HA Convention 2025

F8.5 : The consistency and heterogeneity of aged 50-64 Inflammatory Arthropathy patients across 4 hospital networks in HK: The effects of algorithm-selected ambulatory and postacute services, patient multichronicitues, municipal SES and 28-day rehospitalization.

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Why Population Data-centric AI is a Breakthrough for Public Health (Panteli et al, 2025. Lancet)

- **Precision Segmentation**: Transforms public health from generic, disease-centric frameworks to nuanced, data-driven population segments, enhancing understanding of complex patient needs.
- **Tailored Resource Allocation**: Allows targeted deployment of resources by identifying precise care gaps and differential needs across and within populations, improving efficiency and effectiveness.
- **Dynamic Insights and Proactivity**: Shifts public health practice from reactive to proactive by dynamically identifying emerging needs and risks, significantly improving preventive capabilities.

→ **Breakthrough**: Integrating AI-driven segmentation provides actionable insights into previously unseen population dynamics, driving equitable and cost-effective interventions. A call to action to which our current study heeded

Collaborative Tenet of AI-Driven Public Health Research and Practices

- **Intensive Collaboration**: AI-driven public health research necessitates even deeper and more extensive collaboration than traditional public health research, integrating diverse data sources and stakeholders.
- **Value and Complexity**: The findings from AI-driven research provide greater value, capturing comprehensive insights and addressing population heterogeneity, but require robust governance and implementation frameworks.
- **Implementation and Surveillance**: Effective deployment demands central government leadership for strategic policy alignment, supported by a community service network for practical implementation and ongoing surveillance.
- **Multilevel and Cross-Disciplinary Collaboration**: Successful research and implementation rely on collaboration across governmental departments, community stakeholders, AI scientists, clinicians, public health specialists, and health system researchers.

→ **Our recent study on profiling care needs and service gaps in Kwai Tsing district (to appear in HKMJ)** adopt this collaborative approach, directly responding to the call for integrated AI and public health initiatives exemplified by Lancet's recent call to action.

The current Study: Filling the gaps of MSK research among Young Olds

- **High Burden in Young-Old (50-64)**: MSK conditions like Inflammatory Reactive Arthropathy (IRA) significantly burden young-old adults, causing considerable disability, care utilization, and preventable hospitalizations.
- **Exemplifies Socioeconomic Disparities**: IRA disproportionately affects socioeconomically disadvantaged populations, highlighting critical inequities in health care access and outcomes.
- **Model Population for AI-Driven Intervention**: IRA patients' varied responses to postacute care and differences in preventable utilization clearly illustrate the necessity and benefits of precision-driven public health interventions.

→ **Strategic Importance**: IRA in young-old populations serves as a powerful exemplar of Lancet's vision—addressing systemic inequities and enhancing preventive public health through AI-informed, targeted interventions.

