Modelling Excellence: Quality Patient Segmentation for Targeted Health Care Solutions

Brief Definitions

What is population segmentation?

Dividing and conquering: Population segmentation is a data-driven approach that divides a whole — typically large and diverse — population into smaller homogenous and more manageable subgroups based on their characteristics and needs. This helps users better address the unique needs of each subgroup while improving overall health outcomes and efficient resource allocation.

What is risk stratification?

Where to start: Whilst similar in nature to segmentation, stratification is a fundamentally different data-driven approach. Stratification involves **prioritising** individuals within a population based on their relative health risk or probability of a specific future outcome.

In practice, the two approaches should be used together, so that users can more effectively plan service delivery and prioritise the allocation of resources. For example, health systems may segment the population to understand how many people have multiple complex clinical conditions and then further stratify the subgroup to highlight those who are at greatest risk of having an injurious fall in the next twelve months.

Segmentation supports a range of use cases across key decision makers:

From your whole population at a glance…

Population health management strategy: Helps **health planners and commissioners** identify a population's health care needs and plan for resources. This approach allows health systems to **implement strategies based on underlying health risks** to engage and support each segment.

To cohorting/worklists…

Intervention targeting: Segmentation can help **practitioners and programme managers** determine which subset of a patient population will benefit the most from a specific intervention, based on enrolment criteria and likelihood of impact. This helps **ensure a match of the right patient to the right programme,** with outcomes of each intervention measured over time.

To an individual

Tailoring care delivery: Segmentation shows **health practitioners** the highlighted clinical needs of each patient. This **operationalises tailored care delivery** based on clinical need, characteristics or behaviours. A segmentation-based approach to population health is often more useful to clinicians than single risk markers, as it considers overall patient health needs.

What does 'good' look like?

There are many ways health systems can segment their populations. Some key principles and foundations of an effective segmentation approach are:

Inclusive and comprehensive

- Clinically coherent and simple
- Uses routinely collected standard health care datasets
- Considers a complete set of conditions, problems and risks across primary and secondary care settings

Evidence-based and transparent

- Based on a validated model with transparent methodology
- Backed by evidence, including published studies and customer use cases and outcomes

Flexible and adaptable

- Part of a comprehensive and customisable suite of analytical tools
- Used and understood by multidisciplinary teams of clinicians, analysts and business leaders
- Supports clinical decision making and intervention planning, including community engagement and outreach teams

Supported and maintained

- Supported and continually improved to respond to changing demands and priorities
- Includes training and services that educate teams to use the analytic tools successfully
- Has a community of users who collaborate and share best practices

"The ultimate test of a good segmentation is whether it is understood, accepted, and used effectively by the organisation. A segmentation that is not understood or embraced will fail to drive meaningful action, regardless of its analytical sophistication."

— David J. Batholomew

What is the Patient Need Groups (PNG) framework and how does it fare against these key points?

Introducing PNGs: The ideal clinical segmentation approach

The Patient Need Groups

PNG01	PNG02	PNG03	PNG04	PNG05	PNG06	PNG07	PNG08	PNG09	PNG10	PNG011
Non User	Low Need Child	Low Need Adult	Multi-Morbidity Low Complexity	Multi-Morbidity Medium Complexity	Pregnancy Low Complexity	Pregnancy High Complexity	Dominant Psychiatric Condition	Dominant Major Chronic Condition	Multi-Morbidity High Complexity	Frailty

Increasing Health Needs

The Johns Hopkins ACG® System's PNGs offer an innovative and clinically-based approach to patient segmentation. Each individual is unique and as such requires a tailored care plan driven by their medical conditions, demography and social factors. Our PNG methodology assigns individuals of all ages into one of **11 mutually exclusive groups that are easy to understand,** tracking patients as they move into and out of various levels of need throughout their life. Exploring impactable risk factors, such as tobacco use and care coordination issues, helps users identify where to concentrate their clinical team's time.

