Logistical Impact of New Emergency Medical Services Transport Policies for Out-of-Hospital Cardiac Arrest Patients to Cardiac Arrest Centres

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Introduction

- Current Emergency Medical Services (EMS) transport of out-of-hospital cardiac arrest (OHCA) patients in Singapore is sending them to the nearest public hospital.
- Cardiac arrest centres (CACs) are specialized in higher level resuscitation and post-resuscitation care for OHCA patients.
- Previous studies and clinical experience suggested that OHCA patients with shockable rhythms and ROSC have higher survival to discharge rate when sent to CACs.

Aim

- To evaluate the impact on emergency care resources in designated CACs under new transport policies for out-of-hospital cardiac arrest (OHCA) patients in Singapore

Methodology

- We used historical data from 2017 to 2019 to simulate a new transport policy – sending all patients with both shockable rhythms and ROSC to CACs, while avoiding overloading CACs.
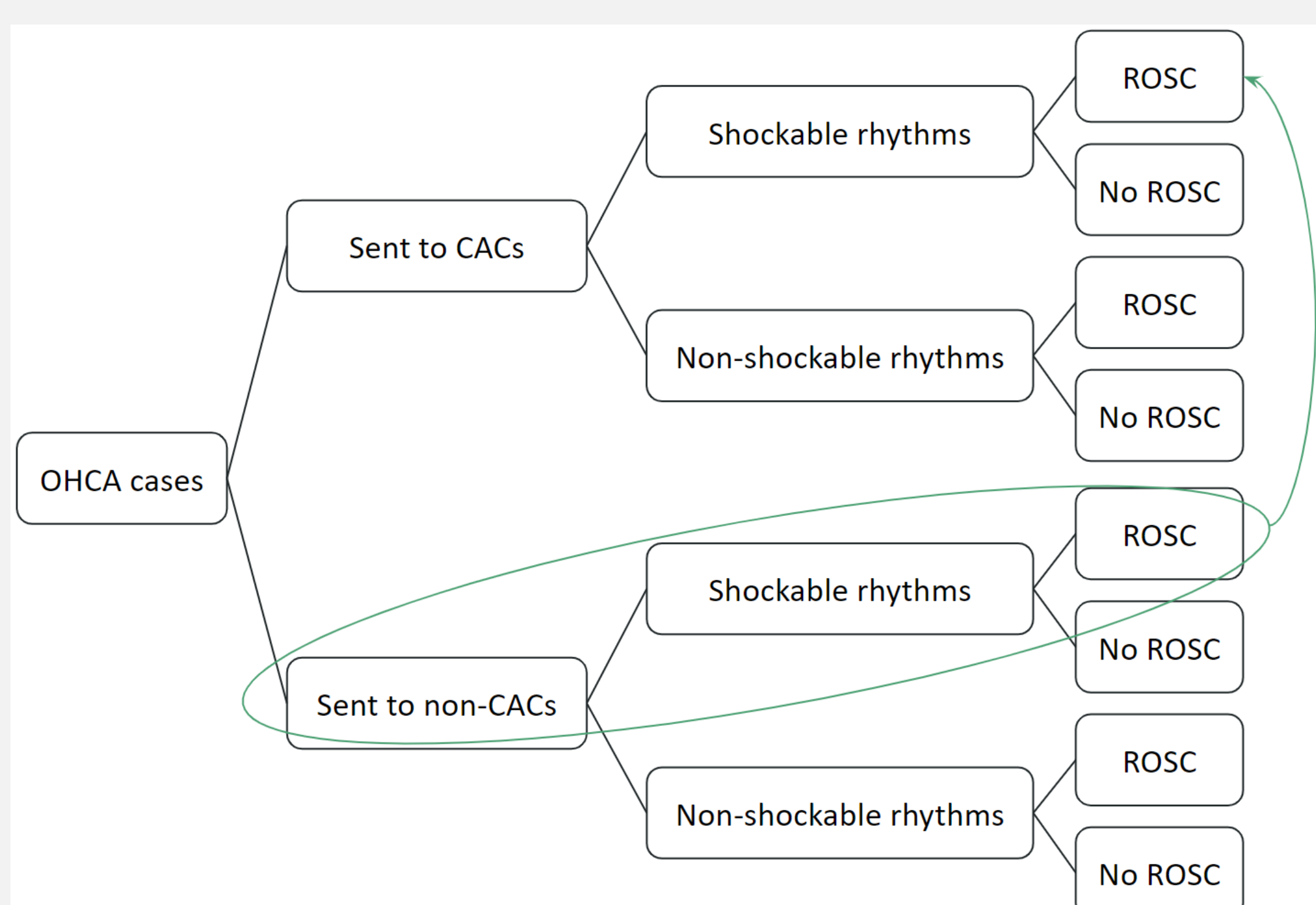

Figure 1. Decision tree of transporting OHCA patients.

