

Segmentation for Outcomes

Segmentation approaches for
outcomes based commissioning

Part 1 – Whole Population
Segmentation Models

outcomesbased**healthcare**

Evaluation of Whole Population Segmentation for Outcomes Based Commissioning (OBC)

Accountable care and population health systems are increasingly being established to improve health and social care services across entire geographies, and to deliver better outcomes for people. Whole-population, outcomes based approaches to commissioning, require a more extensive review and understanding of the population segmentation models available.

Part one of this report briefly outlines the different approaches to population segmentation in healthcare, including their advantages and disadvantages when used in the context of outcomes based commissioning.¹

Part two of this report will focus on a more detailed analysis of segmentation for outcomes measurement, specifically exploring application of the 'Bridges to Health', whole-population segmentation model.

Table of Contents

Segmentation in Healthcare	2
1. Why Segment	3
2. Ways to Segment	4
3. Segmentation vs Stratification	10
4. Brief Review of Whole Population Segmentation Models	11

Segmentation in Healthcare

1. Why Segment

Health and care systems have historically categorised populations by the services utilised at a point in time. For example, people accessing care from their GP are delivered a different 'bundle' of services to those attending A&E, or receiving acute inpatient care, or rehabilitation from a chronic condition. This approach has several adverse effects:

- Care may be inconsistent, duplicative or incomplete
- Providers are only reimbursed for services delivered at specific locations at a specific point in time, even if there are better, more sustainable ways to achieve the same or better results
- There is little incentive for integration that may result in savings across entire care pathways
- People may not be seen by providers with the appropriate skill level, or in settings that have appropriate ancillary services. This 'over-generalisation' may result in unnecessary appointments, delayed care and inconvenience to patients and service users
- Care may also be over-specialised, with services delivered in acute settings when they would more appropriately be delivered in the community

Segmentation aims to categorise the population according to health status, health care needs and priorities. This approach recognises that groups of people share characteristics that influence the way they interact with health and care services. To optimise health outcomes, service user experience, efficiency and care costs, care delivery systems should respond to the needs of different population segments in different ways.

Segmentation has been widely used in other industries, particularly those that are customer-facing e.g. hospitality or the car industry. This enables the development of offerings that meet the needs of a specific customer segment perfectly, rather than meeting a minimum standard for all segments. The benefits of applying a similar approach to health care are considerable:

- Peoples' needs are truly put in the centre of the system. Care can only be tailored to a segment after truly understanding the health needs and priorities of that population
- Health and care outcomes are optimised by providing the right services, from the right provider, at the right time. This improves efficiency, overall experience, and provides timely and appropriate screening, diagnosis and treatment, where necessary
- Services have the potential to be more integrated, if collaboration, information sharing, and pooled funding can be realised across all services in a segment
- Providers can develop the specialist expertise that allows them to respond optimally to the needs and preferences of a specific population segment

Segmentation does not negate the need to tailor care for individual patients and service users. Variation will exist (e.g. in risk factors, social determinants of health), even if most people have most of their needs well met. Similarly, there may be value in stratifying patients by need, complexity and acuity within specific, clearly defined, segments. Despite this, individuals within a subgroup often share the same basic health and care requirements, and care can be broadly organized around these.

2. Ways to Segment

There are many distinct approaches to population segmentation. Approaches with potential application for outcomes measurement generally need to consider three main dimensions: the purpose segmentation is serving, the method or approach utilised, and a description of the variables which are used to group people. To evaluate different segmentation approaches, the appropriate combination of those three dimensions need to be present, for the purposes of outcomes based commissioning.

a) Why: intended purpose for segmentation?

Population segmentation can be undertaken for a range of different purposes. Existing evidence describes three distinct levels of integration from a care organisation perspective: macro-, meso-, and micro-level integration.^{2,3} These serve as a framework to describe the general purposes of segmentation. These may lend themselves differently to specific purposes, such as improving direct patient care, outcomes measurement, establishing a financial envelope and/or capitated budget, health and social marketing, and so-on.

b) What: method used to identify segments?

Different methods can be used when identifying cohorts in any segmentation exercise. Their application to segmentation in outcomes-based commissioning is evaluated here, including the potential for confusion when using risk stratification for segmentation purposes.

c) How: variables used to define segments?

There are a number of characteristics which can be used to identify particular (potentially high-risk) subgroups, such as age or life stage, lifestyle, income, deprivation, condition, and so-on. These are briefly outlined below.

a) Why: intended purpose for segmentation?

Care integration has recently been at the top of the agenda for many health and care systems globally. In reviewing evidence on integration, segmentation experts describe a distinction at three levels of care integration: macro-, meso- and micro-. The table 1 below describes these broad concepts and their application for the main specific purposes of segmentation in health systems.

