

Population Segmentation

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Chong, J.L., Lim, K.K. & Matchar, D.B. Population segmentation based on healthcare needs: a systematic review. *Syst Rev* 8, 202 (2019). <https://doi.org/10.1186/s13643-019-1105-6>

- Originating from Market Segmentation

Criteria	What is it?
Homogeneous	Consumers added to each segment should be similar in some way
Heterogeneous	Each segment should be relatively unique, as compared to other segments
Measurable	Some data should be available to measure the size of the segment
Substantial	Segment should be large enough, in terms of sales and profitability to warrant attention
Accessible	Segment need to be reachable, particularly in terms of distribution and communication
Actionable/Practical	Need to be able to implement a distinctive marketing mix for each segment
Responsive	Each segment should respond better to a distinct marketing mix than a generic offering

- Aims for Population Segmentation

- to make the people in the segment as similar as possible
- to make the segments as different as possible
- to make the people identifiable
- to make the segments big enough to be useful
- to make sure we can communicate with the segments
- to make sure we can do something different with the segment
- to make sure the segments respond differently

Segmentation tools

Segmentation tool	Segment formulation	Segmentation base type	Peer-reviewed validation	Proprietary	Need for comprehensive electronic medical record	Number of segments
Lynn et al.'s Bridges to Health model	Expert driven	Medical	No	No	No	8
Hewner et al.'s Complexedex	Expert driven	Medical, lifestyle	No	Yes	Yes	4
Kaiser Permanente's Senior Segmentation Algorithm (SSA)	Expert driven	Medical	Yes	Yes	Yes	4
Delaware Population Grouping	Expert driven	Medical	No	No	Yes	20
Lombardy Segmentation	Expert driven	Medical, demographic, utilization	No	No	Yes	8
3M's Clinical Risk Group (CRG)	Expert driven	Medical, demographic	Yes	Yes	Yes	6–269
Joynt et al.'s Medicare claims-based segmentation	Expert driven	Medical, frailty indicators, demographic	Yes	No	Yes	6
British Columbia Health System Matrix	Expert driven	Medical, demographic, utilization	No	No	Yes	14
Singapore MOH (Ministry of Health) Segmentation framework	Expert driven	Medical, utilization	Yes	No	Yes	6
Northwest London Segmentation Scheme	Data, expert driven	Medical, demographic, functional	No	No	Yes	10
John Hopkins Adjusted Clinical Group (ACG)	Data, expert driven	Medical, demographic	Yes	Yes	Yes	92
Van der Laan et al.'s Demand-driven segmentation model	Data driven	Medical, functional, social	Yes	No	No	5
Liu et al.'s Latent Class Analysis (LCA) of Taiwan National Health Interview Survey (NHIS)	Data driven	Medical, functional, socio-demographic	Yes	No	No	4

Segmentation vs Risk Stratification

- The goal of population segmentation is to group individuals in relatively homogeneous groups that are different from other segments that we can communicate with and deliver different services to.
- Risk stratification divides a population into different strata of risk for a specified outcome, i.e. risk of emergency admission in next 6 months.

Foundry PCN Lewes

- Clinician led expert driven approach assigning red, amber, green categories to all patients in the PCN
 - **Green** – Generally well and can be seen by any suitable clinician
 - **Amber** – Ongoing conditions with focus on continuity of care provided at a surgery site with their usual GP if possible or a member of the surgery multidisciplinary team
 - **Red** - Most vulnerable patients often with complex needs for whom continuity is paramount. Given preferential access to usual GP and a focus on proactive care, with care coordinators assigned to support their care.

Torrige PCN Approach

- Data driven approach for initial assignment
- Expert driven validation check
- Develop continuity groups from the clusters
- Review pathways according to clusters
- Resource planning based on clusters

Current Simplified Approach

- Ranking based on
 - Number of QOF Registers
 - Number of Repeat Medications
 - Number of Appointments
- Data fields
 - ID
 - Gender
 - Age
 - Postcode
 - Named GP
 - QOF Registers (n = 20): AF, AST, CAN, CHD, CKD, COPD, DEM, DEP, DM, EP, HF, HYP, MH, OB, OST, PAD, PC, RA, SMOK, STIA
 - Number of Repeat Meds (12 mths)
 - Number of Appointments (12 mths)

