

Availability; Accessibility; Quality; Continuity

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Criteria for model assessment (1 / 2)

Appropriateness of methods for use and for further investigation by this WP

Patient/population health & Patient experience		Healthcare resource utilisation	
Patient Outcomes	**Patient Experience**	**Resource Utilisation / Cost**	**Technology**
Which outcomes are most interesting? Can they be measured? How can they be improved? Time frame Measures of success?	Does the impactability assessment result in patients needing more appointments / procedures / diagnostic tests?	Resources needed for performing the impactability assessment and the resulting net effect on clinician/system resources of implementing the results. Burden of data collection & analysis Types of costs: • staff involvement • clinicians training • Raising awareness	Is the necessary technology available? Processing power of hardware Do people know how to use the technology?

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Criteria for model assessment (2 / 2)

Appropriateness of methods for use and for further investigation by this WP

Healthcare professional experience	Actuarial Concerns		
Staff Experience	**Data Availability**	**Professionally / Clinically / Academically Rigorous**	**Suitability for this WP to research further**
Increase workload? Are staff sufficiently trained in the procedures / techniques / understanding results of the analysis? Recruitment necessary	Sufficient data? How quickly can it be accessed? Data history Individual level data Data quality Data privacy, information governance, GDPR, etc	Solid theoretical bases? Clinically sound? Are the methods transparent? Peer reviewed? Are assumptions justified? Bias Regression to mean	Can actuaries add value to the field regarding each model? E.g. the data-driven approaches would tend to lend themselves more to actuarial skillset

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Practical considerations

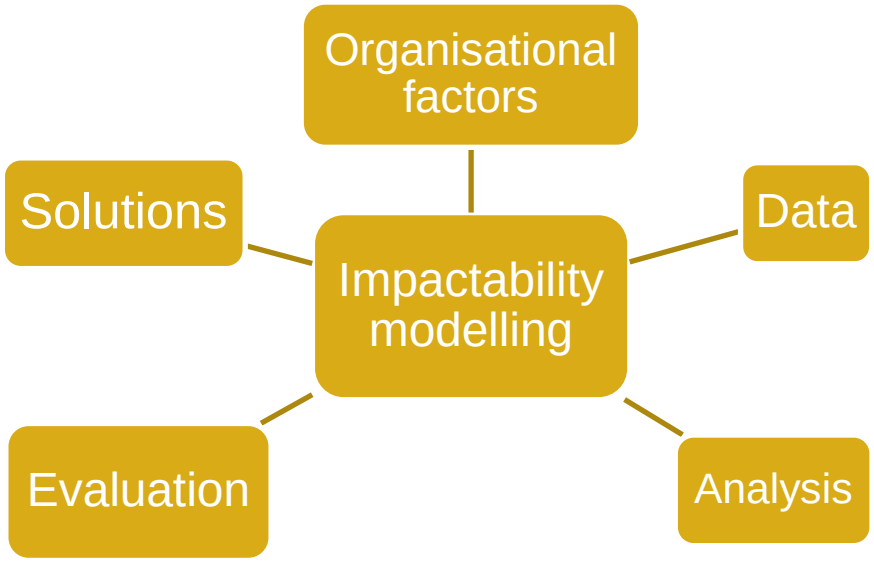
What are the barriers and enablers to effective impactability modelling

Dr. Chris Martin

25 June 2024

Practical considerations

- Eight interviews conducted so far with stakeholders and experts.
- Grounded thematic analysis of interview notes.



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Practical issues 1

Impactability modelling	Organisational factors

Risk stratification
• Intangible disease subgroups.
• Anxiety in patients.
• Risk model failure.
• New methods such as AI.
 	
Impactability
• Organisational features as well as patient.
• Risk scores can only be fitted to the data available.
 	
Identification of risk and impactability thresholds.
	• Surviving organization reforms.
	
	• **Relationships and morale**.
	  • Local trumps national.
	  • Engagement, trust and motivation.
	  • Affects multidisciplinary team implementation.
	
	• Inter-operability of records systems.
	
	• Training issues and understanding.

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Practical issues 2

Data	Analysis
• Consistent, complete, precise, sufficient. • Incompleteness • Lack of standardisation. • Data availability and usefulness not the same. • Data for stratification a secondary purpose. • Poor sharing of data.	• Huge demand and a lack of capacity. • Diversion of analyst resources to statutory returns. • Communication of results is a problem. • Needs to be system wide and not at component level.

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Practical issues 3

Evaluation	Potential solutions
• Understand the logic model first. • Perspective affects performance metric. • Outcome more important than adherence. • Requires the passage of time. • Causation can't be inferred with pre/post studies. • Impactability important for evaluating the cost-effectiveness of interventions as well as for identifying targets for intervention.	• To improve access. • • To increase the supply of analytic skills to population health management: • Support for organisations in understanding segmentation, risk stratification and impactability. • A phased approach to systems integration across organisations may have a greater chance of success.