Table 1: Purpose of Segmentation

INTEGRATION LEVEL	DESCRIPTION	SPECIFIC SEGMENTATION PURPOSE (EXAMPLES)			
		Direct Patient Care	Establishing Capitated Budgets	Social Marketing	Outcomes Measurement
MACRO-LEVEL	<p>Integrated care to be delivered across the whole spectrum of services to a population, or range of subpopulations</p> <p>Example: NWL WSIC Programme; Stockport Together Programme,^{4 5}</p>	Offers large-scale opportunity to bring together independent provider entities into fully integrated care systems beyond just healthcare. Supports primary prevention in currently 'healthy'. Whole system approach ensures every person is accounted for.	Movement between segments can complicate the estimation of financial envelopes. Can be challenging to map out relevant care activities to specific subgroups without single linked dataset across care settings.	Appropriate for campaigns aimed at whole-population campaigns i.e. smoking cessation. Less directly helpful for targeted social marketing to specific subpopulations.	Provided that segments are defined where similar needs are aligned, then outcomes can be defined and measured, although these will usually need to be specific to populations, rather than pathways or conditions.
MESO-LEVEL	<p>Integrated care to be delivered for particular care groups with similar characteristics, such as age or long-term condition</p> <p>Example: North Central London Diabetes & Older People Living with Frailty Programmes^{6 7}</p>	Designing care around groups of people who share the same condition or pathway tends to work well from a clinical point of view; the concept of integrated Practice Units can be easily applied. ⁸	More straightforward to design financial envelope if condition/stage and care activities related to them are appropriately identified within principal datasets.	Allows the identification of specific care groups which can benefit from preventative care i.e. diabetes.	Outcomes definition tends to be reasonably straightforward, when applied to groups who share same type of condition, and for specific care pathways.
MICRO-LEVEL	<p>Integrated care to be delivered to individual patients/service users (usually high needs), typically following a care plan</p> <p>Example: Community Assessment Risk Screen - CARS⁹</p>	Allows tailored care to be designed for those individuals who have high risk of complications, admissions and/or cost a lot to the system.	Although very useful for identifying cohorts of high cost individuals, difficult to design capitated budgets around specific risk groups.	Individuals who share similar risk status don't necessarily share same characteristics that are suitable for the purposes of social marketing.	Individuals who share similar risk status don't necessarily share similar healthcare needs, and may have very diverse outcomes which matter.

b) What: method used to identify segments?

Vuik et al (2016) describe how segmentation can support the three different population strategies described above; 'macro-', 'meso-', and 'micro-level' integration, assisting with the identification of target populations, and providing helpful insights. While the analysis has emerged from the perspective of care integration design, it provides a useful framework to describe the different segmentation methods that could be used in the context of outcomes based commissioning.

Table 2: Segmentation Approaches

INTEGRATION LEVEL	TYPICAL SEGMENTATION APPROACH	WHAT DOES THIS MEAN FOR OUTCOMES MEASUREMENT? 
MACRO-LEVEL	<p>Whole Population: All individuals of a population are "assigned" into distinct homogeneous groups. Characteristics used to identify those groups can vary. As care needs vary significantly across members of a population, segmentation into meaningful groups allows the identification of clusters of people with similar needs, around which care can be organised. Segment definitions should be distinct enough for individuals to clearly belong to one main group and avoid ambiguity wherever possible.</p> <p>Example: The Health System Matrix, British Columbia¹⁰; The Bridges to Health Model</p>	<p>Simply identifying 'high level' subgroups is not usually sufficient for the purposes of outcomes measurement. Within whole population segmentation, precise definitions for each subgroup are required in order for outcomes to be identified and measured. Measuring outcomes can become highly complex if sub-cohorts are not appropriately defined. The number of cohorts identified need to be limited enough to allow for simplicity and diverse enough to allow the identification of populations with similar needs – potentially a difficult balance to achieve. Outcomes measures might be defined at too high a level for individual care pathways i.e. condition-specific outcomes might not be captured using this approach.</p>
MESO-LEVEL	<p>Subpopulation: Segmentation is used to select a cohort of interest (rather than necessarily fitting all members of a population into groups). Subgroups of interest are appropriately identified by defining entry and/or exclusion criteria, which apply to the cohort.</p> <p>Example: Electronic Frailty Index¹¹</p>	<p>When selecting a subpopulation of interest, defining the precise inclusion/exclusion criteria for this segment is key in order for outcomes to be appropriately defined and measured i.e. what is really meant by 'Older People with Frailty'?</p> <p>Segmentation applied to specific care groups is typically suitable for outcomes measurement. As long as the defining criteria (inclusion and exclusion) are well established, identifying similar needs within pre-selected cohorts tends to be straightforward. Also, outcomes frameworks can measure a level of detail, not usually possible when developing a framework for whole populations.</p>
MICRO-LEVEL	<p>Selected Individuals: Key individuals, often people at high risk of admissions/complications and/or those who account for a disproportionately large portion of health care costs are identified and provided with tailored care plans. Risk stratification tools are most commonly used. Risk stratification in itself is often not considered a form of segmentation. This is discussed in the next section.</p> <p>Example: Combined Predictive Model, King's Fund¹²</p>	<p>Risk stratification can provide useful insights when applied within meaningful defined segments. However, as a standalone tool, it does not allow for the identification of groups with similar health needs. Unless individuals are identified within well pre-defined cohorts, establishing similar needs within a risk-based group can be challenging, if not impossible. While it is possible to identify very granular outcomes applicable to each individual person (which can help tailor care plans), it is generally unsuitable for outcomes based commissioning purposes.</p>