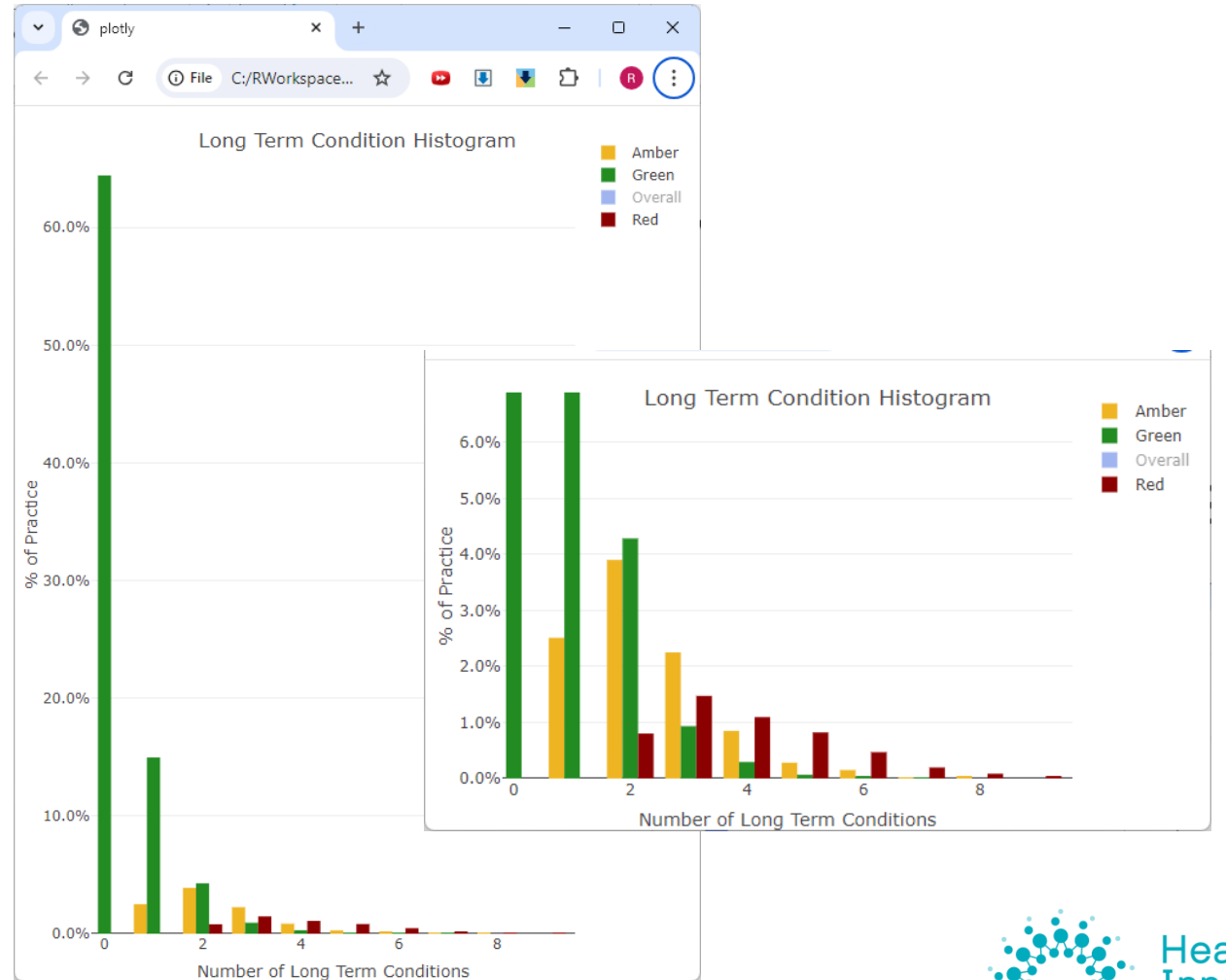
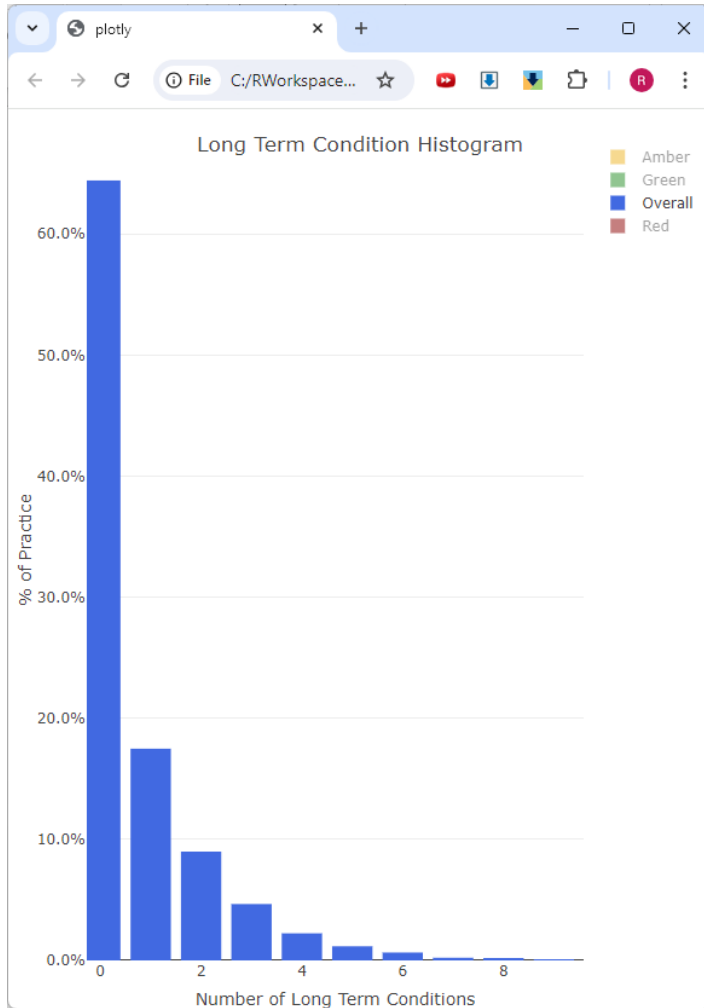
Demographics and Metrics