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Ethics & Patient View

Sarah Culkin

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Ethics and Patient Involvement

- Range of ethical considerations when developing an Impactability model:

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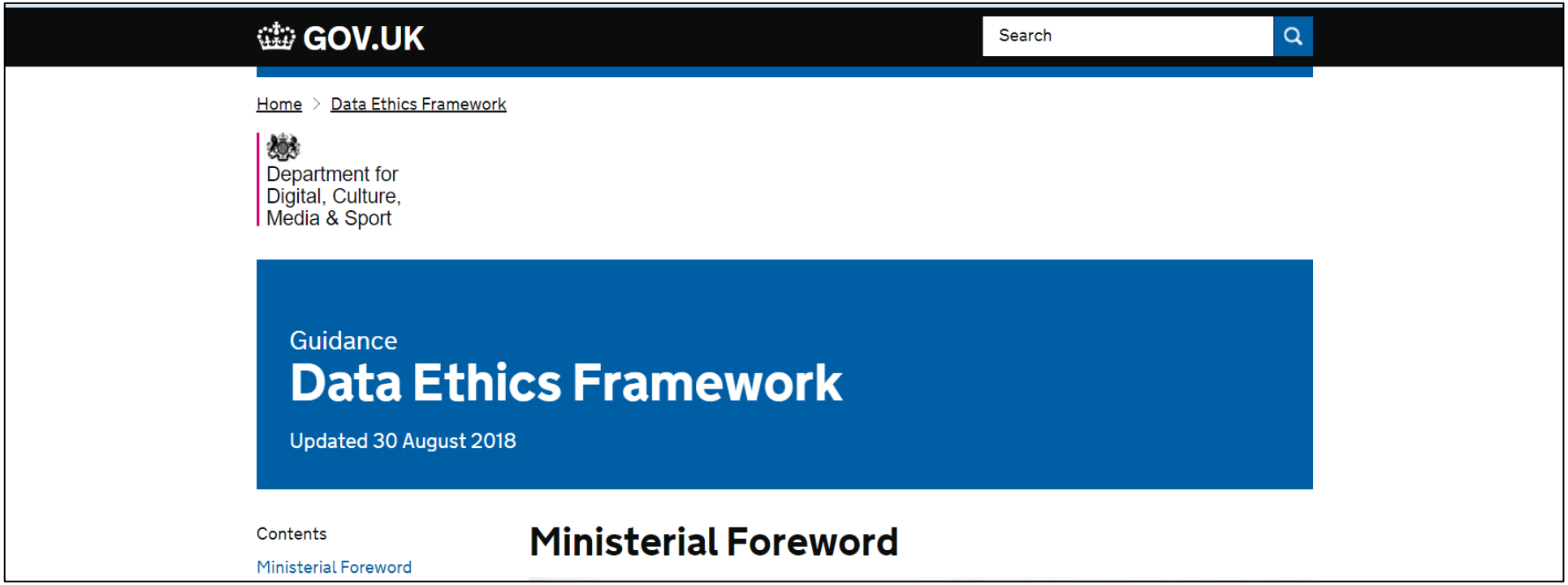
Ethics: Data In



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Ethics: Decision Support Out

Traditional Medical/Public Health bioethics

- Utility
- Benefits
- Justice
- Transparency
- Autonomy

Example:

1. Value/s	2. DRG-specific factors	Macro-level	Meso-level	Micro-level
Utility	Cost & efficiency	(D) Do DRGs help to contain costs for the health care system?	(D) Is efficiency under DRGs correlated with the kind of hospital providing the service?	(M) What if anything can we learn about the impact of DRGs from HCPs' perceptions of efficiency?
Producing benefits	Quality of care	How should we define and mea good quality of health care?	(D) How is patient safety affected by the implementation of DRGs at specific hospitals?	(D) How if at all do DRGs influence the quality of care for individual patients?
Distributive justice	Access to health care	(N) Is sufficient access to health care a fundamental requirement of justice?	(D) Do DRGs affect access to care at specific hospitals?	(D) What are HCPs' perceptions of how vulnerable groups are affected by DRGs?
Transparency	Hospital transparency	(D) Do DRGs result in greater pricing transparency?	(D) Are hospital procedures conducive to promoting transparency?	(M) How if at all can hospital transparency be judged at a micro-level?
Autonomy	Patient autonomy	M) What is patient autonomy and how should it be measured?	(D) Do DRGs lead to greater competition between specific hospitals and does this impact on patient choice?	(D) How if at all do DRGs affect the autonomy of individual patients e.g. through an impact on informed consent?

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Q & A

All

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Questions

Comments

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