Purpose vs Method

It is important to highlight the main difference between purpose and method of segmentation, as these two dimensions can be easily confused. The method selected for segmentation is generally based on its purpose i.e. if macro-level integration is required, a whole population method is usually the most appropriate. However, it is possible, for instance, to apply a whole population method for the purposes of identifying subpopulations. Delaware's State Health Care Innovation Plan is an example of that approach, where the whole population is segmented into four age groups and 5 disease groups. Subsequently priority subgroups of interest were selected based on cost and the potential for intervention.²

Regardless of the segmentation method selected, or the level of care integration intended, identification of meaningful groups who share similar needs is required if relevant outcomes are to be defined and measured. Whilst some outcome measures can be universally applicable to nearly all people (e.g. quality of life), most people will have fundamentally different health and life circumstances, needs, and care expectations. Therefore, many outcomes which really matter to people, or which are unique to a specific population need to be described around groups of people with broadly similar needs.

Risk stratification tools, or stratification approaches generally, can provide useful insights while still allowing for meaningful outcomes measurement when applied within already defined segments. However, if applied to inadequately defined groups, **risk stratification will generally only allow the identification of people with similar magnitude of needs, rather than similar types of needs.** This therefore makes risk stratification in isolation largely ineffective for the purposes of outcomes measurement. Due to the common ambiguity between the definitions and purposes of risk stratification compared with segmentation, this paper dedicates a section to addressing some common misconceptions for the purposes of outcomes measurement. When selecting a cohort of interest, defining the precise inclusion/exclusion criteria for this segment is key in order for outcomes to be appropriately defined and measured i.e. what is meant by '*Older People with Frailty*'? In the next section, the different characteristics that can be used when segmenting populations are considered.

c) How: variables used to define segments?

The set of characteristics or variables utilised by different segmentation models does not always take into account the basic health requirements shared within a cohort. Without these, they will have limited use when applied to outcomes definition and measurement.

The North West London (NWL) Whole Systems Integrated Care (WSIC) Programme analysed four broad categories of “primary organising characteristics” which can be used to group populations. Each have their pros and cons: type of condition and age, social and demographic factors, utilisation risk (risk stratification) and behaviour.¹³ These are useful conceptual groupings, and this report has reviewed their analysis to inform evaluation of the different segmentation models. However, when evaluating segmentation approaches specifically for outcomes based commissioning purposes, this report proposes a slightly different grouping of defining characteristics. These are largely aligned with the World Health Organisation (WHO) determinants of health¹⁴.

- **Person-Centred:** variables/characteristics that are inherent to the individual, and fairly constant at any point in time. They can be:
 - **Health-specific** i.e. condition and age. Although age could be classified as a person specific characteristic (see below), it plays a significant role in development of health conditions and health-specific requirements, especially in the older population. The term condition can be interpreted as either a specific health condition (i.e. presence of diabetes) or a health status (i.e. presence or absence of a long term condition, or healthy).
 - **Person-specific** i.e. gender, ethnicity, personality traits.
- **Social and Economic Related:** these are factors related to the individual’s environment, and are known to have significant effects on health outcomes¹⁵
 - Income, education, social isolation, employment, housing.
- **Behavioural:** behaviour and lifestyle are considered major determinants of health.^{16,17} In this context, the term behaviour is defined by personal lifestyle such as mobility and habits i.e. smoking and drinking. Although behavioural characteristics could be classified as person-centred, they are fluid and subject to continuous change, therefore sitting outside of our definition of person-centred. Behaviour towards the health system i.e. patient activation, is considered a system-focused variable in this context, while personality traits would be qualified as a person-specific characteristic.
- **System-Focused:** these are characteristics that define how a person utilises/interacts with the health system.
 - Activity, number of hospital admissions, costs, access to services, patient activation, behaviour towards one’s health.