- [Population Pyramid](#)
- [Long Term Conditions](#)
- [Repeat Medications](#)
- [Appointments](#)
- [Interrelationships](#)

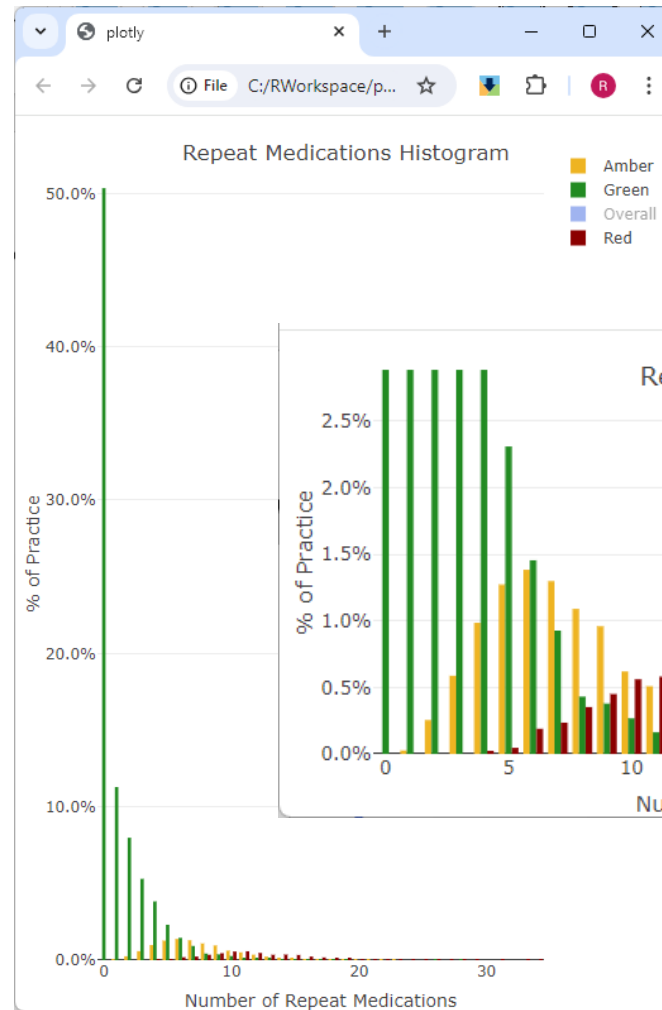
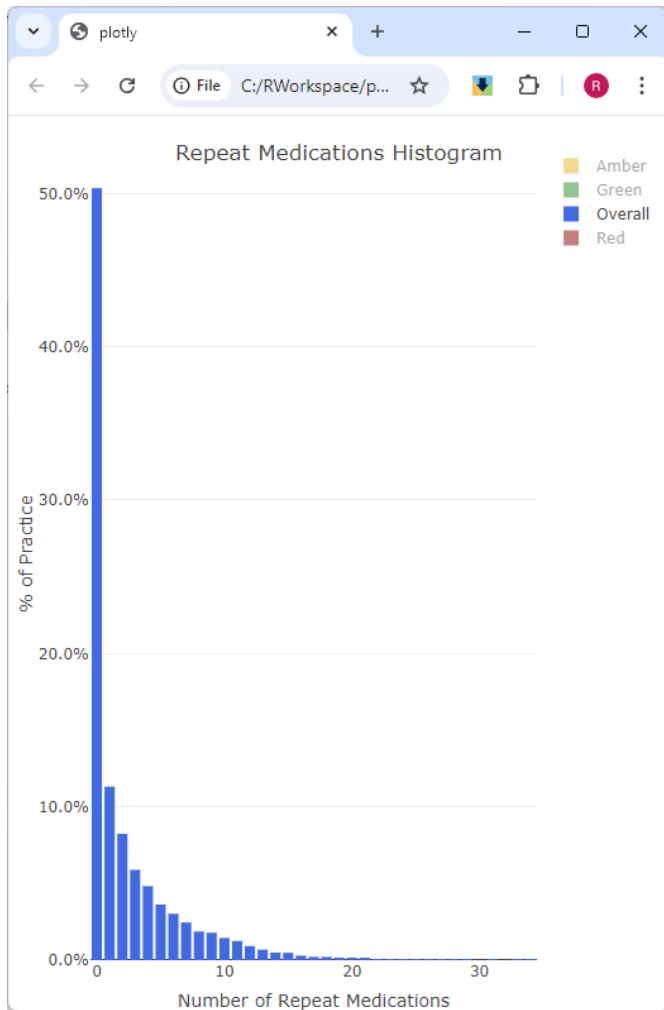
Population Pyramid