- The outcomes evaluated are estimated caseloads across the designated CACs before and after policy adjustment.

Conclusion

- Allowing more OHCA patients with shockable rhythms and ROSC to be sent to CACs has potential to improve their outcomes, hence improving overall OHCA outcomes.
- With an alternative policy of dividing CACs and non-CACs into clusters, the increase in cases received by CAC in each cluster might be more balanced.

Results

- There were 2,800 OHCA cases in 2017, 2,886 in 2018, and 2,961 in 2019.
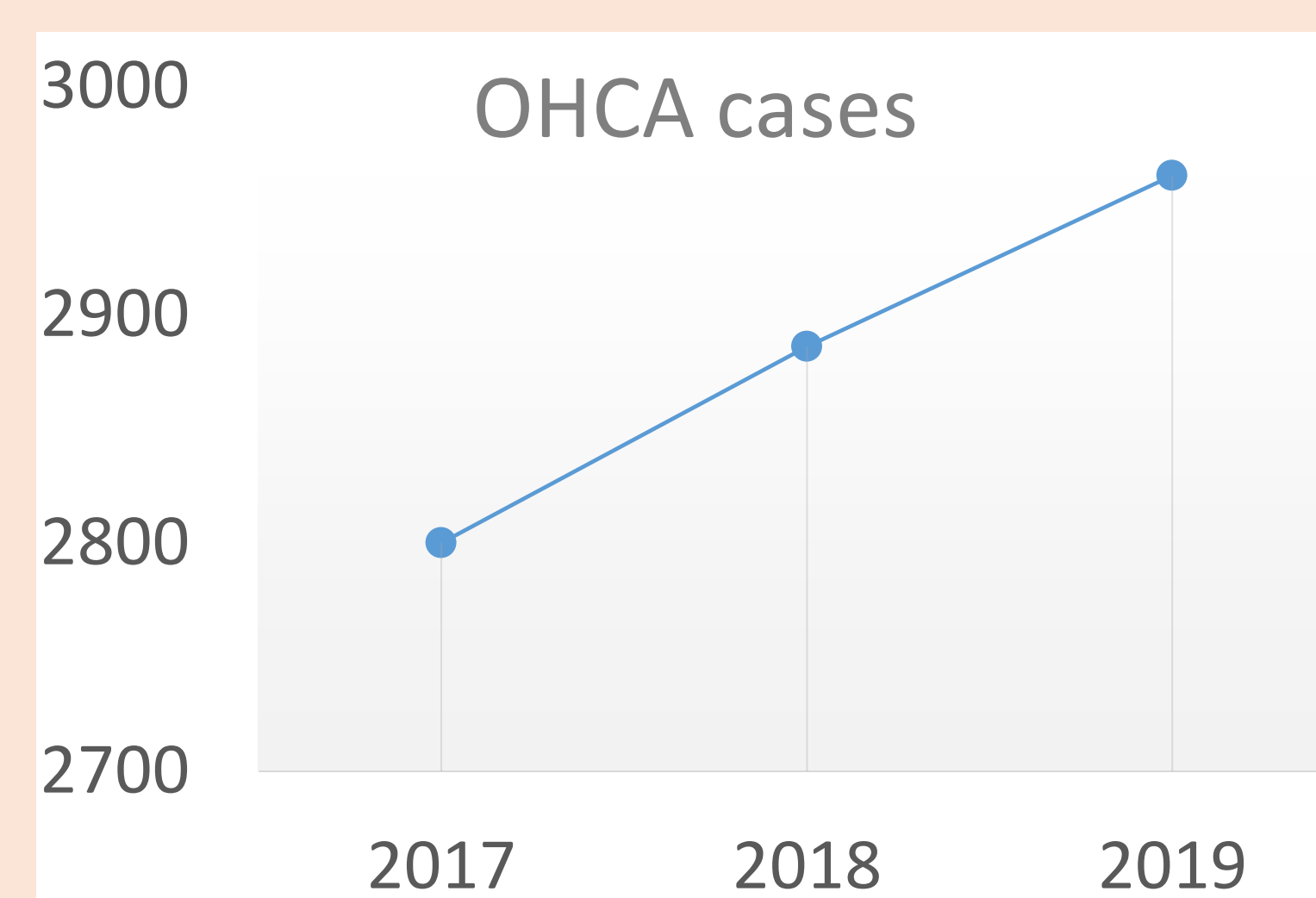

Figure 2. OHCA cases in 2017, 2018, and 2019.

- Simulated increases in cases (5.9% - 10.8%) received by CACs under a new transport policy which sends all patients with both shockable rhythms and ROSC to CACs, were calculated for each year.
- Base case policy:
    - Cluster 1: NUH & Ng Teng Fong General Hospital (NTFGH); Cluster 2: TTSH & Khoo Teck Puat Hospital (KTPH), and; Cluster 3: SGH, Changi General Hospital (CGH), & Sengkang General Hospital (SKGH)
- Alternative policy:
    - Cluster 1: NUH & NTFGH; Cluster 2': TTSH, KTPH & SKGH, and; Cluster 3': SGH & CGH
- Alternative policy resulted in more balanced caseloads across CACs in different clusters.