In general, segmentation models that utilise health-specific, person-centred variables as determinants for groupings are a better fit for health and care outcomes definition and measurement. Take a common variable being used to define ‘patients’ – the presence of an unspecified long-term condition (LTC). A person who lives with diabetes might be concerned about avoiding complications such as a heart attack, strokes and amputations, while a person living with rheumatoid arthritis might be concerned about things like mobility, pain management, and potential disease progression. Although common outcomes can be identified for both groups – i.e. avoidance of complications – they also have fundamentally different outcomes expectations, which can only be identified once the defining variable is further refined.

For example, utilising specific ‘condition type’ – e.g. people with coronary heart disease – as a common characteristic to identify a cohort is generally helpful from a clinical outcomes measurement perspective.

Segmentation approaches for outcomes based commissioning

Part 1 – Whole Population Segmentation Models

However, ambiguity can arise if the defined condition is too generic e.g. people who have stomach pain. Meanwhile social and economic variables may be more helpful from a social and personal outcomes measurement perspective.

Table 3 summarises the advantages and disadvantages of using different variables to define a health segment for the purposes of outcomes based commissioning:

Table 3: Segmentation Defining Variables

DEFINING VARIABLES	ADVANTAGES	DISADVANTAGES
Person-Centred: health-specific Example: condition and age	<ul style="list-style-type: none"> • Easy to define. • Segments relatively stable over time. • Variables are typically easy to identify within health datasets. • Similar health needs/ clinical outcomes can be identified. 	<ul style="list-style-type: none"> • Can be highly complex when determining baselines in light of data availability and quality.
Person-Centred: person-specific Example: ethnicity and gender	<ul style="list-style-type: none"> • Easy to define. • Segments relatively stable over time. • Variables are typically easy to identify within health datasets. • Has limitation, but can be used to determine similar health needs. 	<ul style="list-style-type: none"> • Difficult to identify common health outcomes/ similar needs.
Social and Economic Related Example: housing	<ul style="list-style-type: none"> • Can be good to identify basic whole system health needs, and social outcomes. • Easy to identify a baseline. 	<ul style="list-style-type: none"> • Difficult to identify common health outcomes/ similar needs. • Difficult to design or organise care around.
Behavioural Example: habits (smoking)	<ul style="list-style-type: none"> • Good for responding to service provision (i.e. programmes for smoking cessation). • Has limitations, but can be used to determine similar health needs. 	<ul style="list-style-type: none"> • Difficult to determine a baseline without major survey rollouts.
System-Focused Example: number of admissions to hospital	<ul style="list-style-type: none"> • Good for responding to service provision (i.e. prevention programmes for high-needs users). • Easy to determine baseline using healthcare data. 	<ul style="list-style-type: none"> • Difficult to identify common health outcomes/ similar needs. • Difficult to design and organise care around.

3. Segmentation vs Stratification

The terms segmentation and stratification are often used interchangeably in healthcare. At times, stratification is described as a form of segmentation.² NHS England and the Department of Health agree on the following definition:

*“Segmentation is grouping the local population by what kind of care they need as well as how often they might need it. Risk stratification means understanding who, within each segment, has the greatest risk of having a significant health event or is at most risk of deterioration”.*¹⁸

As set out above, outcomes can only be meaningfully defined and accurately measured when applied to groups of people with similar needs, as opposed to groups of people with similar costs. Within the context of outcomes-based commissioning, the term ‘similar needs’ is defined by homogeneous health status, and/or healthcare needs. This includes the relevant clinical and preventative care needs, around which services are organised. Integration of services around people with similar needs enables outcomes, costs and processes to be measured for homogeneous groups of people. Where segmentation seeks to categorise populations according to health status, needs and priorities, alignment with outcomes definitions and measurement is possible – depending on the variable used for grouping, as discussed in the next section.

Limitations of Risk Stratification Models for Outcomes Based Commissioning

Risk stratification seeks to identify people who are most at risk of deterioration, or at risk of a significant care event, therefore generally failing to provide clear criteria for defining common desired outcomes – or end results of care – within each risk strata. Risk stratification without segmentation tends to group people by care usage, or cost to the system, which is not the same as a homogeneous set of needs. For example, young people with learning disabilities could be in the same group as older people with frailty, in terms of risk of care usage, cost, or care event, but often these two groups don’t share a common set of needs, or similar outcomes. Defining cohorts using risk stratification approaches generally allows an understanding of people’s needs from the system as a whole (and their associated costs), as opposed to the identification of their needs as individuals, or as groups of individuals.