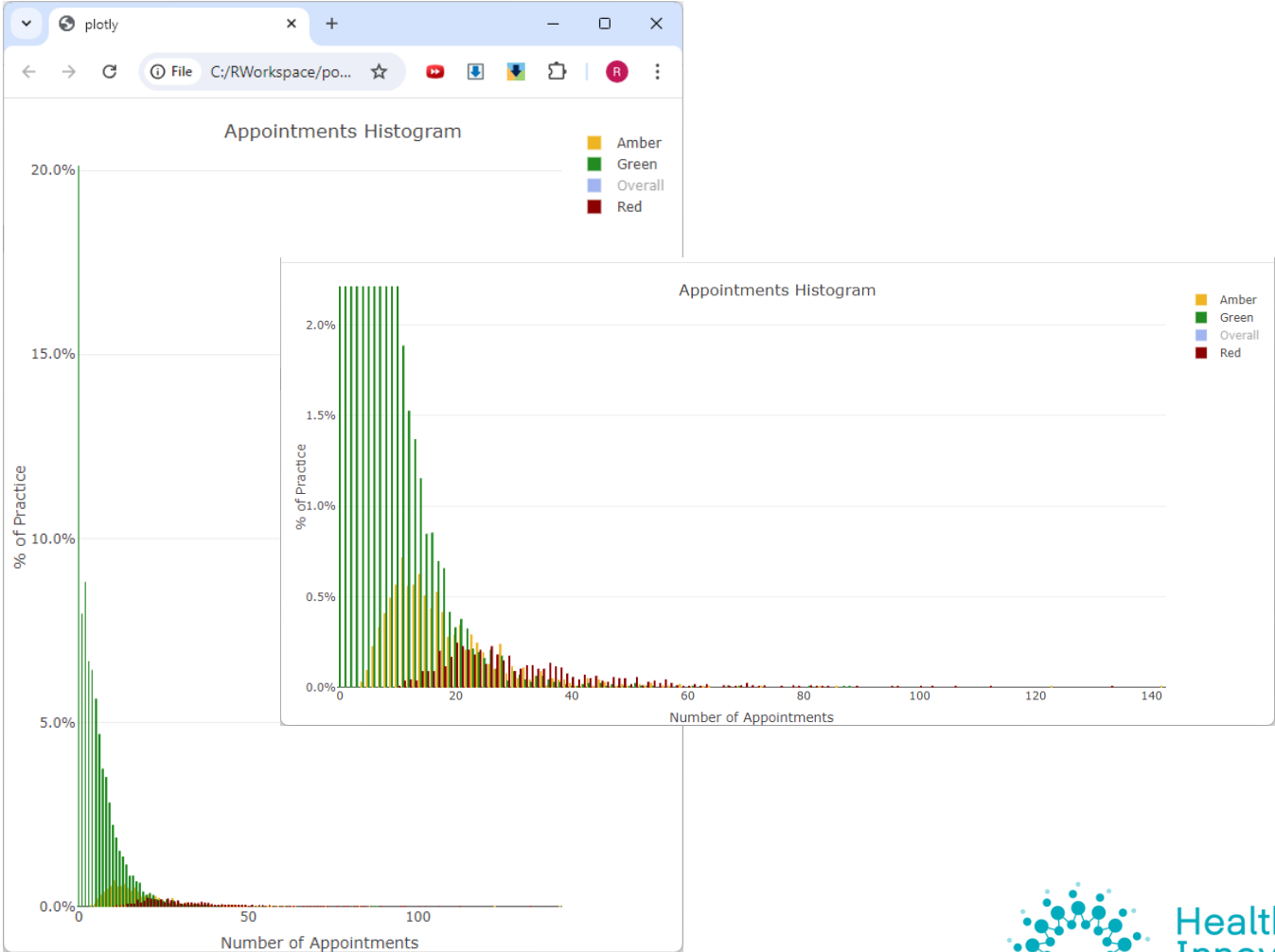
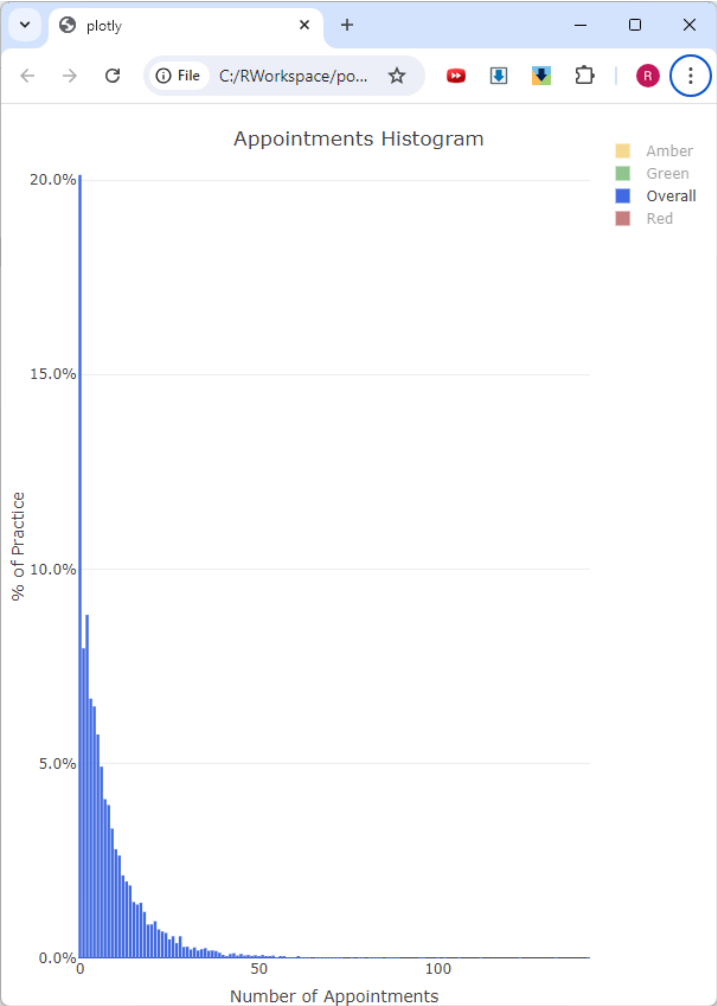
Long Term Conditions