Current division of clusters	Increase in cases received by CAC(s) in each cluster	Alternative division of clusters	Increase in cases received by CAC(s) in each cluster
Overall	[5.9%, 10.8%]	Overall	[5.9%, 10.8%]
Cluster 1	[13.4%, 13.9%]	Cluster 1	[13.4%, 13.9%]
Cluster 2	[3.5%, 5.7%]	Cluster 2'	[4.0%, 8.0%]
Cluster 3	[17.1%, 21.9%]	Cluster 3'	[15.7%, 15.8%]

Table 1 & 2. Increases in cases received by CACs under new transport policy with two different policies of dividing clusters.
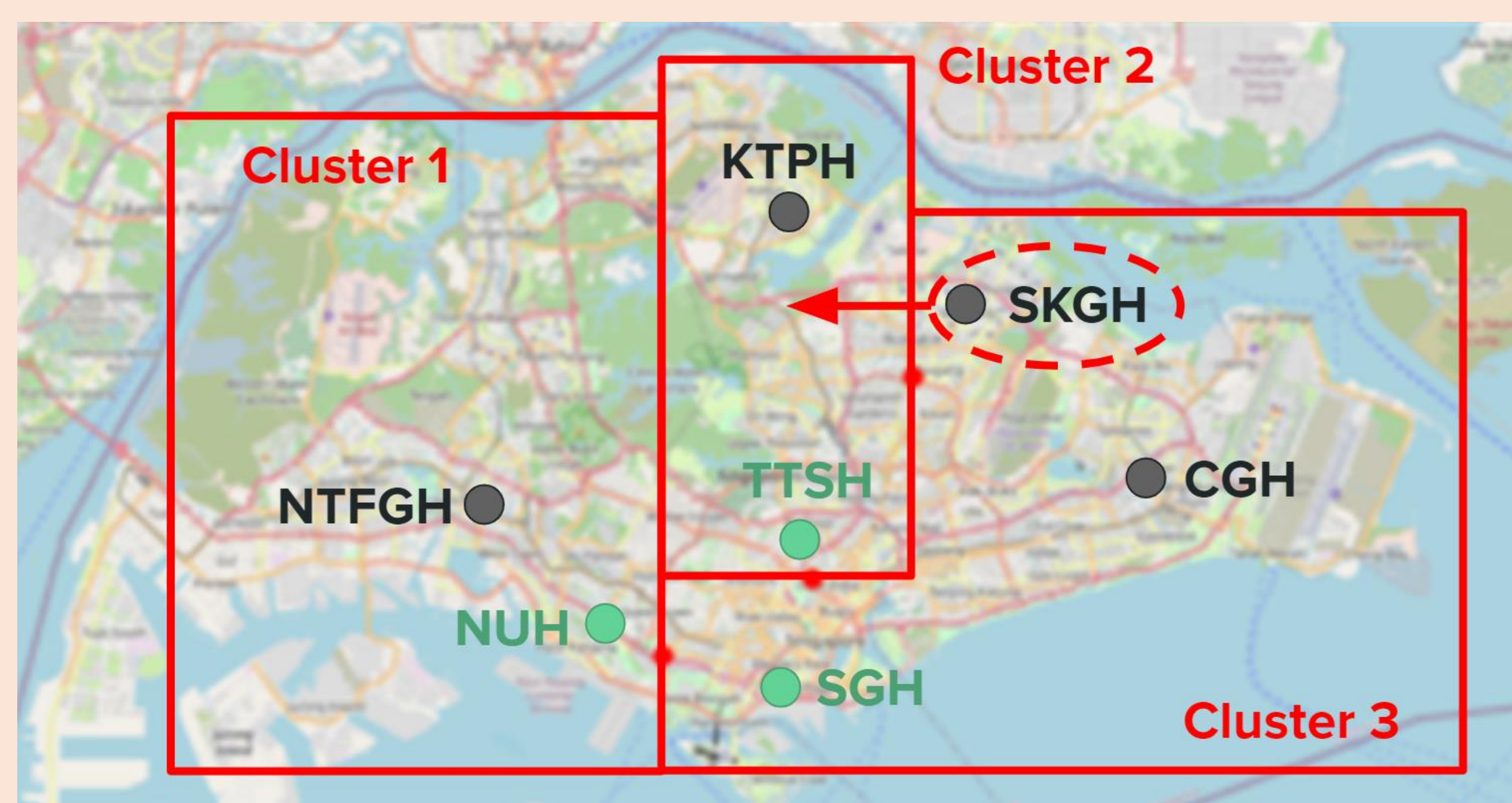

Figure 3. Base case and alternative policies of dividing clusters by capacity and geography.