Received: 7 April 2025 | Revised: 13 June 2025 | Accepted: 30 June 2025

DOI: 10.1002/hkj2.70025

SYSTEMATIC REVIEW

WILEY

The Hong Kong emergency medical services system: A scoping review

Lancelot Hei Lok Leung[1] | **Anthony Yunda Kwok**[1] | **Eponine Kate Wong**[1] | **Arthur Chi Kin Cheung**[2] | **Timothy Hudson Rainer**[2]

[1]LKS Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China

[2]Department of Emergency Medicine, School of Clinical Medicine, LKS Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China

Correspondence
Arthur Chi Kin Cheung.
Email: arthurck.hku@gmail.com

Handling Editor: CT Lui

Abstract

Introduction: Hong Kong's emergency medical services (EMS) system has been developing since the late nineteenth century and has evolved over the years to form a complex system with multiple organisations providing pre-hospital emergency care to the community. This review aims to provide an up-to-date description of the contemporary EMS system in Hong Kong.

Methods: In this review, a comprehensive review of both published and grey literature was conducted to investigate the contemporary structure of the Hong Kong EMS system. This included any articles that provided information regarding the EMS system. This was then supplemented by interviews with key stakeholders from major EMS organisations. The results of these two components were then analysed thematically based on the major components of the system.

Results: This review summarised the recent developments of the EMS system in Hong Kong. It also highlighted the key role of auxiliary organisations and volunteers in the Hong Kong EMS system. This scoping review also discovered many research gaps in the prehospital setting in Hong Kong and provides some recommendations for further study and developments.

KEYWORDS
air ambulances, ambulances, delivery of health care / organisation & administration*, emergency medical services / organisation & administration*

1 | INTRODUCTION

Hong Kong's emergency medical services (HK-EMS) system has been developing since the late nineteenth century and has evolved over the years to form a complex system with multiple organisations providing pre-hospital emergency care to the community. Hong Kong's EMS system adopts the classic Anglo-American model, characterised by a paramedic-based approach with advisory input from designated medical professionals. Hong Kong has a well-established healthcare sector, whereas different governmental and auxiliary organisations provide various specific services and cooperate to form a wider EMS system. Hong Kong also boasts one of the highest life expectancies and most densely populated cities in the world, necessitating a high demand for EMS.

As Hong Kong has become a major part of the Greater Bay Area of China, there is a pressing need for mutual understanding and service integration between

different healthcare and EMS systems.[1] Although there are several narrative reviews published on the HK-EMS topic, our scoping review aims to update the knowledge presented in these reviews as the most recent narrative review was published in 2009.[2]

This review aims to provide a comprehensive and up-to-date description of the HK-EMS system and identify any gaps in knowledge and needs for future research. In this review, a broad definition of EMS was adopted to provide a comprehensive picture of the entire system. Hence, nonemergency services provided by EMS organisations and services which support the regular EMS services will also be included in the review. The following research question was formulated for our review: Who are the main players in the HK-EMS system and how do their respective scopes, roles and capacities contribute to the functioning of the EMS system?

2 | METHODS

2.1 | Search strategy and selection criteria

MEDLINE, Embase and Global Health databases were systematically searched for all literature from the databases' inception to 31 March 2024 regarding prehospital care in Hong Kong. The detailed search strategy is included in the appendix (Appendix 1). Additionally, we conducted a manual citation search for all included articles, reviewing all articles that cited and were cited by selected articles. We adopted the definition of literature 'produced on all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers'.[3] Our search focused on departmental and organisational websites of EMS organisations and any relevant publications and audits of the Audit Commission of Hong Kong. This was then further supplemented by a Google search to search for any relevant literature published by other organisations.

Our inclusion criteria for published literature were deliberately broad; all full-text articles published in an English-language journal were included, except experimental studies such as RCTs, as they provided limited insight into the organisation of the HK-EMS system. The broad eligibility criteria allowed for a more comprehensive understanding of the HK-EMS system. This scoping review follows the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews guidelines (Appendix 2).[4]

2.2 | Interviews

Because of the scarcity of published and grey literature on the HK-EMS system, interviews with representatives from all major EMS organisations were conducted to provide qualitative information. These organisations included the Fire Services Department (FSD), Government Flying Service (GFS), Auxiliary Medical Service (AMS), Civil Aid Service (CAS), St. John Ambulance (SJA) Hong Kong and the Hong Kong Red Cross (HKRC). Interviewees were either the head of the organisation or the person in charge of the EMS portion of their organisations. A semi-structured interview format was conducted with a set of standard questions about the composition, manpower, scope of practice etc. Site visits to individual headquarters were performed.

2.3 | Data analysis

We used a reference management software, EndNote 21, to remove duplicate articles found in the database searches. Two independent investigators (LHLL, AYK) conducted the initial screening, followed by a full-text review of the articles screened. Any discrepancies were resolved through discussion with a third reviewer (ACKC). The included articles and interviews were then analysed using a thematic approach. The themes were derived from the key components of EMS systems, including public education, emergency ambulance response and interfacility transfer, vehicle equipment and supplies, interprofessional collaboration, mass gathering and specialised units. Data were extracted into those categories by two reviewers (LHLL, AYK or EKW); any discrepancies were then resolved through discussion with a third reviewer (ACKC). The findings of the literature review and interviews were integrated by each theme to form the basis for a comprehensive analysis. This approach facilitated a systematic comparison and grouping of data, ensuring that the narrative accurately reflected the HK-EMS system. EMS organisations were then contacted again and provided with the extracted data to ensure factual accuracy.

3 | RESULTS

The literature review identified 14 studies that met our inclusion criteria, with three of the articles being narrative reviews about the HK-EMS system. The latest study was in 2009.[2] However, this was a narrative review mainly focused on the FSD. The main findings of other publications are detailed in Table 1. Grey literature was identified through audit reports published by the Audit Commission of the Government of Hong Kong, websites of individual organisations and through Google searches. In total, 6 audit reports, 4 published documents from organisations, 3 government documents and 12 organisational web pages were included in our analysis. Most of these documents describe the

TABLE 1 Summary of findings of published literature on the emergency medical services of Hong Kong.