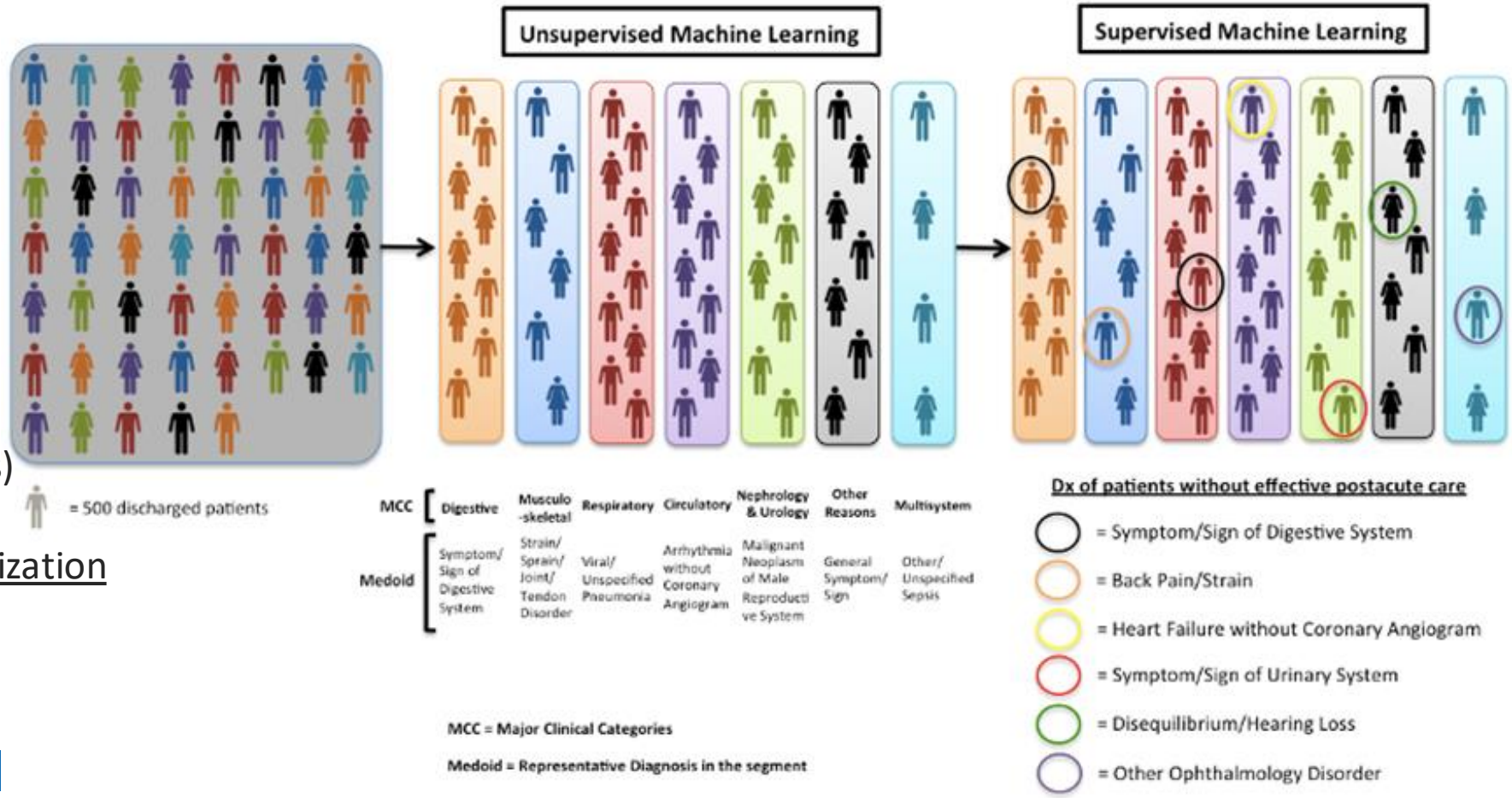
METHODS:
Profiling patient populations' care needs and service gaps across 4 medical systems with hybrid machine learning

Case-mixing parameters
- Age x Sex Grouping
- Comorbidity Level
- Flagged Interventions
- Intervention Events
- Out-of-Hospital Interventions

Acute care utilization
- Admission via A&E (y/n)

@ index hospitalization
- Index hospitalization LOS
- Cumulative A&E visits (6 months)
- Cumulative LOS (1 year)

Ambulatory and Postacute care utilization
- Types
- Duration
- Timing from discharge



How does our current study leverage our previous AI-driven public health research?

- In our AI-driven public health research of KT to appear in HKMJ:
  - Not only is the 50-64 inpatient population who suffers from clinical complexity more likely to re-hospitalize within 28-day after discharge, but the clinically complex 50-64 inpatient population is also least likely to have received algorithm-selected postacute care – the recipient of which has been associated with significantly lower rehospitalization rates among patients with similar clinical and acute care utilization profiles.
  - The typical patient profiles among the 50-64 inpatient population who show greater clinical complexity and higher rehospitalization rates most often belong to the diagnostic group of Inflammatory Reactive Arthropathy (IRA) or COPD.

→ In the current study we seek to validate our findings from KT by extending our research to four other regional medical systems beyond KT, and to explore the effect of municipal poverty on the clinical profile and care gaps among 50-64 patient populations of the respective districts.

