

THE MUTUAL GROWTH OF INTERNATIONAL AND NATIONAL EMERGENCY MEDICAL TEAMS (EMT): SYNERGETIC GROWTH AND REINFORCEMENT BETWEEN JAPAN'S DISASTER RELIEF TEAM AND DISASTER MEDICAL ASSISTANCE TEAM

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List of abbreviation

APCDM	: Asia Pacific Conference on Disaster Medicine
CSCATTT	: Command, Safety, Communication, Assessment, Triage, Treatment and Transport
DBHs	: Disaster Base Hospitals
DMAT	: Disaster Medical Assistance Team
EMIS	: Emergency Medical Information System
EMT	: Emergency Medical Team
FMTs	: Foreign Medical Teams
GIS	: Geographical Information System
IGM	: INSARAG Global Meeting
ITL	: INSARAG Team Leaders
JADM	: Japanese Association for Disaster Medicine
JDRT	: Japan Disaster Relief Team
JICA	: Japan International Cooperation Agency
JMT	: Japan Medical Team

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JMTDR	: Japan Medical Team for Disaster Relief
MDS	: Minimum Data Set
MoFA	: Ministry of Foreign Affairs
MoHLW	: Ministry of Health, Labor and Welfare
NDMS	: National Disaster Medical System
SAR	: Search and Rescue
SPEED	: Surveillance in Post Extreme Emergencies and Disasters
WHO	: World Health Organization

ABSTRACT

Introduction: Japan, situated on the seismically active Pacific Ring of Fire, frequently experiences natural disasters. Consequently, Japan's disaster medical response system has evolved significantly, leveraging both international and domestic experiences. This study reports the development of Japan's disaster medical teams, emphasizing the synergistic relationship between international and domestic response efforts while highlighting key milestones in the system's evolution. **Methods:** This study utilizes a case study approach to report the historical evolution of Japan's disaster medical response system. Data were gathered through document reviews and a rapid review approach, which assessed major events and structural developments. **Results:** Japan's early international disaster medical efforts began with its response to the Cambodian refugee crisis in the 1970s, leading to the establishment of JMTDR and later JDRT. Domestically, the Great Hanshin-Awaji Earthquake in 1995 catalysed the establishment of DMAT and Japan NDMS. The J-SPEED system, inspired by international deployments, further standardized WHO EMT for rapid and informative medical data collection. **Conclusion:** The evolution of Japan's disaster medical teams highlights key milestones and the synergetic collaboration between JDRT and DMAT. Japan's international and domestic disaster response systems have facilitated the advancement of disaster response capabilities, leading to more sophisticated response abilities.

Keywords: JDRT; DMAT; Disaster Medical Response; Emergency Medical Team

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INTRODUCTION

Japan's geographical conditions render it one of the most disaster-prone countries in the world. Japan comprises only 0.25% of the world's total land area, but due to its location in the seismically active Pacific Ring of Fire, it experiences frequent earthquakes and tsunamis and is home to numerous active volcanoes. Over the past eight decades, several major disasters have occurred, including more than 300 earthquakes with magnitude of 6.0 or greater. The Great East Japan Earthquake in 2011 was the most significant, causing more than 21,000 deaths (4,6) (Figure 1). Furthermore, due to its topographic and climatic conditions, Japan is prone to a variety of other natural disasters, including flooding from typhoons, heavy rains, and heavy snowfall (4). Consequently, Japan has amassed extensive experience and expertise in disaster countermeasures. This unique position not only highlights the nation's vulnerability to natural disasters but also underscores its proactive approach to developing effective strategies for disaster preparedness and response, including a disaster medical assistance team and the system (1-3).