Author and year published	Study type	Main findings
Wong 2023[5]	Retrospective observational cohort study	'Postdispatch advice improved the overall bystander cardiopulmonary resuscitation rate in out-of-hospital cardiac arrest and shortened the time from out-of-hospital cardiac arrest recognition to chest compression.'
		'Improvement in survival did not reach statistical significance.'
Cheung 2022[6]	Retrospective observational cohort study (helicopter EMS)	'Most interventions were related to oxygen therapy, intravenous fluid and administration of medications.'
		'An age ≥70 years, casualty evacuation A+ category and any preflight emergency medical interventions were independent predictors for in-flight medical interventions.'
Li 2020[7]	Qualitative interview	'The ageing population in Hong Kong contributes to a low survival rate; however, the lack of bystander CPR knowledge, coupled with the sparse placement of AEDs throughout the city, the lack of confidence in performing CPR and the fear of legal consequences has severely hindered the survival rate in Hong Kong.'
Wong 2017[8]	Retrospective time series analysis	'The lowest temperatures during cooler months were found to be negatively associated with average daily ambulance demand (adj-R2 = 0.38), whereas the average amount of cloud cover and highest temperatures were found to be positively associated with average daily ambulance demand during hotter months (adj-R2 = 0.34).'
		'When the analysis was stratified spatially by ambulance command units, Hong Kong Island had the highest adj-R2 during cool and hot months, reported at 0.55 and 0.46, respectively.'
Lui 2015[9]	Retrospective observational cohort study	'The trauma patient diversion protocol currently in use in Hong Kong is not accurate enough. Further revision and refinement is needed.'
Wong 2013[10]	Retrospective cross-sectional study	'The overall field triage compliance by the paramedics is satisfactory. Under-diversion rate in NTWC is high.'
		'Nonmotor vehicle accident mechanism and isolated head injury are 2 significant predictors for under-diversion.'
Mok 2013[11]	Retrospective observational study	'Over-triage in CASEVAC categorisation is common irrespective of the time of day. Revision of the current CASEVAC guidelines is recommended.'
Suen 2011[12]	Retrospective observational study	'Although the initial experience of primary trauma diversion (PTD) in Kowloon Central Cluster (KCC) is satisfactory, more severely injured patients will benefit from our trauma centre service by improving the under-triage rate.'
Au 2010[13]	Retrospective observational study	A descriptive study illustrating 'the principles used in the medical coverage of Oxfam Trailwalker.'
Wong 2010[14]	Retrospective observational study	'Most hikers evacuated by the GFS did not suffer from serious conditions. GFS should still be prepared for the occasional cases that require advanced life support.'
Graham 2009[2]	Narrative review	'The history and the development of the Hong Kong EMS, with a particular focus on the ambulance service, the design of the system and the training of its staff.'
Lo 2000[15]	Narrative review	A narrative study describing the history, training quality assurance, disaster response and other aspects of the ambulance service of the Fire Services Department.
Wong 2000[16]	Prospective case series	'Scene and interfacility transfers by helicopter have different patient profiles and a substantial proportion of scene transfers may be inappropriate. Guidelines such as field triage and helicopter dispatch criteria need to be established.'
Cocks 2000[17]	Narrative review	This article 'reviews some of the issues involved in prehospital care over the last 20 years, in addition to a personal perspective from the author'.

activities of individual organisations. Key findings of grey literature included in our review are detailed in Table 2. A summary of the literature review process is presented in Figure 1.[44]

3.1 | Thematic analysis

3.1.1 | Public education

All HK-EMS organisations are actively contributing to the dissemination of emergency care knowledge and skills to the general populace.

The main providers of first aid certificate courses recognised by the HKSAR government are the Hong Kong SJA, the HKRC and the AMS. SJA Association, the training arm of SJA, hosts a wide range of public education courses such as first aid courses, adult CPR & AED provider courses, prehospital trauma life support courses, advanced medical life support courses etc. SJA Association also promotes first aid through television programmes and interviews with newspapers. HKRC conducts public education campaigns and training courses, including first aid training, emergency planning & disaster preparedness and psychological first aid. AMS primarily offers first aid training to civil servants from various government departments. They also organise first aid courses for local schools, nongovernmental organisations and elderly home institutions.

FSD had special programmes which offer free training on CPR and AED use to universities and secondary schools' students and staff, as organised by the Community Emergency Preparedness Team. In 2018, FSD initiated the 'Anyone' social media campaign which emphasised that 'Anyone' can perform bystander CPR to save lives. In 2021, the 'AED Anywhere for Anyone' programme was launched to enhance the availability and use of AEDs in the community. This is further augmented by FSD's postdispatch advice to bystanders, guiding them when managing over 30 types of common prehospital conditions.

The CAS, through its public campaigns, educates the public about a range of topics related to emergency preparedness and disaster response, such as through emergency preparedness training for local community and the mountaineering safety promotion programmes. CAS also organises training workshops or drills for other EMS organisations.

Apart from the previously mentioned educational programmes, all six major EMS organisations have related uniformed youth groups or cadet corps which provide invaluable training to students, especially in teamwork, leadership and community service.

3.1.2 | Emergency ambulance response and interfacility transfer

Hong Kong's ambulance services can be divided into two tiers to cater for the different needs of prehospital patients. The first tier is the emergency ambulance service (EAS). This service is designed for individuals in immediate need of prehospital care and swift transfer to a medical facility for urgent attention. The second tier is the nonemergency ambulance transfer service (NEATS). NEATS is tailored for patients necessitating transportation to and from medical establishments without clinical urgency.

The geographical location of major EMS facilities in Hong Kong is depicted in Figure 2.

Emergency ambulance service (EAS)

The main providers of EAS are the FSD and SJA Brigade. GFS provides a helicopter EMS ambulance service to remote, rural areas.

The FSD responds to emergency calls through their emergency hotlines directed to the Fire Services Communication Centre, which then deploys ambulances as necessary. FSD's Ambulance Command consists of the command headquarters and two operational regions, namely, the Hong Kong & Kowloon region and the New Territories region, with each operational region further split into 2–3 geographical divisions for sufficient service coverage across Hong Kong. FSD has an establishment of about 10,740 uniformed personnel and about 760 civilian members, including around 3000 ambulance personnel, of whom 1372 are paramedics and 289 are integrated advanced skills providers (IASPs). FSD paramedics serve a pivotal role in patient diversion and streamline the transition from prehospital to hospital care. FSD paramedics can actively divert patients with severe injuries that meet certain specific criteria to designated trauma centres. Furthermore, FSD paramedics are trained to perform stroke assessments and 12-lead ECG assessments for STEMI diagnosis to alert hospital personnel, ensuring patients receive timely interventions. IASPs are paramedics who have undertaken an additional 5-day training course at the Fire and Ambulance Services Academy (FASA) and who are trained to perform more advanced procedures, for example, video laryngoscopy for handling suspected foreign body upper airway obstruction.

