



Development of the Asthma Population Health Dashboard in ODYSSEY

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Background

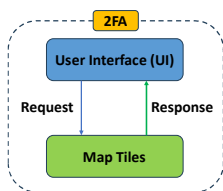
- The prevalence of reported lifetime asthma in adults is **10.5%**, contributing a **significant burden** to Singapore's healthcare system and society.^[1,2] The **economic burden** is estimated to be **SGD 2.09 billion annually**.^[2]
- The asthma patient journey often consists of a diagnosis in a **primary care** setting followed by a referral to **specialist care**. There is a paucity of data describing the clinical characteristics of patients transitioning between different care settings.
- The SingHealth-Duke-GlaxoSmithKline COPD and Asthma Real-world Evidence (SDG-CARE) collaboration developed a **real-world registry** of electronic healthcare records from **primary and specialty care settings**.^[3]

Aim

To develop and deploy a real-world evidence (RWE) dashboard in ODYSSEY (On-premise Data Science and Systems Explorer), a SingHealth Cluster Data Science Platform, to inform population health of patients with asthma.

Methodology

- The SDG-CARE registry is used as a data source to develop the RWE dashboard.
- A geospatial mapping capability, to capture patient catchment areas across primary and specialty care, is embedded in the dashboard.
- The social economic status (SES) of patients determined by the Singapore Housing Index (SHI) is captured.
- With the patients' SES, users will be able to evaluate the catchment of patient cohorts across various care types to identify high-risk groups and initiate interventions.
- The map tiles are served without the need for a separate server, thereby saving resources on ODYSSEY.
- The application is fortified with two-factor authentication for a secured login.



Implementation in ODYSSEY

Data Flow Diagram

	2015	2016	2017	2018	2019	2020
Cohort Extracted	✓	✓	✓	✓	✓	✓
Index Date	✓	✓	✓	✓	✓	✓
Recruitment (Ongoing)	✓	✓	✓	✓	✓	✓
Personal Characteristics (BMI, Smoking, AET, WAAF, etc)	✓	✓	✓	✓	✓	✓
Followup Period (Time between Visits)	✓	✓	✓	✓	✓	✓

Cohort Table: 36,405 Unique Patients, 204,407 Unique Asthma Related Visit IDs
 Diagnosis Table: 35,260 Unique Patients, 176,684 Unique Asthma Related Visit IDs

Merged Cohort: 21,215 patients

SC: 2,910 patients | PC: 15,653 patients | SC and PC: 2,652 patients

Patient Characteristics

Demographic	Study population N=21,215	PC only n=3,644	SC only n=2697	PC & SC n=5074	Difference between groups
Age, years, mean (SD)	51.8 (19.0)	50.4 (19.3)	50.7 (20.8)	56.2 (18.7)	P<0.001
Male, n (%)	9430 (44.5)	6065 (45.1)	1306 (48.4)	2059 (40.6)	P<0.001
Ethnicity, n (%)					
Chinese	11,168 (52.6)	6751 (50.2)	1648 (63.2)	2767 (54.5)	P<0.001
Malay	3278 (14.9)	3860 (10.7)	318 (11.8)	1096 (21.6)	P<0.001
Indian	3005 (14.2)	1480 (12.5)	440 (17.3)	865 (17.3)	P<0.001
Other	1768 (8.3)	1151 (8.9)	171 (6.3)	345 (6.8)	P<0.001
BMI (kg/m ²)					
Underweight (<18.5)	5,145 (24.2%)	4,074 (19.3)	240 (8.9)	831 (16.3)	P<0.001
Normal (18.5 - 25)	6,521 (30.7%)	3,635 (27.0%)	1,201 (44.5%)	1,687 (33.2%)	P<0.001
Overweight (25.0 - 30)	5,362 (25.2%)	3,185 (23.7%)	752 (27.9%)	1,418 (27.9%)	P<0.001
Obese (≥30)	4,185 (19.7%)	2,546 (18.9%)	501 (18.5%)	1,138 (22.4%)	P<0.001
Smoking status	n=17,392	n=11,450	n=1,595	n=4,347	
Never smoker	15,411 (88.6%)	10,374 (89.7%)	1,281 (80.3%)	3,866 (88.9%)	<0.001
Ex-smoker	348 (2)	76 (0.6%)	138 (9.3)	114 (2.6%)	<0.001
Current smoker	1,623 (9.3%)	1,001 (8.6%)	156 (9.7%)	367 (8.4%)	<0.001

ODYSSEY Geospatial Dashboard

Users can hover every pin to review (de-identified) patient information

Geospatial distribution of low-income asthma patients based on filters

Dashboard to draw insights on the sample population

ODYSSEY Access Flow: 2-Factor Authentication

Compatibility with the Microsoft Authenticator mobile application

Aligned to the 2FA platform used in SingHealth

Conclusion

- The dashboard is now **live in ODYSSEY** and can be viewed by relevant staff anywhere within the SingHealth network.
- It tracks individual patients' progress, outcomes and trends, aiding population health **strategic planning and research**.
- Updating of data till 2024** is currently in progress.
- Future work will focus on determining the **medical interventions** to high-risk asthma patients.

References

- [1] Ministry of Health. National Health Survey 2010. Available from: <https://www.moh.gov.sg/resources-statistics/reports/national-health-survey-2010>. Last accessed 12 September 2023
- [2] Finkelstein EA, et al. *BMJ Open Respir Res.* 2021;8(1):e000654
- [3] Lam SSW, et al. *BMC Med Inform Decis Mak.* 2023;23(1):4. COPD, chronic obstructive pulmonary disease; SDG-CARE, SingHealth-Duke-GlaxoSmithKline COPD and Asthma Real-world Evidence; SGD, Singapore Dollar

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