Other important considerations are:

- Cohorts identified through risk stratification alone may become out of date too quickly for the purposes of outcomes based commissioning; a 2013 report by Kent and Medway Public Health Observatory suggests that approximately 30% of patients move out of the very complex risk band (0.5% of the population) within one month; 50% after five months and 80% after one year.¹⁹
- Many risk stratification methodologies rely on using diagnosis codes or READ codes to capture information about the risk factors and probability of future unplanned admission. This requires well-coded, linked datasets with appropriate information governance in place to extract the most value.

Although stratification has limited use for the purposes of segmentation in outcomes-based commissioning, it can be usefully applied to defined segments. It can enable a better understanding of subpopulations within defined segments, as well as providing insights into how outcomes can be improved, once defined.

4. Brief Review of Whole Population Segmentation Models

The Bridges to Health Model (and accountable care approaches generally), focuses on a whole-population (and 'macro-level') approach to care integration, and other segmentation models that follow similar approaches are considered here.²⁰

There are numerous examples of areas in the UK that have developed outcomes frameworks at a 'meso-level' of integration, focusing on specific cohorts of interest for which outcomes based contracts have been established. Sheffield and Bedfordshire have established Musculoskeletal Care outcomes based contracts,^{21 22} while several North Central London CCGs have developed programmes aimed at populations like: People with Diabetes and Older People Living with Frailty.^{6 7} The Care Pathway Framework²³ developed by Health Dialog is an example of mixed population segmentation and risk stratification, where nine stages of illness are described: the first three stages ('well', 'well at risk', and 'pre-diagnostic') apply to the whole population. The remaining stages ('condition onset', 'early progressive', 'late progressive', 'critical', 'sentinel event' and 'recovery') are applicable to specific condition pathways (i.e. cancer, COPD, diabetes, etc.). As they vary significantly from whole population approaches, they have not been reviewed for the purposes of this report.

As far as risk stratification tools are concerned, those that aim to stratify whole populations, and are more closely-related to segmented, whole-population approaches have been reviewed. There are countless stratification tools that could be described/reviewed, such as the PARR++ algorithms,¹² Combined Predictive Model¹² as well other analytics tools such as Dr Foster Quality Investigator.²⁴ However, as those have not been explicitly intended to stratify whole populations specifically for the purposes of outcomes based approaches, they have been excluded from further analysis here.

Finally, material that has been made available regarding whole population and vanguard, and/or New Models of Care programmes, has been reviewed and considered in the background research for this report.

Although segmentation and stratification approaches used in many areas have been reviewed and analysed, only areas that have very clear, well-developed approaches to whole-population segmentation, with appropriate definition of segments have been described further in this report.

Summary

In summary, an ideal whole-population segmentation model for outcomes based commissioning should meet the following criteria:

- Each segment should be broadly homogeneous, with common health prospects and priorities that can be addressed through careful system planning. Therefore, the variables utilised to describe segments should be key determinants of health needs.
- Each segment should be sufficiently distinct, with unique health and health service delivery needs.
- The set of population segments must include every person, acknowledging that individuals will move between segments, as their health needs change.
- The number of segments must be limited in order to deliver accessible integrated services for the defined populations. Within segments, populations may be further sub-segmented or stratified in response to specialised health care needs.
- At any one time, everyone best matches one distinct segment, but over time people move through segments. Therefore, the variables utilise to describe the segments should be fairly constant.
- Each segment's definitions should be sufficiently precise to allow a baseline population number to be determined, assuming access to the appropriate dataset.

The following two tables briefly describe the main segmentation and stratification models that are most relevant to this analysis.