While other population health analytic tools identify patients by disease state, care episode or utilisation event, the ACG System has always focused on a **whole-patient approach to care.** Patients, particularly those with complex health needs, cannot be defined simply in terms of their disease states ("a diabetic") or event ("a readmission").

The chart below clearly sets out the association between key system metrics and the different needs of each segment in the PNG hierarchy.

			% of population	Mean Age	Mean Number of Chronic Conditions	Mean Number of GP Appointments	Mean No. of Active Ingredients (Distinct Drugs)	Emergency Admissions per 1,000	Mean Emergency (LOS) days	Mean Risk of Emergency Admission
High Complexity; Multi-Morbidity	11	Frailty	1.2%	85	8.1	16.5	8.1	751	7.5	55.6%
	10	Multi-Morbidity, High Complexity	3.5%	71	7.9	15.9	8.2	714	3.9	51.3%
Dominant Chronic	09	Dominant Major Chronic Condition	6.5%	58	4.4	9.6	5.0	146	0.5	16.4%
	08	Dominant Psychiatric/ Behavioral Condition	3.3%	46	3.6	7.8	3.5	114	0.5	5.4%
Pregnant	07	Pregnancy, High Complexity	0.2%	32	2.7	11.4	3.1	338	0.3	3.6%
	06	Pregnancy, Low Complexity	0.8%	31	1.0	6.8	1.6	80	0.1	0.2%
Moderate Needs	05	Multi-Morbidity, Medium Complexity	15.7%	62	4.2	9.4	4.6	132	0.3	7.9%
	04	Multi-Morbidity, Low	23.6%	47	1.7	4.9	2.0	47	0.1	0.2%
Healthy	03	Low Need Adult	30.2%	42	0.3	1.9	0.6	8	0.0	0.0%
	02	Low Need Child	14.4%	9	0.2	2.4	0.6	37	0.0	0.0%
	01	Non-User	0.6%	23	0.0	0.0	0.0	0	0.0	0.0%

Gaining clarity on your population and selecting subgroups

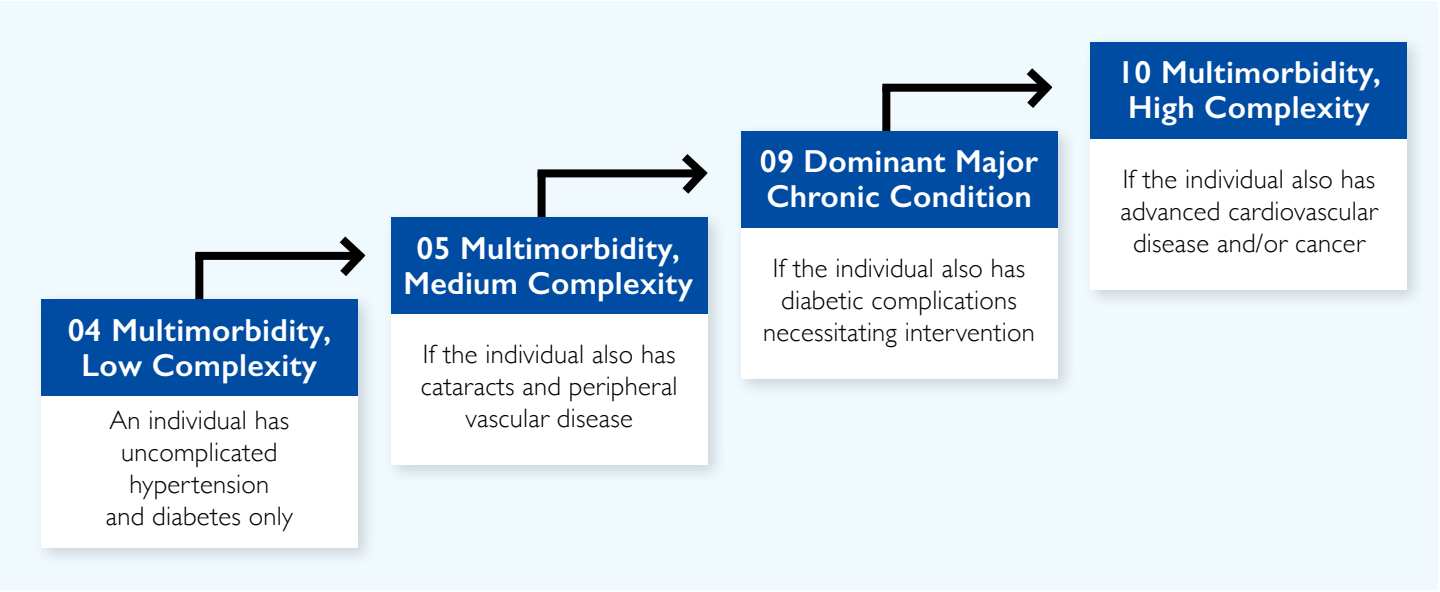
The PNG toolkit has three components. This model acts as a lens to zoom in on your population starting with segmentation, then moving to care modifiers and predicted risk.