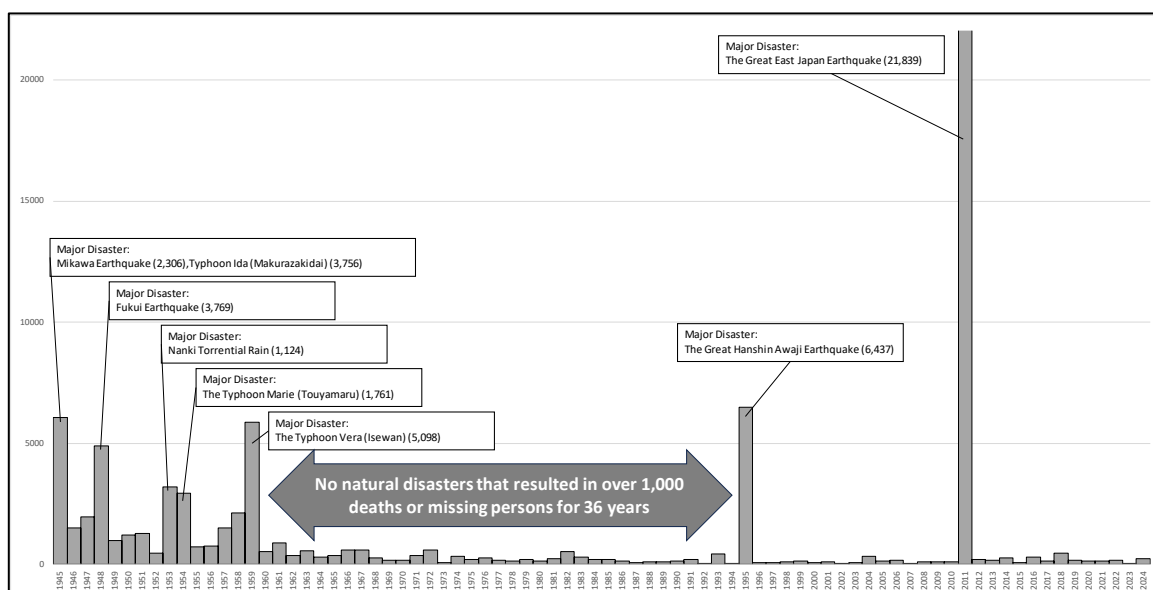


Figure 1. Number of Deaths and Missing Persons Due to Natural Disasters During 80 Years in Japan
Source: Cabinet Office Government of Japan., 2023; Japan Disaster Management Agency (Bousai)., 2011

In addition to managing and responding to domestic disasters, Japan has engaged in international disaster relief since the 1970s. The evolution of the nation's international aid activities reflects its deepening commitment to global disaster response. Having frequently

managed disaster response operations, Japan has made significant strides in developing a comprehensive disaster management system that integrates these experiences into an organized framework. Moreover, Japan's disaster medical response system has evolved considerably by systematically collecting patient data from field activities. This approach leverages insights gained from both international cooperation and domestic strategies to establish a coordinated and effective response to disasters, particularly for medical response (1-3,7-13).

This study reports the evolution of the Japanese emergency medical team's response to domestic and international disasters, emphasizing key milestones in system development and the synergistic relationship between the international emergency medical team, known as the Japanese Disaster Relief Team (JDRT), and national emergency medical team, known as the Japan Disaster Medical Assistance Team (Japan DMAT).

METHOD

This study adopts a case study approach to examine the historical evolution of Japan's Disaster Response System, focusing on both international and national EMT activities (14). It also explores the collaboration and coordination between JDRT and Japan DMAT. The analysis is based on review of documents sourced from the Ministry of Foreign Affairs (MoFA), the Ministry of Health, Labor and Welfare (MoHLW), the Japan International Cooperation Agency (JICA), the JDR medical team, and the Japan DMAT. Additionally, the authors' expertise in disaster response activities of EMTs and both international and national aid was incorporated in the analysis.

To introduce the development of JDR and the Japan DMAT, we outlined key events in chronological order that either prompted or shaped the establishment of relevant policies or regulations. Additionally, we highlighted the synergy between JDRT and Japan DMAT to demonstrate their interconnected growth and collaborative impact.

RESULTS

The timeline of Japan's disaster response activities, both domestically and internationally, has catalyzed significant developments in establishing emergency medical teams, improving the national disaster medical system, and enhancing disaster health knowledge management. This section will first discuss national and international efforts, before finally examining the

interconnectedness between the two. Figure 2 illustrates the chronological progression of major events that influenced the establishment of relevant policies and regulations.

National Disaster Events and Activities

1. A turning point in Japan's disaster preparedness and the enactment of the Disaster Countermeasures Basic Act

Each year, Japan suffers significant losses in both lives and property due to natural disasters (15). In the first half of the 1950s, the country experienced a series of devastating typhoons and major earthquakes that resulted in thousands of fatalities. Notable incidents include the Mikawa earthquake in 1945, which claimed 2,306 lives, and Typhoon Ida in the same year, which resulted in 3,756 deaths. The Fukui earthquake caused approximately 7,369 fatalities in 1948, and Typhoon Marie led to 1,761 casualties in 1954. These catastrophic events underscored the urgent need for effective disaster response strategies in Japan (16).