Table 4: Description of Key Whole Population Segmentation Models

MODEL	DEVELOPED BY	PURPOSE/METHOD	SEGMENTS	APPLICABLE VARIABLES
Bridges to Health	Medicare & Medicaid	Understand whole population	8 Segments: healthy, maternal & infant health, acutely ill, chronic conditions, normal function, Stable but serious disability, short period of decline before dying, limited reserve and exacerbations, frailty, with or without dementia.	Health prospects and needs.
The Health System Matrix¹⁰	British Columbia	Understand whole population	14 Segments: no users, healthy, adult major age 18+, child and youth major <18, low complex chronic conditions, medium complex chronic conditions, mental health and substance use, maternity and healthy newborns, frail in the community, high complex chronic conditions, frail high complex chronic conditions, cancer, frail in care, end of life.	Condition type/health needs.
London Health Commission⁵	NWL WSIC Programme	Understand whole population	4 age groups across 10 Segments: mostly healthy, one or more physical or mental long term conditions (cancer as a separate sub segment), Serious and enduring mental illness, learning disability, severe physical disability, advanced dementia and Alzheimer's, socially excluded groups.	Age and condition type/health needs.
Delaware's State Health Care Innovation Plan	Delaware State	Identify subgroups of interest; risk stratification	Matrix: 5 conditions status (no chronic condition (CC), one CC, 2 or more CC, mild mental health (MH) condition, severe MH condition) across 4 age groups (elderly, adults, adolescent/ paed, infant).	Life-stage and number of conditions.
3M™ Clinical Risk Grouping²⁶	3M Health Information Systems	Identify subgroups of interest; risk stratification	9 Segments: healthy/non users, history of significant acute disease, single minor chronic disease, minor chronic disease in multiple organ systems, single dominant or moderate chronic disease, significant chronic disease in multiple organ systems, dominant chronic disease in 3 or more organ systems, dominant and metastatic malignancies, catastrophic condition status.	Individuals assigned to one of 330 mutually exclusive, clinically defined base CRGs according to the combination of primary chronic diseases. Base CRGs assigned to one health status.
Commonwealth Fund Typology²⁷	Commonwealth Fund	Understand whole population	11 Segments: Under 65 disabled, behavioural health, children with complex needs, advanced illness, end of life, complex chronic conditions, simple chronic conditions, multiple chronic conditions, frail elderly, social complexity, healthy with acute event.	Details of segmentation model not discussed at length; model not definitive, just first iteration. Multiple approaches used.
Healthy Foundations²⁸	DH Commissioned	Understand whole population	Matrix: 10 groups defined by age and life circumstance, further sub segmented by 4 types of attitudes/beliefs (fighters, survivors, thrivers and disengaged).	Age, environment & attitudes/beliefs
PATH Model²⁹	Wilkins & Navarro	Understand whole population	9 Segments: naturalist, independently healthy, ready user, loyalist, traditionalists, family centred, generic, avoider, clinic cynic.	Behaviour towards health care use, health risks & status, trust in medical professionals, level of satisfaction, & compliance.
Adjusted Clinical Groups® (ACG)³⁰	Johns Hopkins	Identify subgroups of interest; risk stratification	Various risk classifications/population splits are possible.	Disease patterns (diagnostic and pharmaceutical codes), age and gender.

Table 5: Segmentation Models: Suitability for Outcomes Based Commissioning

MODEL	SEGMENTS HOMOGENEOUS, WITH SIMILAR HEALTH NEEDS?	SEGMENTS SUFFICIENTLY DISTINCT TO DESIGN CARE AROUND?	NUMBER OF SEGMENTS LIMITED?	DO SEGMENTS INCLUDE ALL PEOPLE IN POPULATION?	ARE DEFINING VARIABLES CONSTANT OVER TIME?	ARE THE SEGMENT DEFINITIONS SUFFICIENTLY PRECISE?
Bridges to Health	✓	✓	✓	✓	✓	✓
The Health System Matrix	✓	✓	✓	✓	✓	✓
London Health Commission	✓	✓	✓	✓	✓	✓
Applicable to whole-population OBC?	<p>Yes. The defining variables on the above three models are fairly constant, and similar needs among sub-cohorts can be identified. The variables used to identify cohorts (age and conditions mainly) are good determinants of health needs. Movement between segments needs to be addressed/determined.</p> <p>It is possible to define segments from a data/definition perspective, although adjustments need to be made to cater for major exceptions i.e. where rare genetic conditions sit, for example. It is possible to establish a baseline for number of people within segments, although the use of approximation/assumptions might be necessary i.e. defining number associated with frailty in the absence of a single, linked dataset for indirect patient care.</p> <p>Models of care can be designed around the different segments based on similar needs, but a further level of 'tailoring' is needed to cater for individual needs at a service provision level.</p>					
Delaware's State Health Care Innovation Plan	✓	No	✓	✓	✓	✓
Applicable to whole-population OBC?	<p>Potentially. The segments are not sufficiently distinct – the number of chronic conditions is a limited determinant of health (the existence of a chronic condition in itself may be more relevant). The non-chronic condition group may not be homogeneous enough i.e. could include elderly people who are healthy as well as elderly people who are frail. Further segmentation would be needed.</p>					

Table 5 (cont.): Segmentation Models: Suitability for Outcomes Based Commissioning