Patient Need Groups:
a core set of 11 population segments

Care Modifiers (CM):
indicators that reflect opportunities for clinical interventions

Predicted Risk:
levels used for insightful overlay of predicted cost with current health needs

Example: Creating a custom cohort using PNGs



How can this information help users improve their population health strategy?

Together with contextual and personal, self-reported information about an individual, health care practitioners and decision makers can **design and direct care improvement programmes tailored to each patient's needs.** Less-complex PNG patient groups may be encouraged to sign up for health improvement programmes to focus on appropriate lifestyle management and prevention of worsening disease. Whereas highly complex patients may receive additional specialist clinical services focused on cardiovascular disease management and medication management to prevent future hospitalisations.

Where are PNGs being currently applied and what benefits are they driving?

- **Optimised outcomes for patients with complex multi-morbidity at Kumar Medical Centre, Slough**
  - Applied PNGs together with other clinical criteria to redesign the QOF review framework for conducting annual visits with people with complex chronic conditions
  - Segmented population to prioritise the sickest patients earlier in the year
  - Decreased repeat visits by getting patients to the appropriate clinician for their needs right from the start
    - Reduced encounters by 13% compared to other practices in the area
    - Reduced ED admissions by 10%
    - Reduced hospital admissions by 33%
    - Reduced total number of hospital bed days by 31%

- **Digital triage to improve access to care at Brookside Group Practice, Berkshire**
  - Used PNGs and self-reported patient data to segment the population based on clinical need
  - Triaged patients to the right type of professional according to their needs, allowing each professional to work at the top of their license
  - Improved care continuity with patients seeing the same care team over time
  - Reduced hospital wait times, allowing the sickest patients to be treated more quickly
  - Improved operational efficiency through better workflow management, staff satisfaction, and reduced burden on administrative teams

- **Redesigning urgent and emergency care model at Frimley ICS**
  - Used PNGs and presenting need to categorise risk of individuals presenting to urgent care and ED
  - Discovered insights into utilisation patterns and opportunities to redirect patients from ED to more appropriate and lower cost care settings
  - Informed strategic planning decisions around resource allocation
  - Guided patient communication and engagement to redirect less urgent cases to resources, including community services and a children's drop-in-unit

ABOUT THE JOHNS HOPKINS ACG SYSTEM:

The ACG System is a flexible, transparent set of tools developed and validated by scientists and clinicians at the Johns Hopkins Bloomberg School of Public Health. Customers use the ACG System to segment their patient populations and to process their organisation's existing medical, pharmacy and lab data to generate clinical risk markers and predictive models at the population and patient level.

The ACG System provides health care analytics teams with the insights they need to inform rapid decisions about patient care, resource planning and service design.

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To learn more about Patient Need Groups and the ACG System, contact our team at acginfo@jh.edu or visit hopkinsacg.org.