SJA responds to ambulance requests from the FSD and the public through their 24-h hotline. SJA provides primary ambulance services including emergency calls requiring immediate transport to the closest appropriate public hospital, supplementing the FSD ambulance service and secondary interhospital transfers. SJA transfer services facilitate both cross-district public

TABLE 2 Summary of findings of grey literature on the emergency medical services of Hong Kong.

Title	Year published	Nature	Description
Report No. 80, Chapter 1: Administration of the Auxiliary Medical Service[18]	2023	Audit report	The report audited the administration of the Auxiliary Medical Service and provided recommendations regarding the management of members and cadets, provision of services and administrative issues.
Report No. 72, Chapter 4: Administration of the Civil Aid Service[19]	2019	Audit report	The report audited the administration of the Civil Aid Service and provided recommendations regarding training and services of CAS members, management of the CAS Cadet Corps and administrative issues.
Report No. 64, Chapter 2: Operation of the Government Flying Service[20]	2015	Audit report	The report audited the operation of the Government Flying Service and provided recommendations regarding the provision of flying services, management of aircrew members, maintenance of aircraft, procurement of aircraft and spare parts, and recent developments.
Report No. 57, Chapter 1: Auxiliary Medical Service[21]	2011	Audit report	The report audited the administration of the Auxiliary Medical Service and provided recommendations regarding the training of members, provision of services, management of stores, management of ambulances and performance management.
Report No. 51, Chapter 4: Fire Services Department, emergency ambulance service[22]	2008	Audit report	The report audited the Ambulance Command of the Fire Services Department and provided recommendations for improving the use of emergency ambulance services, effectiveness of publicity campaigns, performance measures and the maintenance and procurement of ambulances.
Report No. 45, Chapter 5: Operation and training of the Civil Aid Service[23]	2005	Audit report	The report audited the operation and training of the Civil Aid Service and provided recommendations regarding training of CAS members and cadets, services provided by CAS members, pay and allowances of CAS members, utilisation of training venues and suboffices, and management information.
Hong Kong St. John Ambulance Annual Report 2022–2023[24]	2023	Organisational document	This annual report details major events that occurred in 2022–2023 in Hong Kong St. John Ambulance. It also published statistics such as manpower, courses conducted and service performance indicators.
Hong Kong Fire Services Department Review 2022[25]	2023	Organisational document	This annual report details major events that occurred in 2022 in the Fire Services Department. It also published statistics regarding their operations.
Civil Aid Service Performance Pledge[26]	2021	Organisational document	The performance pledge published by CAS details their vision, mission and values, services delivered, performance targets and standards, and other information regarding their scope of service.
Ambulance Services in Hong Kong[27]	2018	Organisational document	A short document published on the FSD website describing the scope of service of major ambulance providers in Hong Kong and methods to request assistance from these providers.
Hong Kong: The Facts – Fire Services[28]	2023	Government document	A short document published by the Government of the Hong Kong Special Administrative Region describing the services provided by FSD.
Hong Kong: The Facts – Government Flying Service[29]	2022	Government document	A short document published by the Government of the Hong Kong Special Administrative Region describing the services provided by GFS.
Hong Kong: The Facts – Emergency Services[30]	2023	Government document	A short document published by the Government of the Hong Kong Special Administrative Region describing the major emergency services provided in Hong Kong. It describes all major players involved in disaster preparedness in HK.

(Continues)

TABLE 2 (Continued)

Title	Year published	Nature	Description
Postdispatch advice[31]	2024	Organisational web page	Webpage from the Fire Services Department describing the postdispatch advice service
Roles and functions[32]	2024	Organisational web page	Webpage from the Auxiliary Medical Service describing their scope of service
Performance pledge[33]	2024	Organisational web page	Webpage from the Auxiliary Medical Service describing their performance pledge
Operations[34]	2023	Organisational web page	Webpage from the Auxiliary Medical Service describing their operational structure
About us—Organisation[35]	2023	Organisational web page	Webpage from the Fire Services Department describing their organisational structure
Service and operation[36]	2022	Organisational web page	Webpage from the Government Flying Service describing their scope of service
Performance statistics[37]	2023	Organisational web page	Webpage from the Government Flying Service describing their performance statistics
Aircraft[38]	2023	Organisational web page	Webpage from the Government Flying Service detailing in-service and retired aircraft
'AED Anywhere for Anyone' ('AAA') programme[39]	2023	Organisational web page	Webpage from the Fire Services Department describing their 'AAA' campaign
Amber[40]	2023	Organisational web page	Webpage from Amber Medical describing their current scope of service
First responder programme[41]	2021	Organisational web page	Webpage from the Fire Services Department describing their programme of using firefighters as first responders
Full Implementation of Paramedic Ambulance Service[42]	2018	Organisational web page	Webpage from the Fire Services Department describing the scope of practice of paramedics in their ambulance service
First aid service[43]	N/A	Organisational web page	Webpage from the Hong Kong Red Cross describing their first aid service

hospital transportation and transfers from public to private healthcare facilities, which is unique in the HK-EMS system. SJA employs approximately 40 ambulance staff spread across different depots, with the control and communication centre stationed at the Sheung Shui station. At least one ambulance is always active in each of the three regions in Hong Kong. In addition to these permanent staff, SJA recruited nine part-time paid employees. To ensure adequate staffing levels to meet demand, the HKSJA also employs 40–50 part-time substitute staff.

GFS operates a 24-h air ambulance service, also known as casualty evacuation. Air ambulances are routinely staffed with Air Crewman Officer (ACMO) who have undergone a specialised training programme jointly designed by GFS and the Hong Kong College of Emergency Medicine (HKCEM), which includes first aid, basic life support and international trauma life support. In addition, GFS deploys specialised doctors and nurses who volunteer their expertise to deliver trauma and emergency treatment on board during the daytime of every Friday to Monday and public holidays. It is estimated that GFS helicopters transport approximately 1500 casualties to hospitals annually.

Nonemergency ambulance transfer service (NEATS)

The main providers for NEATS are AMS and the Hospital Authority.

AMS offers a free NEATS for the HK public, primarily targeting those requiring outpatient care at Department of Health or Hospital Authority clinics or referrals from private hospitals, operating daily from 0800 to 1800 h. The Hospital Authority's NEATS primarily facilitates transportation for geriatric day hospital patients, discharged patients and specialist outpatient clinic patients. This service is especially for mobility-challenged individuals who cannot use standard transportation. Service requests can be made directly to clinical staff, who will then book the NEATS via a dedicated system.

Currently, there is also a private ambulance company founded in 2022 which provides NEATS. It is a fee-for-service provider and has a wider scope of service and provides medical transport services to ports of entry in Hong Kong.