MODEL	SEGMENTS HOMOGENEOUS, WITH SIMILAR HEALTH NEEDS?	SEGMENTS SUFFICIENTLY DISTINCT TO DESIGN CARE AROUND?	NUMBER OF SEGMENTS LIMITED?	DO SEGMENTS INCLUDE ALL PEOPLE IN POPULATION?	ARE DEFINING VARIABLES CONSTANT OVER TIME?	ARE THE SEGMENT DEFINITIONS SUFFICIENTLY PRECISE?
3M™ Clinical Risk Grouping	Some	Some	✓	✓	✓	✓
Applicable to whole-population OBC?	Potentially. Even though segment definitions are fairly well aligned with the Health Matrix model, the entry criteria used to determine who belongs to which cohort is based on a combination of diagnosis and procedure codes, as well as demographic information from administrative claims data. This does not necessarily place people with similar needs in the same segment. For example, vulnerable populations such as the frail elderly, or people with physical disabilities cannot be adequately described using administrative claims data alone. ³¹ However, the 3M CRGs have been used in accountable care organisations (ACOs) in state Medicaid programs, such as Texas and New York. They have also been used in outcomes-based payment programs used by commercial payers and health plans, including many Blue Cross® Blue Shield® organisations.					
Commonwealth Fund Typology	✓	✓	✓	✓	✓	N/A
Applicable to whole-population OBC?	Potentially. As definitions for each segment are not clear, it is difficult to assess the proposed model. Similar definitions to the Bridges to Health and Health Matrix models could be proposed to the segments described, which would potentially allow for a model that is fit for OBC.					
Healthy Foundations	✗	✗	✓	✓	✗	✗
Applicable to whole-population OBC?	Probably not. The variables utilised for segmenting population do not allow for the identification of similar health needs. To date, this model has primarily been used to assess the relative sizes of segments within different populations and develop social marketing strategies (e.g. Change4Life campaign).					
PATH Model	✗	✗	✓	✓	✗	✗
Applicable to whole-population OBC?	Probably Not. Although the segmentation model can be helpful to devise response to service provision, it does not allow for the identification of similar health needs i.e. a naturalist who has diabetes would share more similar health needs with an avoider with a heart condition than with another naturalist that is healthy.					
Adjusted Clinical Groups® (ACG)	N/A	N/A	N/A	✗	✓	✓
Applicable to whole-population OBC?	Potentially. Although the tool allows the use of a number of diagnostic codes to group people in similar risk groups (which could be helpful from an outcomes measurement perspective, as it is stable over time), people with very distinct diagnoses, who don't share similar health needs, might be stratified into the same group.					

Glossary

There are a number of terms used in this paper – definitions of these are set out below for reference:

Table 6: Terms and Definitions

TERM	DEFINITION
Outcomes Framework	Full outcome set covering a population, or populations, typically included within many accountable care or population health programmes
Outcome	Results of care that matter to people, or things that make a meaningful difference to people's lives. Usually measured from a person-perspective- i.e. Across a complete care cycles, often spanning multiple different providers of care
Outcome Measure	Description of the method used to derive a meaningful numerical value for an outcome. This usually means a numerator and denominator definition that can be applied to data, and the data source to be used (including a survey/PROM tool for personal outcomes)
Outcomes Based Commissioning	Approach to healthcare commissioning based on outcomes, where providers are incentivised to improve whole pathway outcomes for people, spanning multiple care settings

References

¹ Bersani J, Dunbar-Rees R, McGough R. **Contracting for outcomes**. Outcomes Based Healthcare and Capsticks. Oct 2014.

² Vuik S, Mayer , Darzi, A. **Patient segmentation analysis offers significant benefits for integrated care and support**. Health Affairs 35, no.5, 2016;769-775, doi: 10.1377/hlthaff.2015.1311.

³ The King's Fund. **Integrated care**. 2011. <https://www.kingsfund.org.uk/sites/files/kf/Integrated-care-summary-Sep11.pdf> (accessed 23/08/2016).

⁴ North West London Whole System Integrated Care. <http://integration.healthiorthwestlondon.nhs.uk/>. (accessed 23/08/2016).

⁵ McKinsey & Company. **Population Segmentation for Integrated Care**. Health Service Journal, Nov 2014. <https://www.hsj.co.uk/download?ac=1292827>. (accessed 23/08/2016).

⁶ Price S, Lissauer R. **Value based commissioning in north central london**. <http://www.kingsfund.org.uk/sites/files/kf/media/Sarah-Price-Rachel-Lissauer-value-based-commissioning-North-Central-London.pdf> (accessed 23/08/2016).

⁷ Islington Clinical Commissioning Group. http://democracy.islington.gov.uk/documents/s6157/151123_Introducing%20Value%20Based%20Commissioning_Islington%20HOSCV2.pdf (accessed on 23/08/2016).

⁸ Porter M, Lee T. **The strategy that will fix healthcare**. *Harvard Business Review*, Oct 2013; 91.10:50-70

⁹ Shelton P, Sager M, Schraeder C. **The community assessment risk screen (CARS): identifying elderly persons at risk for hospitalization or emergency department visit**. The American Journal of Managed Care, Aug 2000; 6(8):925-33.

Segmentation approaches for outcomes based commissioning

Part 1 – Whole Population Segmentation Models

¹⁰ British Columbia Ministry of Health. **The health system matrix 6.1: understanding the health care needs of the british columbia population through population segmentation.** Feb 2015. http://www2.gov.bc.ca/assets/gov/health/conducting-health-research/data-access/health_system_matrix_61_definitions.pdf

¹¹ Clegg A, Young J, Iliffe S, et al. **Frailty in elderly people.** Lancet 2013; 381: 752–62.