Years later, on September 26 in 1959, Typhoon Vera (Isewan Typhoon) caused massive damage. Notably, Typhoon Vera was one of the strongest typhoons to strike Japan in the nation's history, and its catastrophic impacts resulted in the enactment of the Disaster Countermeasures Basic Act in 1961, which aimed to establish a comprehensive and systematic disaster prevention framework from prevention, response, and recovery. Subsequently, various adequate earthquakes and volcanic eruptions occurred in Japan from 1961 to 1993. These disaster events catalysed the adoption of additional disaster response legislation, including acts for the evacuation of areas surrounding active volcanoes and financial provision aimed at urgent earthquake countermeasures. This legislation prompted significant improvements in disaster prevention systems, including the promotion of land conservation, the enhancement of weather forecasting, and the development of effective disaster information transmission methods, all of which contributed to a reduction in the impacts of natural disasters (4).

Following Typhoon Vera in 1959 and the enactment of the Disaster Countermeasures Basic Act in 1961, Japan experienced a notable absence of deadly disasters, with no events resulting in more than 1,000 fatalities for a period of 36 years. While significant advancements were made in various sectors of disaster management during this time, concrete preparations for a disaster medical system saw minimal

progress. This gap in medical preparedness ultimately limited the effectiveness of Japan's disaster response capabilities, highlighting a critical area that requires urgent attention and development (17).

2. Japan DMAT following the Great Hanshin-Awaji Earthquake

The Great Hanshin-Awaji Earthquake in 1995 underscored the crucial need for a dedicated national disaster medical team within Japan (3,18). At 5:46 a.m. on January 17, 1995, a magnitude 7.3 earthquake struck northern Awaji Island, Hyogo Prefecture. The earthquake had a seismic intensity of 6 in Kobe and Sumoto, and was felt widely from the Tohoku region to Kyushu (19,20). Notably, the Meteorological Agency's mobile observation recorded a seismic intensity of up to 7 in some parts of Kobe. The earthquake resulted in approximately 6,434 fatalities, over 43,000 injuries, and left more than 316,000 people homeless. Many deaths were classified as "preventable disaster deaths," which could have been avoided with timely medical response and emergency support (18,21). A Cabinet Office report suggests that around 500 of the deceased might have been saved with adequate measures (3,22).

Immediately following the Great Hanshin and Awaji Earthquake in 1995, many of the medical personnel involved in the response efforts in Kobe were JDRT registrants (18,23). Despite limited information, numerous doctors and nurses from Tokyo, Kansai, and the Kinki region voluntarily mobilized to Kobe. Two weeks after the earthquake, the Prime Minister requested assistance from the Japan Disaster Relief Team (JDRT) through JICA, leading to support activities that also served as part of their training. Thirty-one registered medical professionals worked in three shifts, providing care at Mikage Elementary School in Higashinada Ward, Kobe City, from February 4 onward (22). This event highlighted the urgent need for a robust crisis management system and a domestic disaster medical framework for handling large-scale disasters in Japan.

Based on the experience of the Great Hanshin-Awaji Earthquake, the Japanese government proposed and advanced countermeasures to address four issues (3). Deficiencies in the emergency medical system, delays in rescue activities, problems with information transmission, and deficiencies in emergency evacuation and transportation plans.

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- a. **Deficiencies in the emergency medical system:** Many medical facilities sustained significant damage, impeding their ability to deliver essential medical services. The collapse of buildings and subsequent fires rendered numerous hospitals non-functional, leading to the establishment of **Disaster Base Hospitals (DBHs)** in 1996 to address the urgent healthcare needs of the affected population.
- b. **Delays in rescue activities:** Access to the disaster area was obstructed, hindering the timely arrival of rescue teams. Consequently, the inability to promptly assist individuals trapped beneath the rubble resulted in numerous preventable fatalities. This situation underscored the need for a specialized unit, namely the **Disaster Medical Assistance Team (DMAT)**, to enhance medical responses during the acute phase of disasters. The journey of developing the Japan DMAT from 1995 to 2005 culminated in the inclusion of DMAT initiatives within the Basic Plan for Disaster Prevention established by the Central Disaster Management Council (11).
- c. **Problems with information transmission:** The transmission of information immediately following the disaster was inadequate, and appropriate support could not be promptly provided. Vital details regarding the conditions in the disaster-affected areas and the requisite support materials were not effectively communicated, which ultimately led to the establishment of the **Emergency Medical Information System (EMIS)**.
- d. **Deficiencies in emergency evacuation and transportation plans:** Emergency response plans for large-scale disasters proved inadequate, resulting in confusion among numerous medical institutions and emergency teams during the initial response and a lack of efficient patient transport. This prompted the development of a **wide-area medical evacuation plan**.