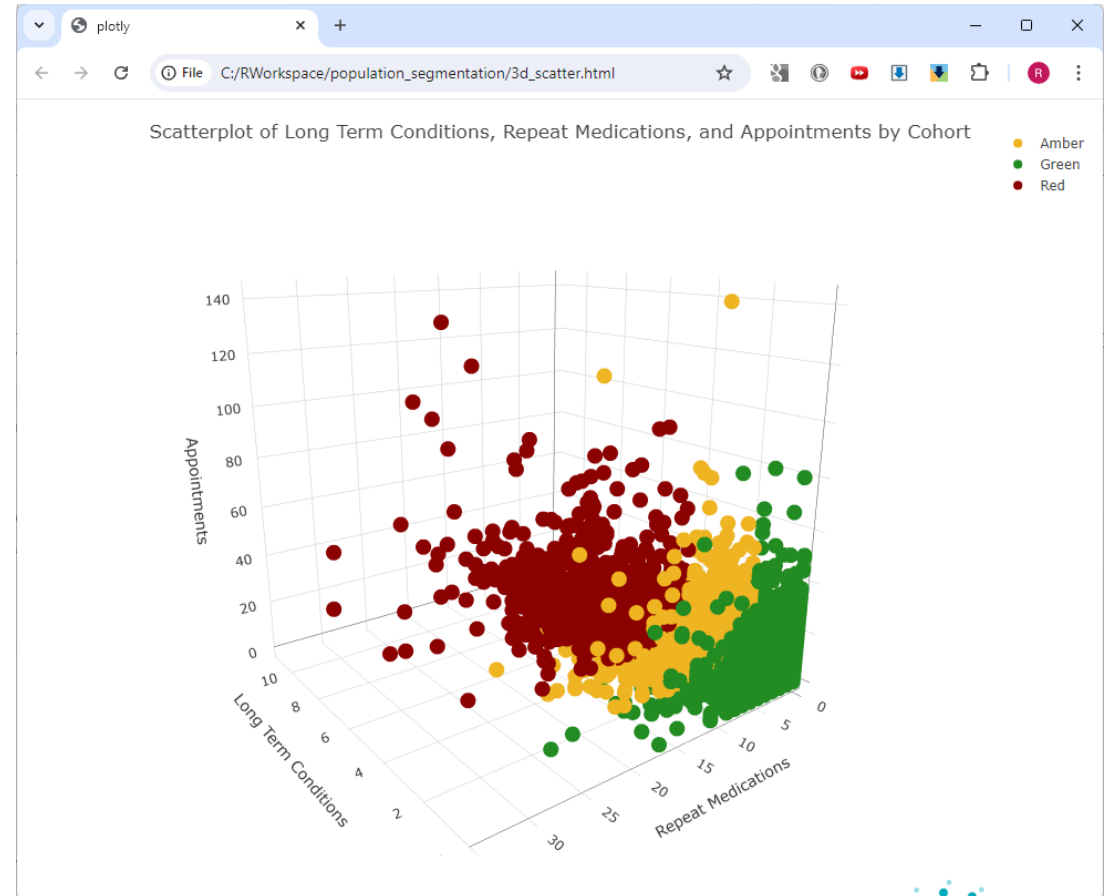