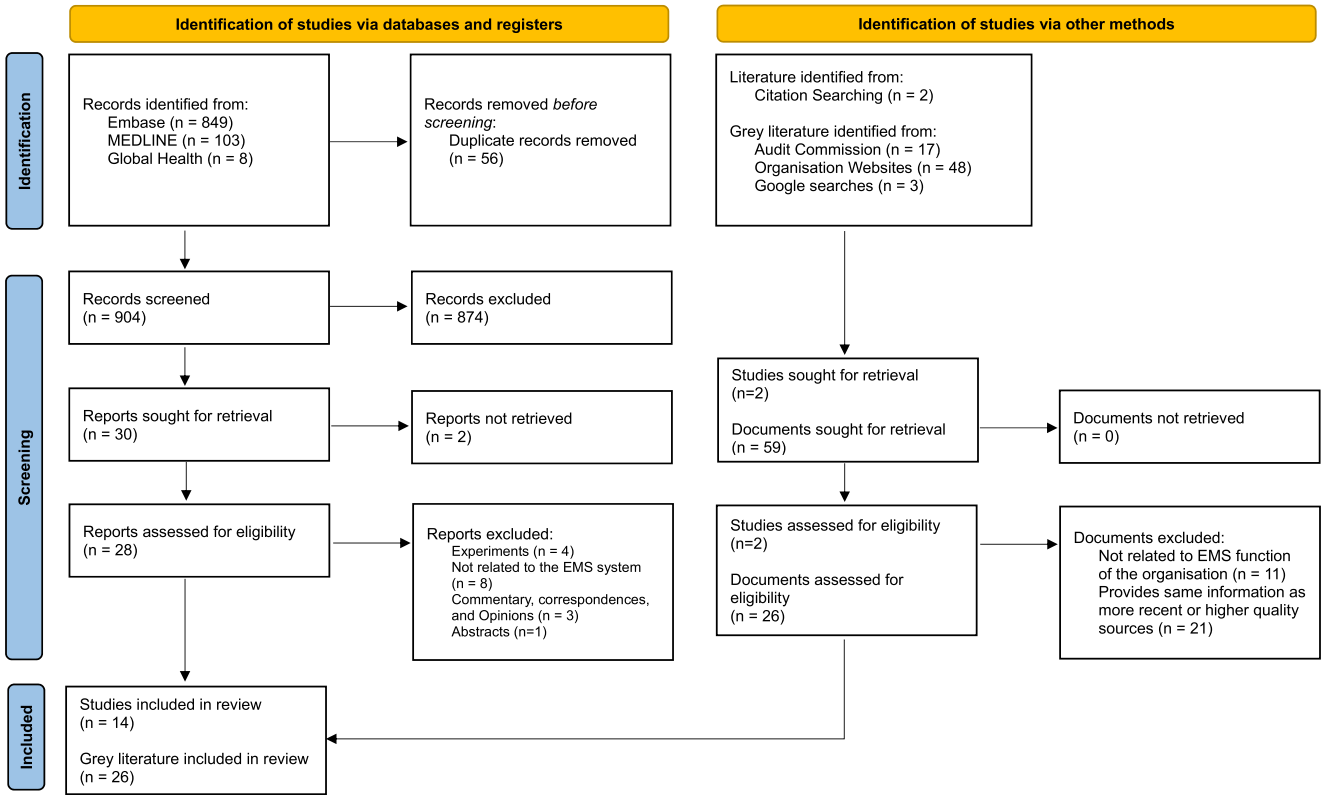

FIGURE 1 Preferred Reporting Items for Systematic reviews and Meta-Analyses 2020 flow diagram of literature review.

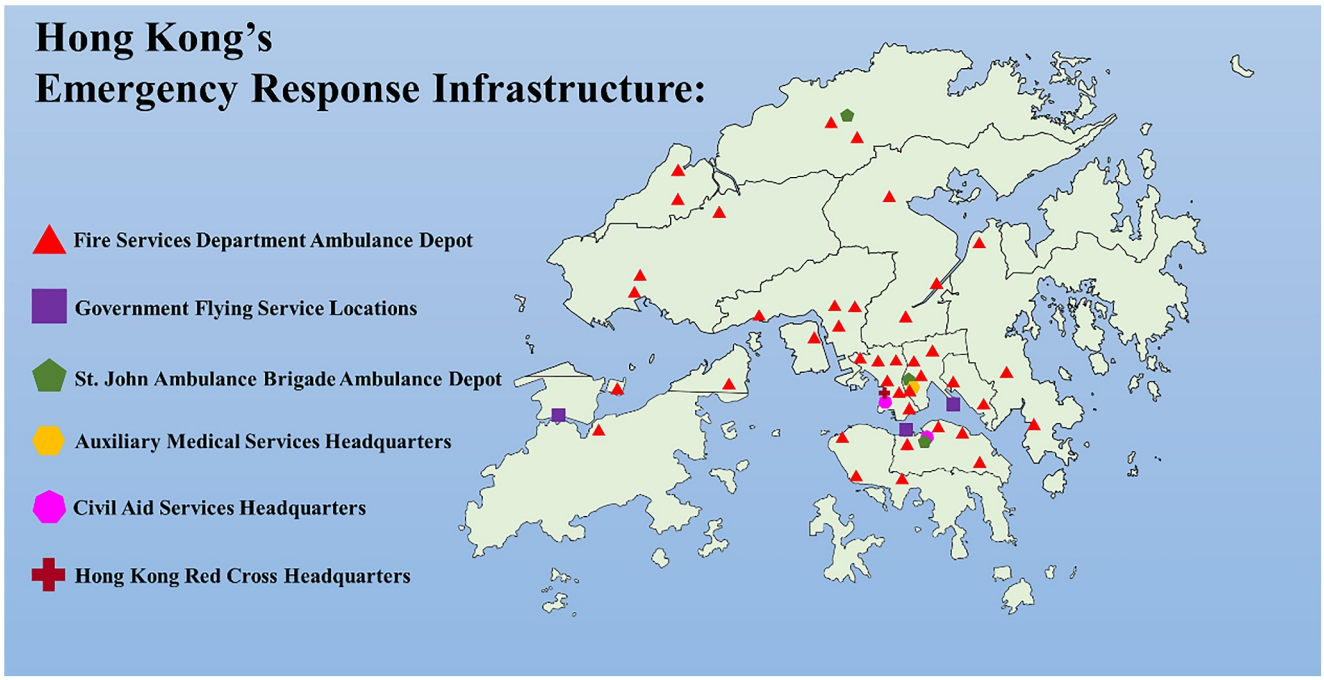

FIGURE 2 Map of important emergency medical services locations in Hong Kong. Map adapted from Nv7801. 2021 Hong Kong Legislative Council Election Geographical constituency Map [Internet]. 2021 Apr 15. Available from https://commons.wikimedia.org/wiki/File:2021_Hong_Kong_Legislative_Council_Election_Geographical_constituency.svg.[45]

3.1.3 | Vehicle equipment and supplies

As the main provider of ambulance care, FSD operates a fleet of more than 400 ambulances, representing the largest fleet of ambulances in Hong Kong. In 2022, the FSD Ambulance Command responded to a total of 740,129 ambulance calls and transported 648,442 patients to hospitals. FSD also operates specialised ambulance vehicles to respond to different circumstances. FSD's use of specialised vehicles allows the department to provide an effective and tailored response, allowing for greater adaptability in their ambulance service. The different types of specialised vehicles are described in Table 3.