The lessons learned from the Great Hanshin-Awaji earthquake of 1995 were instrumental in establishing the Japanese National Disaster Medical System (Japan NDMS). From 1995 to 2005, the Japan NDMS developed: 1) DBHs, which are tertiary

hospitals strengthened to handle hazards and equipped to manage multi-casualty events; 2) EMIS, an internet-based geographical information system (GIS) that provides real-time data on the location, capabilities, and functions of DBHs, the current positions of Japan DMAT, affected healthcare facilities, evacuation centers, and field hospitals; 3) DMAT, which is mobile and trained in basic knowledge of disasters and principles of Command, Safety, Communication, Assessment, Triage, Treatment and Transport (CSCATTT); 4) the Wide Area Transportation system, which is meant to transport the patients from resource lacking affected areas to distant areas for better medical care, and; 5) Regional Disaster Medical Health Coordinators, who were appointed to oversee medical and public health relief operations and logistics at the local government headquarters, DBHs, and staging care units (9,24).

In 2011, 16 years later, Japan faced the most powerful earthquake recorded in the Tohoku region, followed by a catastrophic tsunami and subsequent hydrogen explosions at the Fukushima Daiichi Nuclear Power Plant. This unprecedented event, known as the Great East Japan Earthquake, resulted in a significantly higher number of fatalities and missing persons than the Great Hanshin-Awaji Earthquake in 1995 (25,26). During this crisis, Japan's National NDMS — and particularly the DBHs and the Japan DMAT — was put to the ultimate test. Notably, over 340 DMAT members were deployed for a duration of 10 days. The Great East Japan Earthquake imparted crucial lessons for the development of DMAT, highlighting the necessity for additional training in radiation safety and primary care approaches (1,10).

Another critical challenge in the development of EMIS is the timely collection and integration of data from healthcare facilities and EMTs. Drawing inspiration from the JDRT's experience with the Surveillance in Post Extreme Emergencies and Disasters (SPEED) system, which they had utilized in the Philippines during Typhoon Haiyan in 2013, the innovative Japan SPEED (J-SPEED) system was developed and published in 2015. During the 48-day response to the Kumamoto Earthquake in 2016, J-SPEED significantly enhanced timely data collection, facilitated information sharing among stakeholders, and supported evidence-based decision making (2,27). This integration of health data through J-SPEED was essential for adapting to the evolving operational landscape.

Despite achieving notable success in national disaster preparedness efforts, these events highlight the fact that Japan must always remain vigilant, as unexpected large-scale natural disasters can occur at any time. Though there have been significant advancements in preparedness across various sectors, the health system must still be ready to swiftly adapt and increase its capacity to meet new and sudden demands.

International Disasters and Aid Activities

1. 1970s – Early 1980s: Pioneering international medical aid: the transition from JMTDR to JDR

Amid a period of relative stability in national disaster preparedness, the Japanese government took the initiative to broaden its international disaster assistance efforts, demonstrating a commitment to global solidarity in the face of crises.