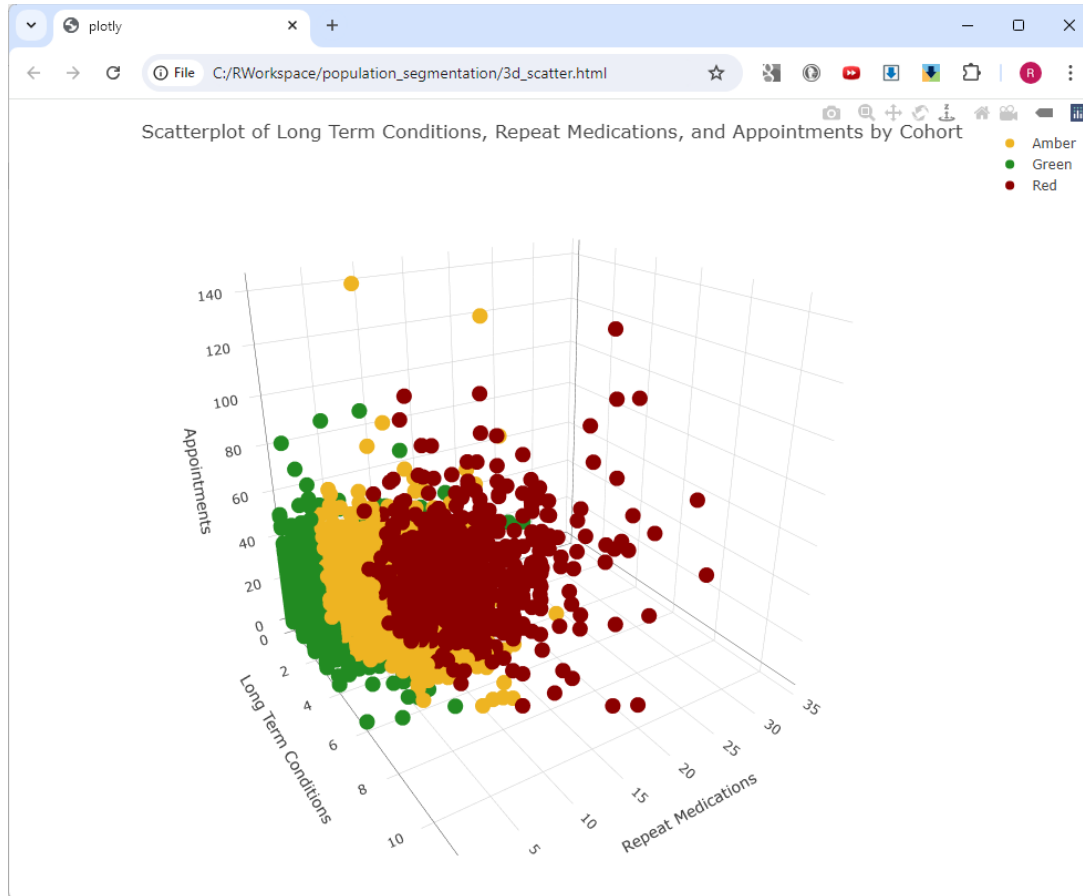
Repeat Medications