GFS operates seven helicopters (Airbus H175), which are multitasking in performing air ambulance, search and rescue, firefighting and law enforcement joint operations. Furthermore, GFS has two fixed-wing aircraft (Bombardier Challenger 605) for long-range search and rescue, aeromedical retrieval service, meteorological data collection and tropical cyclone tracking.

SJA has 14 ambulances and operates 3 ambulances for their 24-h EAS service. In the period from March 2022 to March 2023, 95% of SJA ambulance calls were emergencies, highlighting their predominant role as an auxiliary EAS.

AMS operates a fleet of seven nonemergency ambulances, five town ambulances and five motorcycle ambulances. AMS town ambulances and motorcycle ambulances provide ambulance services in country parks on Sundays and public holidays. AMS town ambulances can also be used to supplement the FSD ambulance fleet in cases of disasters.

3.1.4 | Interprofessional collaboration

Medical professionals are highly involved in EMS organisations in Hong Kong as advisors, teachers or volunteers.

TABLE 3 Specialised ambulance vehicles of the Fire Services Department.

Vehicle type	Characteristics	Total no. in service
Outbreak Control and Response Team (OCRT) ambulance	• Managed by OCRT and equipped with special facilities for handling the cases of infectious diseases. They were used extensively during the COVID-19 pandemic.	2
Special Support Unit (SSU) ambulance	• Equipped with paramedic facilities and additional storage of medical items for major events and MCIs	20
Emergency medical assistant motorcycle	• Equipped with paramedic equipment for rapid provision of prehospital paramedical care and treatment to the public • These were introduced in 1982 in order to shorten the arrival time for responses.	33
Mobile Casualty Treatment Centre	• Mobile Casualty Treatment Centre (MCTC) is fitted with a lifting platform and protruding searchlights. • A surgical room is set up on each MCTC. The Hospital Authority could also deploy medical staff to man the MCTCs. • It is equipped with a great variety of life-supporting equipment for providing on-site medical treatment to casualties in the event of a major incident.	4
Mini ambulance	• Mini ambulance is small in size and equipped with paramedic facilities for the provision of prehospital paramedical care and treatment to the public at offshore islands of Hong Kong.	3
Cross-country ambulance	• The cross-country ambulance is a four-wheel drive ambulance with an automatic gearbox and heavy-duty front and rear suspensions. It is equipped with paramedic facilities for the provision of prehospital paramedical care and treatment to the public at places where road topography is rough.	2
Light ambulance	• Light ambulance is comparatively smaller than ordinary ambulances. It is equipped with paramedic facilities for the provision of prehospital paramedical care and treatment to the public, particularly at areas where the access roads are narrower.	12
Rapid response vehicle	• Rapid response vehicle (RRV) is manned by an EMA II ambulance officer. It is equipped with advanced paramedic equipment.	4
Paramedic equipment tender	• Paramedic equipment tender (PET) is equipped with various essential life-saving equipment, paramedic and medical items; a chemical protection suit is also available for providing on-site operational support at the scene of major incidents.	4
Hospital transfer ambulance	• Mainly used for hospital transfer calls but can also respond to regular paramedic calls if required. They are fitted with powered stretchers with a powered fastener system for efficient hospital transfers.	12

In the three first aid service organisations, SJA, AMS and Red Cross First Aid Response Unit (FARU), the roles of medical volunteers are similar. Medical professionals such as doctors and nurses can volunteer in first aid services with these organisations; they are often deployed in larger operations requiring their medical expertise. AMS and SJA both directly appoint medical doctors and registered nurses to predetermined ranks. In addition, doctors and nurses also serve as volunteer lecturers for SJA first aid and home nursing courses. SJA also runs a dental clinic, with voluntary dentists on a rotating basis to provide free dental care for persons with special needs.

The prehospital operations of FSD are supervised by three designated Medical Directors. Two Medical Directors are in FASA who focuse on the protocols and quality assurance, whereas another Medical Director focuses on postdispatch advice. They are also responsible for overseeing the training of paramedics and ambulancemen in the FASA. Other medical professionals in the public hospitals are also involved in teaching for the training of ambulancemen and general paramedics.

In collaboration with the HKCEM, the 'GFS Air Medical Officer Programme' was first organised in 2000 to provide medical training for doctors serving as flight doctors. In 2002, air medical nursing officer was introduced to supplement the aforementioned programme. Currently, there are about 80 flying doctors and nurses from various hospitals and specialities providing voluntary medical services. They are stationed at GFS headquarters and Kai Tak Division every Friday to Monday and during public holidays to assist the helicopter interfacility transfer and search and rescue missions. GFS doctors and nurses are also heavily involved in the training of the ACMOs.

Hospital Authority doctors and nurses work closely with EMS organisations in mass casualty incidents or natural disasters. In these situations, the Hospital Authority deploys a medical team to triage, assess and manage patients at the scene. A medical control officer and a senior emergency physician will also be deployed to the scene to coordinate medical rescue operations and liaise with other stakeholders.

3.1.5 | Mass gathering

In the urban landscape of Hong Kong with such a dense population, mass gathering events like the nightlife festivities such as those in Lan Kwai Fong, New Year countdowns and sporting events such as the Hong Kong (Rugby) Sevens, Standard Chartered Marathon etc., attract significant crowds and present potential risks of injuries and medical emergencies. The early activation of EMS and disaster prevention is essential to prevent unnecessary injuries and fatalities. In this context, EMS organisations in Hong Kong play a pivotal role in ensuring the safety and well-being of participants and attendees at these events.

SJA, AMS and the HKRC FARU are the primary entities serving in the mass gathering events. They are all volunteer-based organisations which utilise volunteer first aiders to man first aid booths on request for any mass gathering, sporting and other necessary events.