Methods: Data Sources and Populations

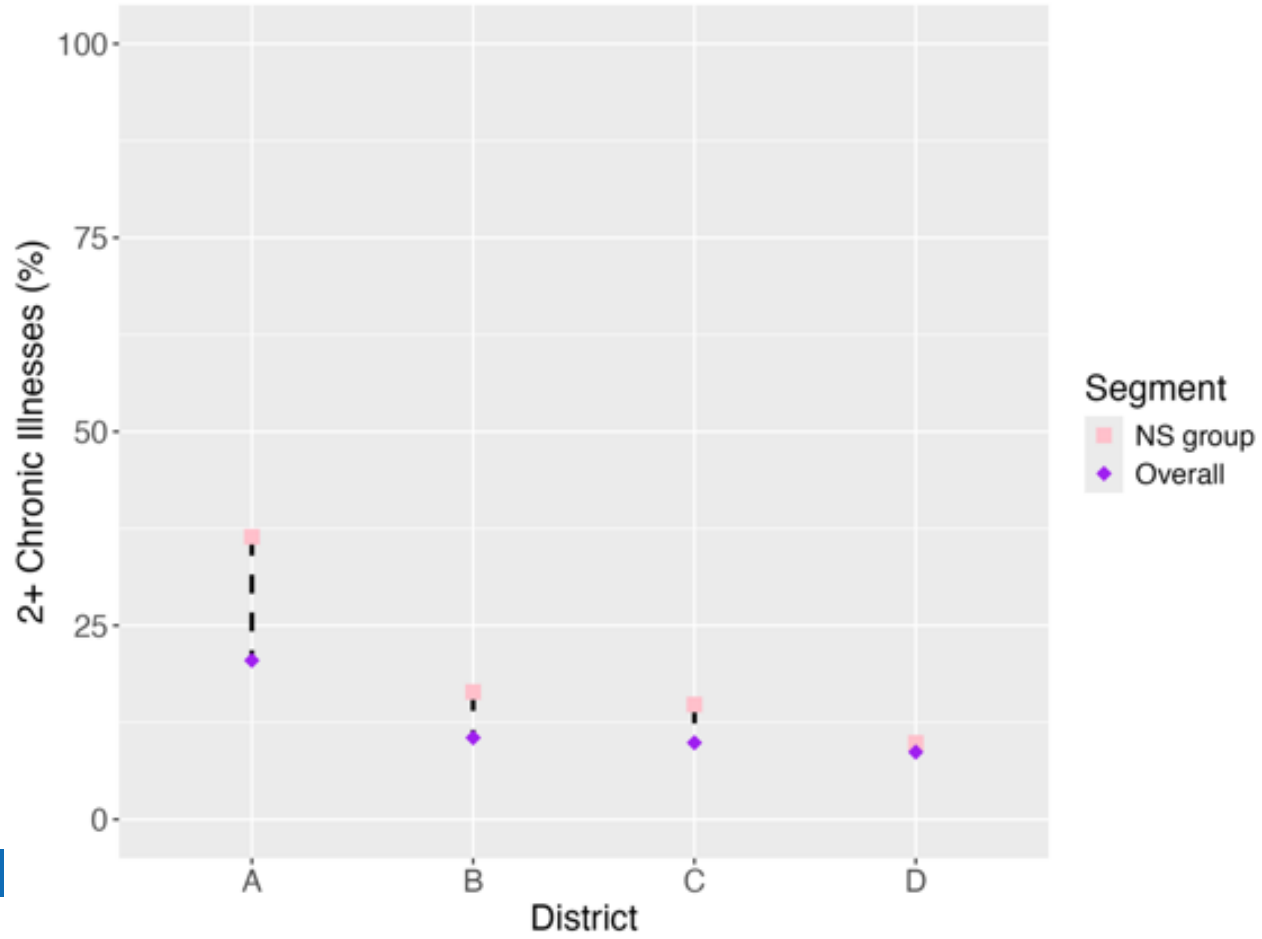
- 276,552 50-64 patients hospitalized in four hospitals from different hospital clusters between January 2019 and December 2019
- Size of the MSK segment of the four : 20928