Appointments



3d Scatterplot



Uses for Population Segmentation

- Moving from 'one size fits all' into a more targeted and personalised approach to delivery
 - Primary care acute hubs
 - Pareto analysis of demand by segment
- Planning
 - Demand and Capacity Planning
 - Prediction of current and future demand by segment
 - Workforce planning for the delivery of that demand
 - Nnoaham, K.E., Cann, K.F. Can cluster analyses of linked healthcare data identify unique population segments in a general practice-registered population?. *BMC Public Health* 20, 798 (2020). <https://doi.org/10.1186/s12889-020-08930-z>
- Targeting of continuity of care

Continuity Measures

Three types of continuity – [Prof. Jeannie Haggerty](#)

- Informational continuity
 - The use of information on past events and personal circumstances to make current care appropriate for each individual
- Management continuity
 - A consistent and coherent approach to the management of a health condition that is responsive to a patient's changing needs
- Relational continuity
 - An ongoing therapeutic relationship between a patient and one or more providers

Continuity Measures

- Relational continuity
 - St Leonard's Index of Continuity of Care (SLICC)
 - Continuity of Care index (COC, Bice–Boxerman)
 - Own Patient Ratio (OPR)
- Informational continuity¹
 - Dimensions: data tool, data content, data structures and data quality
- Managerial continuity¹
 - Dimensions: Information flow, co-operation, co-ordination, multi-professionality, management

¹ Kuusisto A, Asikainen P, Saranto K. *Contents of Informational and Management Continuity of Care. Stud Health Technol Inform.* 2019 Aug 21;264:669-673. <https://doi.org/10.3233/SHTI190307> PMID: 31438008.

Thoughts?