The Cambodian civil war, which lasted from 1970 to 1979, marked the first full-scale operation involving the Japan Medical Team. Triggered by a coup d'état on March 18, 1970, the Cambodian Civil War led to widespread chaos and tragedy with an estimated 2 million people killed by 1979 (28-30). As a result, many Cambodians fled to neighboring Thailand, where they sought refugee status and resided in camps that lacked basic necessities such as medical care, food, and water. In response, Japan provided emergency aid and dispatched medical teams as a member of the international community (31). Public and private hospitals in Japan — along with the Japanese Red Cross Society, JICA, and other organizations — established the first Japan Medical Team (JMT). Medical professionals, including doctors, nurses, and pharmacists conducted medical examinations in Thai refugee camps, focusing on disease prevention and treatment, improving sanitary conditions, and providing nutritional support and food assistance. These efforts saved many lives and significantly enhanced the health of the refugees (23,32). Over the next few years, a total of 13 teams comprising of 407 members operated among the Cambodian refugees (23). This experience underscored the importance of rapid response and provided valuable lessons about preparedness, member training and education, equipment stockpiling, effective team management and training, logistics coordination during disaster deployments, necessity of information transmission systems, cooperation with foreign experts and institutions, and respect for different cultures and medical practices (32–35).

Building on these lessons learned from their early efforts in Cambodia, Japan recognized the need for a more structured approach to international disaster response. On March 5, 1982, the Japan Medical Team for Disaster Relief (JMTDR) was inaugurated at the initiative of the Minister of Foreign Affairs. From 1980 to 1981, a series of preparatory meetings were convened among key organizations and agencies including the MoFA, the MoHLW, the Ministry of Education, JICA, the Japan Society of Emergency Medicine, and experienced members of the JMT. In 1981, this collaborative effort culminated in the establishment of the Special Operations Office for Medical Cooperation within JICA's Medical Cooperation Department. The Japanese government implemented a system for registering medical personnel during non-emergency times and enabling their rapid deployment to overseas disaster situations (23). Many medical professionals registered as volunteers with JICA, which served as the secretariat for the JMTDR. An introductory training took place in 1983, leading to the first deployment during the Ethiopian drought disaster in 1984. Additional deployments followed for the Mexico earthquake and the Colombian mudflow disaster in 1985 (36).

These experiences also underscored the importance of advance preparation by initial response teams, the challenges associated with transporting JMTDR members, the significance of early intervention, the necessity of strengthening infection control measures, and the critical importance of ensuring adequate water and food supplies. In light of these lessons, the government recognized the need for a comprehensive international emergency relief system, including a search and rescue team and disaster recovery experts. Consequently, the Act on Dispatchment of the JDR Team was promulgated and enforced on September 16, 1987, establishing Japan's first comprehensive and officially recognized disaster relief framework. This legislation led to the formation of the JDRT, which replaced the JMTDR and enhanced Japan's capacity to respond to a wide range of international crises through the deployment of rescue and medical specialists (23,31).

2. Late 1980s – Early 1990s: Japan's commitment to strengthening international coordination in humanitarian aid and disaster health knowledge management

In the late 1980s and early 1990s, significant strides were made to develop disaster health knowledge management and enhance international coordination in humanitarian

aid. This period marked the establishment of the Asia Pacific Conference on Disaster Medicine (APCDM), the Japanese Association for Disaster Medicine (JADM), and the Journal of the JADM. Established in Osaka in 1988 mainly by Japanese disaster medical response veterans, the APCDM has played a crucial role in fostering the sharing of knowledge and technology related disaster medicine and enhancing the disaster response capabilities of each country involved, serving as a forum for disaster medical experts in the Asia-Pacific region to exchange opinions and present research findings with the primary aim of promoting international cooperation and collaboration in areas frequently affected by disasters (38,39). Following the establishment of the APCDM, the JADM was founded in 1995 (38). The founding members included Muneo Ota, Yasuhiro Yamamoto, Masamitsu Kaneko, among others. The formation of the association was initiated by disaster medicine professionals who conducted on-site surveys after the 1993 Southwest Hokkaido Earthquake (38), and several significant 1995 events — namely the Great Hanshin-Awaji Earthquake in January, the Tokyo subway sarin attack in March, and the outbreak of the pathogenic bacterium *Escherichia coli* O157 in July — heightened urgency and accelerated its establishment. The first academic meeting was held in Osaka in February 1996, and the journal of the JADM was launched the same year. The logo design symbolizes the concept of “protecting life and the earth with both hands” (41,42). These initiatives all helped to elevate disaster response activities into a distinct scientific discipline, emphasizing the importance of dedicated research and education in this area.