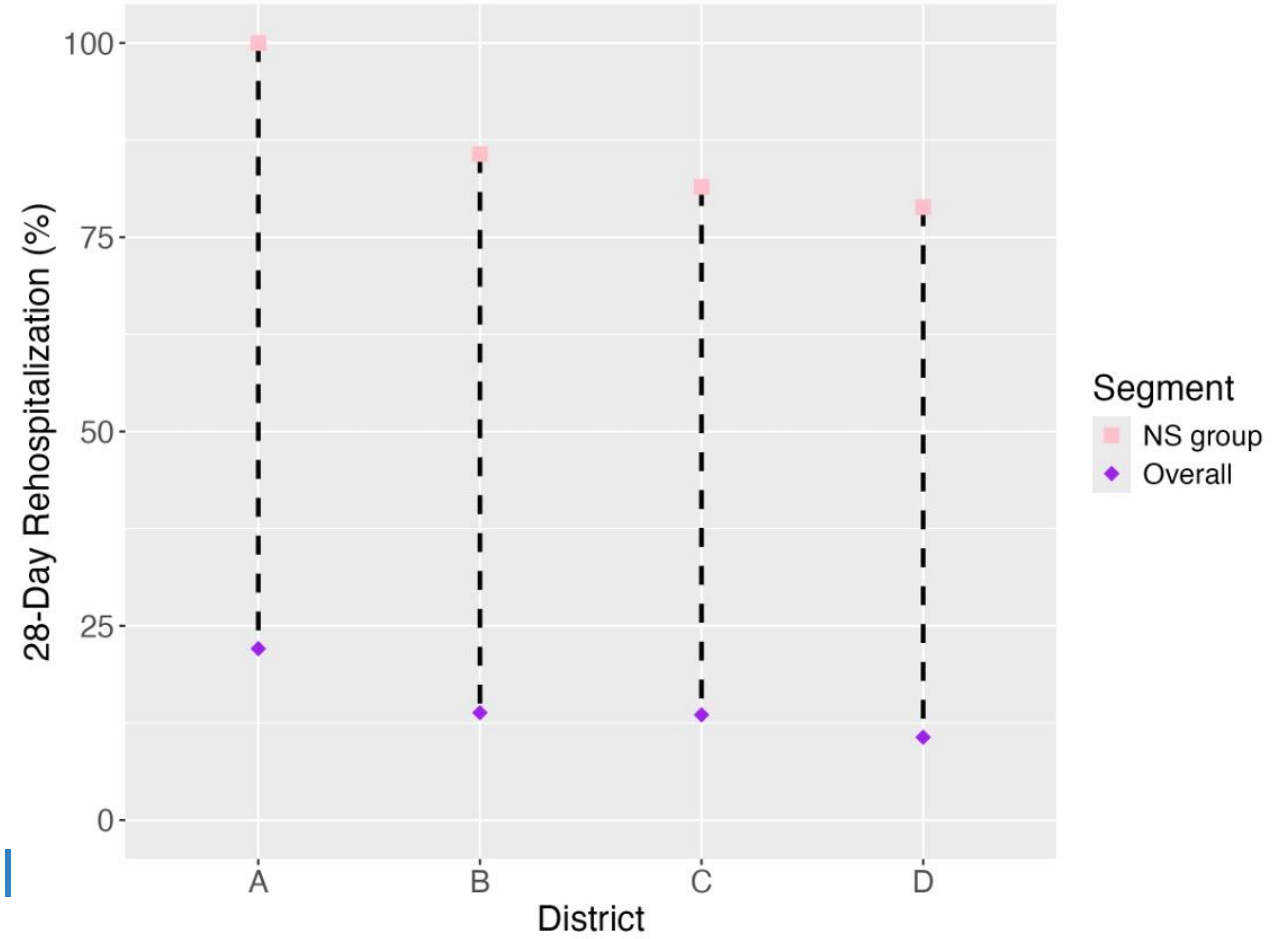
→ We are very grateful for the support, collaboration and access provided by the staff and the leadership of HA Data Collaboration Lab

- Municipal poverty rates reported below are based on Hong Kong Poverty Situation Report (2020).

RESULTS:

The higher the poverty rate of a district, the more likely the 50-64 IRA patient-representative segment to be suffering from multi-chronic comorbidity and 28-day rehospitalization. The effect is more pronounced among those who did not receive the algorithm-selected PACs received by other similar patients with significantly lower rehospitalization rates





Policy Implications

- **Target Population:** Focus on "Young-old" (50-64) for prevention at all levels as they show higher rates of rehospitalization, more intensive interventions, and greater chronic disease burden
- **Primary Prevention:** Leverage "Healthy City initiatives" led by District Councils to deliver targeted health promotion programs that reduce risk factors and enhance healthy lifestyles before disease onset
- **Secondary Prevention:** Encourage DHC/DHCE membership for early screening, detection, and management of risk factors/chronic conditions through GP networks, minimizing hospitalization through timely intervention
- **Tertiary Prevention:** Utilize DHC/DHCE as community hubs to mobilize local resources for those with established chronic conditions—supporting healthy diet, mobility, treatment compliance, and psychosocial needs to prevent complications

Acknowledgment

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- Hospital Authority Data Collaboration Lab
- Kowloon West Cluster - Hospital Authority
- Strategic Public Policy Research (SPPR) Funding Scheme

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