The SJA Brigade consists of 3604 adult volunteers, 4585 first aid-trained cadets and 347 active healthcare professionals who can act as volunteers in mass gatherings. The Brigade offers first aid and related services during large public events such as football matches and cycling events. Their services are primarily available on weekends and public holidays due to the voluntary nature of the first aiders. For significant events with extensive public participation, such as horse racing or long-distance walks, the Brigade could also provide on-site ambulance services for efficient delivery of patients to the hospital as requested.

The AMS consists of 4931 volunteers, also including doctors and nurses for running its services, and is a key first aid provider at large annual sporting events, including the Standard Chartered Marathon and the Trailwalker. Notably, AMS has the only first aid motorcycle service in Hong Kong to be used in sporting activities such as cycling events. The AMS also plays an auxiliary role in major emergency incidents.

The HKRC also operates primarily on a volunteer-based model. The main roles of HKRC are to provide first aid services at major events, such as sporting events, and distribution of resources, including medications, during disasters. The FARU provides event first aid services on request and regularly patrols the Tuen Ma bicycle track to respond to accidents along the road.

CAS also provides crowd control in mass gathering events alongside the Hong Kong Police Force to prevent potential crowd crush incidents, notably during mass gathering events such as New Year's Eve and Halloween.

3.1.6 | Specialised units

Aside from emergency ambulance services, some of these organisations operate specialised units for challenging incidents. The three major organisations responsible for search and rescue missions in Hong Kong are the FSD, GFS and CAS.

FSD includes specialised teams, including the Disaster Response and Rescue Team (DRRT), High-Angle Rescue Team (HAR Team), Mountain Search and Rescue Team (MSRT) and HazMat (Hazardous Material) Team. The DRRT, previously known as the Urban Search and Rescue Team (USAR Team), is

responsible for carrying out search and rescue of victims trapped or buried under rubble after structural collapse, landslides and other major incidents locally or overseas. In 2023, USAR provided humanitarian assistance after the earthquake in Türkiye, demonstrating the HK-EMS system's capacity for foreign aid. The HAR Team carries out rescue missions at high-angle locations, such as cable cars, tower cranes, bridge towers, scaffoldings at construction sites and suspended working platforms of high-rise buildings. The MSRT specialises in mountain search and rescue missions to identify possible locations of casualties and formulate proper rescue strategies. Lastly, the HazMat Team's main duty is to give advice on operational strategies, tactics and safety measures to incident commanders in HazMat incidents through assessing the situation at the scene and carrying out mitigation measures to confine various kinds of HazMat leakages.

GFS conducts SAR operations mostly within 400 nautical miles of Hong Kong but could be extended to the broader South China Sea. As the only government department with airborne capacity and able to operate outside of Hong Kong's territorial waters, GFS plays an essential role in search and rescue operations in the South China Sea. Long-range and offshore SAR operations utilise the CL605 as the initial responder and on-scene commander, whereas the H175 is used for inshore mountainous and water rescues. SAR operations frequently involve challenging terrain and weather conditions and often GFS works closely with the FSD MSRT and CAS mountain rescue unit personnel.

The CAS specialises in mountain search and rescue and provides other services, including rescues during floods and landslides, supplementing the efforts of FSD and other emergency responders. CAS is comprised of over 3000 volunteers who undertake a variety of roles, with some serving in specialised teams such as mountain rescues and rope rescues who are trained to conduct searches and rescues and provide prehospital care on challenging terrain. CAS members' unique skill set allows for rescue missions in challenging terrain.

SJA Brigade, AMS and RC all have first aid bicycle teams. They provide first aid and basic life support at major cycling trails on weekends and public holidays. As the geographical environment of bicycle trails is rugged, emergency bicycles are essential to make it easier for first responders to enter the scenes to provide timely assistance. The HKRC established Psychological Support Services in 2009, aiming to provide basic psychological assistance to citizens troubled by emotionally disturbing events such as the Manila hostage incident and providing support to the public during the COVID-19 pandemic. AMS also provides volunteers to man methadone clinics for the Department of Health.

4 | DISCUSSION

Our study revealed the roles of the major EMS organisations in Hong Kong, highlighting the fact that most of the prehospital emergency care services are currently provided by the government and nongovernmental organisations. Private companies currently do not play a major role in the EMS system in Hong Kong. However, the private ambulance market is still relatively young in Hong Kong and may take time to mature and gain popularity. Private ambulances may be the key to expanding services to the Greater Bay Area as their fee-for-service model does not increase governmental fiscal burden when expanding the HK-EMS system to other cities.

An important finding of this study was the important role of volunteers in the EMS. Volunteers play a crucial role in all EMS organisations apart from the FSD. The diverse roles of volunteers in different organisations are an asset to the EMS system and suggest cost-savings as it reduces the need to hire full-time personnel. Volunteers played an important role in supplementing the emergency capacity of statutory ambulance services and providing first aid services in mass gathering events. The use of volunteers in these roles suggests cost-effectiveness as they have a much lower personnel cost compared to private profit-seeking companies.

Our study also revealed substantial research gaps. It is important to understand the interactions between these EMS organisations, especially during joint operations, to understand if there are potential redundancies and needs to streamline the EMS system. Further research is also needed to understand the effectiveness and cost-effectiveness of deploying volunteers as first aiders in mass gathering events and to understand their impact on relieving the strain on the public healthcare system in HK. Currently, there is no widely accepted definition of first aider, EMT and paramedic in HK, as training and accreditation of personnel are within the purview of the individual organisation and are not standardised. Policymakers should consider developing frameworks to classify the skill level of prehospital care providers in HK to improve communication and cooperation in the prehospital system. Similar efforts have already been implemented elsewhere, such as the prehospital emergency medicine competency framework developed by the Royal College of Surgeons Edinburgh.[46]

This scoping review has three main limitations. First, the search for relevant articles and grey literature was conducted for English-language sources only. Limiting our results to English studies may have excluded important sources written in Chinese. This is likely to affect nonofficial sources more than official sources, as English is one of the official languages of Hong Kong. Secondly, only literature available online was included in our sources; this may have excluded important

sources of literature such as unpublished theses and books that are not available online. These two limitations on data comprehensiveness were addressed via interviews with EMS organisations, as we aimed to fill in knowledge gaps in literature through conducting in-depth interviews. Thirdly, our review does not address risks of bias in our sources. Most information included in this study is provided by the EMS organisation. The bias may have also affected the previous academic sources, as they often acknowledge the input from EMS organisations in their research.