¹² King's Fund, Health Dialog, University of New York. **Combined predictive model.** December 2006. http://www.kingsfund.org.uk/sites/files/kf/field/field_document/PARR-combined-predictive-model-final-report-dec06.pdf (accessed on 23/08/2016).

¹³ Whole Systems Integrated Care. **What are the different ways we can group?** <http://integration.healthiorthwestlondon.nhs.uk/section/what-are-the-different-ways-we-can-group-> (accessed on 23/08/2016).

¹⁴ World Health Organisation. **The determinants of health.** <http://www.who.int/hia/evidence/doh/en/> (accessed on 23/08/2016).

¹⁵ Wilkinson M, Marmot M. **Social determinants of health: the solid facts.** World Health Organisation. 2003; 2nd Edition.

¹⁶ Whitehead M, Dahlgren G, Gilson L. **Developing the policy response to inequities in Health: a global perspective. in: Challenging inequities in health care: from ethics to action.** New York: Oxford University Press; 2001:309-322.

¹⁷ The King's Fund. **Broader Determinants of Health.** <http://www.kingsfund.org.uk/time-to-think-differently/trends/broader-determinants-health> (access on 23/08/2016).

¹⁸ NHS England. **'How to guide': the BCF technical toolkit, section one: population segmentation, risk stratification and information governance. 2014.** <https://www.england.nhs.uk/wp-content/uploads/2014/09/1-seg-strat.pdf> (accessed on 23/08/2016).

¹⁹ NHS England. **Using case finding and risk stratification: a key service component for personalised care and support planning.** Jan 2015. <https://www.england.nhs.uk/wp-content/uploads/2015/01/2015-01-20-CFRS-v0.14-FINAL.pdf> (accessed on 23/08/2016).

²⁰ Lynn J, Straube BM, Bell KM, et al. **Using population segmentation to provide better health care for all: the "Bridges to Health" model.** The Milbank Quarterly. 2007;85(2):185-208. doi:10.1111/j.1468-0009.2007.00483.x

²¹ Circle Health. <http://www.circlehealth.co.uk/locations/bedfordshire> (accessed on 23/08/2016).

²² Moving Together. <http://www.sheffieldccg.nhs.uk/msk-faqs.htm> (accessed on 23/08/2016).

²³ Health Dialog. **A clinical approach to population stratification analytics: dispelling the myths of traditional risk segmentation models used in population health management programs.** Jun 2015. <http://healthdialog.com/sites/default/files/whitepapers/A-Clinical-Approach-to-Population-Stratification-Analytics.pdf> (accessed on 23/08/2016).

²⁴ Dr Foster Quality Investigator. <http://www.drfooster.com/tools/quality-investigator/> (accessed on 23/08/2016).

²⁵ Choose Health Delaware. **Delaware's State Health Care Innovation Plan.** Dec 2013. <http://dhss.delaware.gov/dhcc/cmmi/files/choosehealthplan.pdf> (accessed on 23/08/2016)

²⁶ 3M Health Information Systems. **3M™ clinical risk groups: measuring risk, managing care.** Jul 2016. http://multimedia.3m.com/mws/media/765833O/3m-crgs-measuring-risk-managing-care-white-paper.pdf?fn=crg_white_paper.pdf (accessed on 23/08/2016).

Segmentation approaches for outcomes based commissioning

Part 1 – Whole Population Segmentation Models

²⁷ Abrams M, Kleiman R, Schneider, et al. **Overview of segmentation of high-need, high-cost patient population.** National Academy of Medicine, Jan 2016. <https://nam.edu/wp-content/uploads/2016/02/Overview-of-Segmentation.pdf> (accessed on 23/08/2016).

²⁸ Department of Health. **The healthy foundations lifestyles segmentation.** HIPD Social Marketing and Health Related Behaviour. Jul 2011. <http://www.thensmc.com/file/272/download?token=BS57Q-UJ> (accessed on 23/08/2016).

²⁹ Wilkins S, Navarro F. **Has the web really empowered health care consumers?** Marketing Health Services, 2001; 21(3):5-9.

³⁰ Johns Hopkins Bloomberg School of Public Health. **The Johns Hopkins ACG® system version 11.0 technical reference guide.** Nov 2014. <http://acg.jhsph.org/> (accessed on 23/08/2016).

³¹ 3M Health Information Systems. **3M™ clinical risk groups for vulnerable populations: FAQs.** Jan 2013. <http://multimedia.3m.com/mws/media/862373O/faqs-using-crgs-for-vulnerable-populations-01-30-13.pdf>