5 | CONCLUSION

EMS organisations in HK have developed into a complex network of organisations, each taking an imperative role in prehospital care, at the same time complementary to each other. This study highlights the important role of auxiliary members and volunteers who substantially augment the manpower capacity to deal with both emergency and nonemergency services. Medical volunteerism is essential to the EMS system, as professional expertise may influence the care delivery model, improve the quality of EMS and set a role model for the new generation of medical professionals in the field of prehospital care.

AUTHOR CONTRIBUTIONS

Lancelot Hei Lok Leung: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; writing—original draft. **Anthony Yunda Kwok**: Conceptualization; investigation; methodology; project administration; writing—original draft. **Eponine Kate Wong**: Methodology; writing—original draft. **Arthur Chi Kin Cheung**: Conceptualization; formal analysis; investigation; methodology; writing—original draft; writing—review and editing. **Timothy Hudson Rainer**: Conceptualization; investigation; writing—review and editing.

ACKNOWLEDGEMENTS

We would like to express our special thanks of gratitude to Drs. Wan Kuang-an, Ben and Mok Ka-leung (Medical Directors, FSD), Captain Wu Wai-hung, West (Controller, GFS), Dr. Kwok Wing-hong, Willis (Senior Auxiliary Member, GFS), Mr. Wong Ying-keung (Chief Staff Officer, AMS), Mr. Lee Ka-keung, Peter (Staff Officer, AMS), Mr. Chow, Chiu wing, Louis (Deputy Administration Force Commander, CAS), Dr. Lam Ki-wai (Superintendent, HKSJA; First Aid Response Unit, HKRC), Mr Kwok Shing-Lam (Ambulance Services Manager), Mr. Wong Kit, Brian (Acting Senior Manager of Local Emergency Services, HKRC) and Mr. Leung Wing-sun, Darwin (Deputy Manager of First Aid Service, HKRC) for their unwavering support.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

This is a scoping review based primarily on publicly available data, supplemented by information provided by representatives who represent the organisation which was studied. There were no human subjects involved in this study, nor any form of experimentation. As such, ethical approval was not required for this study.

INFORMED CONSENT

There were no human subjects involved in this scoping review.

ORCID

Lancelot Hei Lok Leung https://orcid.org/0000-0001-8557-6719

Eponine Kate Wong https://orcid.org/0009-0008-5291-1937

PEER REVIEW

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1002/hkj2.70025.

REFERENCES

1. *The Chief Executive's 2023 Policy Address*. The Government of the Hong Kong Special Administrative Region; 2023.
2. Graham CA, Cheung CSK, Rainer TH. EMS systems in Hong Kong. *Resuscitation*. 2009;80(7):736-739. https://doi.org/10.1016/j.resuscitation.2009.04.018
3. Paez A. Gray literature: an important resource in systematic reviews. *J Evid Base Med*. 2017;10(3):233-240. https://doi.org/10.1111/jebm.12266
4. Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467-473. https://doi.org/10.7326/M18-0850
5. Wong IN, Choi YF, Lam RPK, Siu AYC. Impact of post-dispatch advice on bystander cardiopulmonary resuscitation in out-of-hospital cardiac arrest in Hong Kong. *Hong Kong J Emerg Med*. 2023;30(6):413-421. https://doi.org/10.1177/10249079231183428
6. Cheung AC, Lam RPK, Fok PWF, Chaang VK, Rainer TH. Predictors for in-flight medical interventions during helicopter interfacility transport in Hong Kong. *Hong Kong J Emerg Med*. 2021;29(5):296-304. https://doi.org/10.1177/10249079211030110
7. Li V, Kwok H, Chan J. Advocacy for resuscitation: any CPR is better than no CPR. An interview with Dr Axel Siu. *Hong Kong Med J*. 2020;26(1):80-82. https://doi.org/10.12809/hkmj-hc202002
8. Wong H, Lai P, Chen S. Biometeorological modelling and forecasting of monthly ambulance demand for Hong Kong.

Hong Kong J Emerg Med. 2017;24(1):3-11. https://doi.org/10.1177/102490791702400101
9. Lui TW, Fan KL, Leung LP. Performance of a prehospital trauma diversion system in Hong Kong, China. *Chin J Traumatol*. 2015;18(3):137-140. https://doi.org/10.1016/j.cjtee.2015.07.008
10. Wong C, Lui C, Tsui K, Tang S. Prevalence and predictors of under-diversion in the primary trauma diversion system in Hong Kong. *Hong Kong J Emerg Med*. 2013;20(5):276-286. https://doi.org/10.1177/102490791302000503
11. Mok V, Leung J, Wong C, Wong T, Lau C. Over-Triage in Casevac categorisation is common in Hong Kong. *Hong Kong J Emerg Med*. 2013;20(6):327-336. https://doi.org/10.1177/102490791302000601
12. Suen K, Chang A, Au C. A regional study on primary trauma diversion in Hong Kong. *Hong Kong J Emerg Med*. 2011;18(2):92-100. https://doi.org/10.1177/102490791101800205
13. Au C, Ho H, Yip E, Ng Y. Medical coverage in mass events: the Oxfam Trailwalker 1996 to 2007. *Hong Kong J Emerg Med*. 2010;17(5):506-516. https://doi.org/10.1177/102490791001700515
14. Wong TW, Lau PF, Lau CC. Aeromedical evacuation of injured hikers in Hong Kong. *World J Emerg Med*. 2010;1(3):176-179.
15. Lo CB, Lai KK, Mak KP. Prehospital care in Hong Kong. *Hong Kong Med J*. 2000;6(3):283-287.
16. Wong TW, Lau CC. Profile and outcomes of patients transported to an accident and emergency department by helicopter: prospective case series. *Hong Kong Med J*. 2000;6(3):249-253. PMID: 11025841.
17. Cocks R. Reflections on twenty years of prehospital care. *Hong Kong J Emerg Med*. 2000;7(4):213-219. https://doi.org/10.1177/102490790000700404
18. Audit Commission. *Chapter 1: Administration of the Auxiliary Medical Service*. Report No. 80 of the Director of Audit. Audit Commission, the Government of the Hong Kong Special Administrative Region; 2023.
19. Audit Commission. *Administration of the Civil Aid Service*. Report No. 72 of the Director of Audit. Audit Commission, the Government of the Hong Kong Special Administrative Region; 2023.
20. Audit Commission. *Operation of the Government Flying Service*. Report No. 64 of the Director of Audit. Audit Commission, the Government of the Hong Kong Special Administrative Region; 2023.
21. Audit Commission. *Auxiliary Medical Service*. Report No. 57 of the Director of Audit. Audit Commission, the Government of the Hong Kong Special Administrative Region; 2023.
22. Audit Commission. *Fire Services Department, Emergency Ambulance Service*. Report No. 51 of the Director of Audit. Audit Commission, the Government of the Hong Kong Special Administrative Region; 2023.
23. Audit Commission. *Operation and Training of the Civil Aid Service*. Report No. 45 of the Director of Audit. Audit Commission, the Government of the Hong Kong Special Administrative Region; 2023.
24. *Hong Kong St. John Ambulance Annual Report 2022–2023*. Hong Kong St. John Ambulance; 2023.
25. *Hong Kong Fire Services Department Review 2022*. Hong Kong Fire Services Department; 2023.
26. *Civil Aid Service Performance Pledge*. Civil Aid Service; 2021.
27. *Ambulance Services in Hong Kong*. Hong Kong Fire Services Department; 2018.
28. *Hong Kong: The Facts Fire Services*. The Government of the Hong Kong Special Administrative Region; 2023.
29. *Hong Kong: The Facts Government Flying Service*. The Government of the Hong Kong Special Administrative Region; 2022.
30. *Hong Kong: The Facts Emergency Services*. The Government of the Hong Kong Special Administrative Region; 2023.
31. Hong Kong Fire Services Department. Fire Services Department - post-dispatch advice. Accessed April 28, 2024. https://www.hkfsd.gov.hk/eng/fire_ambulance_services/pda_information.html
32. Auxiliary Medical Service. Roles & functions. Accessed April 28, 2024. https://www.ams.gov.hk/en/about-us/roles-functions.html
33. Auxiliary Medical Service. Performance pledge. Accessed April 28, 2024. https://www.ams.gov.hk/en/about-us/performance_pledge.html
34. Auxiliary Medical Service. Operations. Accessed April 28, 2024. https://www.ams.gov.hk/en/about-us/operations.html
35. Hong Kong Fire Services Department. Fire Services Department - organization. Accessed April 28, 2024. https://www.hkfsd.gov.hk/eng/aboutus/organization/ambcmd.html
36. Government Flying Service. Service and operation. Accessed April 28, 2024. https://www.gfs.gov.hk/en/about-gfs/service-and-operation/index.html
37. Government Flying Service. Performance statistics. Accessed April 28, 2024. https://www.gfs.gov.hk/en/publication-press-release/performance-statistics/index.html
38. Government Flying Service. Aircraft. Accessed April 28, 2024. https://www.gfs.gov.hk/en/aircraft/In-service/index.html
39. Hong Kong Fire Services Department. Fire Services Department - 'AED anywhere for anyone' ('AAA') programme. Accessed April 28, 2024. https://www.hkfsd.gov.hk/eng/cep_edu/cep/cep_aaa_index/
40. Hong Kong Fire Services Department. Fire Services Department - first responder programme. Accessed April 28, 2024. https://www.hkfsd.gov.hk/eng/fire_ambulance_services/responder.html
41. Amber Medical. Amber. Accessed April 28, 2024. https://www.ambermedical.com.hk/
42. Hong Kong Fire Services Department. Fire Services Department - full implementation of paramedic ambulance service. Accessed April 28, 2024. https://www.hkfsd.gov.hk/eng/fire_ambulance_services/paramedic_amb.html#:~:text=Commencing%20from%2028.2.,rate%20of%20critical%20patients%2F%20casualties
43. Hong Kong Red Cross. First aid service. Accessed April 28, 2024. https://www.redcross.org.hk/en/services/community_healthcare/service.html
44. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. https://doi.org/10.1136/bmj.n71
45. Nv7801. 2021 Hong Kong Legislative Council Election Geographical Constituency Map. 2021. [Internet]. https://commons.wikimedia.org/wiki/File:2021_Hong_Kong_Legislative_Council_Election_Geographical_constituency.svg
46. Frostick E, Johnson C. Pre-hospital emergency medicine and the trauma intensive care unit. *J Intensive Care Soc*. 2019;20(3):242-247. https://doi.org/10.1177/1751143718783601

APPENDIX 1 SEARCH TERMS FOR DATABASES

	Embase	Medline	Global health
1	Exp emergency health service/or exp ambulance/	Emergency medical services/or ambulances/	(EMS or emergency medical services or prehospital).mp. [mp = abstract, title, original title, heading words, cabicodes words]
2	(EMS or emergency medical services or prehospital).mp. [mp = title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]	(EMS or emergency medical services or prehospital).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	(Hong Kong or HK or HKSAR).mp. [mp = abstract, title, original title, heading words, cabicodes words]
3	Exp Hong Kong/	Hong Kong/	Hong Kong/
4	(Hong Kong or HK or HKSAR).mp. [mp = title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]	(Hong Kong or HK or HKSAR).mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	2 or 3
5	1 or 2	1 or 2	1 and 4
6	3 or 4	3 or 4	
7	5 and 6	5 and 6	

APPENDIX 2 PREFERRED REPORTING ITEMS FOR SYSTEMATIC REVIEWS AND META-ANALYSES EXTENSION FOR SCOPING REVIEWS (PRISMA-ScR) CHECKLIST

Section	Item	PRISMA-ScR checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a scoping review	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts and context) or other relevant key elements used to conceptualise the review questions and/or objectives.	3

(Continues)

APPENDIX 2 (Continued)

Section	Item	PRISMA-ScR checklist item	Reported on page #
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a web address); and, if available, provide registration information, including the registration number.	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language and publication status) and provide a rationale.	4
Information sources[a]	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	4
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	31
Selection of sources of evidence[b]	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	4
Data charting process[c]	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	4–5
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	4–5
Critical appraisal of individual sources of evidence[d]	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A
Synthesis of results	13	Describe the methods of handling and summarising the data that were charted.	4–5
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	6
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	6
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see Item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	18–24
Synthesis of results	18	Summarise and/or present the charting results as they relate to the review questions and objectives.	7–13
DISCUSSION			
Summary of evidence	19	Summarise the main results (including an overview of concepts, themes and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	14
Limitations	20	Discuss the limitations of the scoping review process.	14–15
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	15

APPENDIX 2 (Continued)

Section	Item	PRISMA-ScR checklist item	Reported on page #
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	15

Abbreviations: JBI, Joanna Briggs Institute; PRISMA-ScR, Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

[a]Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms and web sites.

[b]A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

[c]The frameworks by Arksey and O'Malley,[5] Levac and colleagues[6] and the Joanna Briggs Institute guidance[4,44] refer to the process of data extraction in a scoping review as data charting.

[d]The process of systematically examining research evidence to assess its validity, results and relevance before using it to inform a decision. This term is used for Items 12 and 19 instead of 'risk of bias' (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion and policy document).