Additionally, further international coordination in humanitarian aid was prompted by the critical lessons learned from the Armenian earthquake in 1988. An influx of international teams arrived to assist the affected regions; however, the multitude of search and rescue (SAR) teams, including the JDR team, led to chaos and confusion (23). In response to this experience, UNOCHA established INSARAG in 1991 and subsequently launched UNDAC in 1993 to assess and coordinate international humanitarian assistance. Japan has consistently participated in INSARAG activities since the inaugural meeting in Germany in 1991, hosting the first INSARAG Global Meeting (IGM) in Kobe in 2010 and holding the INSARAG Team Leaders (ITL) Meeting in Tokyo in 2016. In 2018, Japan was elected as the Asia-Pacific Regional Chair and has continued to support INSARAG initiatives to this day (37). Furthermore, the JDR rescue team successfully achieved Heavy Team status under INSARAG's classification system in March 2010,

and were later reclassified in 2015 (40). These activities reflect Japan's strong commitment to the area.

3. 2001 – Present: WHO EMT's Minimum Standard and Data Set and J-SPEED integration

Building on key lessons learned from past disasters, the period from 2001 to 2024 marks a significant evolution in Japan's disaster health management strategies, as the country expanded its focus to include both national needs and global responsibilities. This era was characterized by a commitment to transforming insights gained from previous experiences into actionable frameworks, enabling Japan to enhance its disaster health resilience and response capabilities. Two major disaster events served as catalysts for this development: the Haiti earthquake in 2010, which triggered the WHO EMT Minimum Standard (43), and Typhoon Haiyan in the Philippines in 2013, which sparked the creation of J-SPEED. Its subsequent adoption as part of the WHO EMT Minimum Data Set (MDS) established a global standard for disaster medical response (27,44-47).

The 2010 Haiti Earthquake represented a pivotal natural disaster that catalysed the initiative to develop the WHO EMT Minimum Standards. In Haiti catastrophe, over 300 Foreign Medical Teams (FMTs), the term used prior to the adoption of EMT, were deployed. These teams often exhibited a lack of coordination, disparities in competencies, and unfamiliarity with international emergency response standards. This experience underscored the necessity for a structured approach to classification and register system for EMTs. Reflecting the INSARAG framework for classification, accreditation, and development established after the Armenian Earthquake, FMT classification was determined and the guidelines were published in 2013. This FMT classification and registration framework was first implemented during the response to Typhoon Haiyan in Philippine in the same year (48,49). Since 2013, these standards have been refined to include EMT classification, defining them as groups of healthcare professionals — including doctors, nurses, paramedics, and logistic support personnel — who deliver care to individuals impacted by emergencies or disasters. This classification ensures the provision of appropriate healthcare services for affected populations while safeguarding EMT members and minimizing the burden on host countries. Prior to the establishment of the EMT Minimum Data Set several years later,

coordination and information sharing posed significant challenges in disaster response efforts (43,50).

Similar challenges in real-time disease surveillance and medical information sharing were encountered following the Great East Japan Earthquake (1,3,51) which spurred the conception of the J-SPEED. This initiative was a collaborative effort involving the Joint Committee for Disaster Medical Records of Japan, the Japan Medical Association, the Japanese Association for Disaster Medicine, the Japan Hospital Association, the Japan Society of Health Information Management, and the Japanese Society for Emergency Medicine, along with the JICA and the Japan Psychiatric Hospitals Association (51). J-SPEED was developed in 2015 as a reporting format designed to rapidly assess medical needs and damage status during disasters. Its framework was inspired by the existing SPEED format utilized in the Philippines. Japan's decision to adopt the SPEED approach followed its support during the 2013 typhoon disaster in the Philippines (47,52). J-SPEED was first extensively implemented during the 2016 Kumamoto Earthquake and has since become the standard tool for the rapid aggregation and reporting of medical data in disaster scenarios. This system has facilitated effective tracking of patient numbers and medical needs, significantly enhancing the efficient allocation of medical resources and the establishment of appropriate support systems (27,47,53–56).

The accessibility and informative nature of J-SPEED have enabled headquarters staff and stakeholders to effectively utilize and analyze disaster health information. This success in standard data collection inspired the development of the Minimum Data Set for WHO EMT. Since 2017, the EMT Minimum Data Set has been recognized and adopted as a standard for disaster and health emergencies worldwide. During the severe winds and flooding that impacted Beira City in Mozambique, known as Cyclone Idai in March 2019, WHO's EMT Minimum Data Set was implemented and yielded excellent results in disaster health data collection (21,51,57).

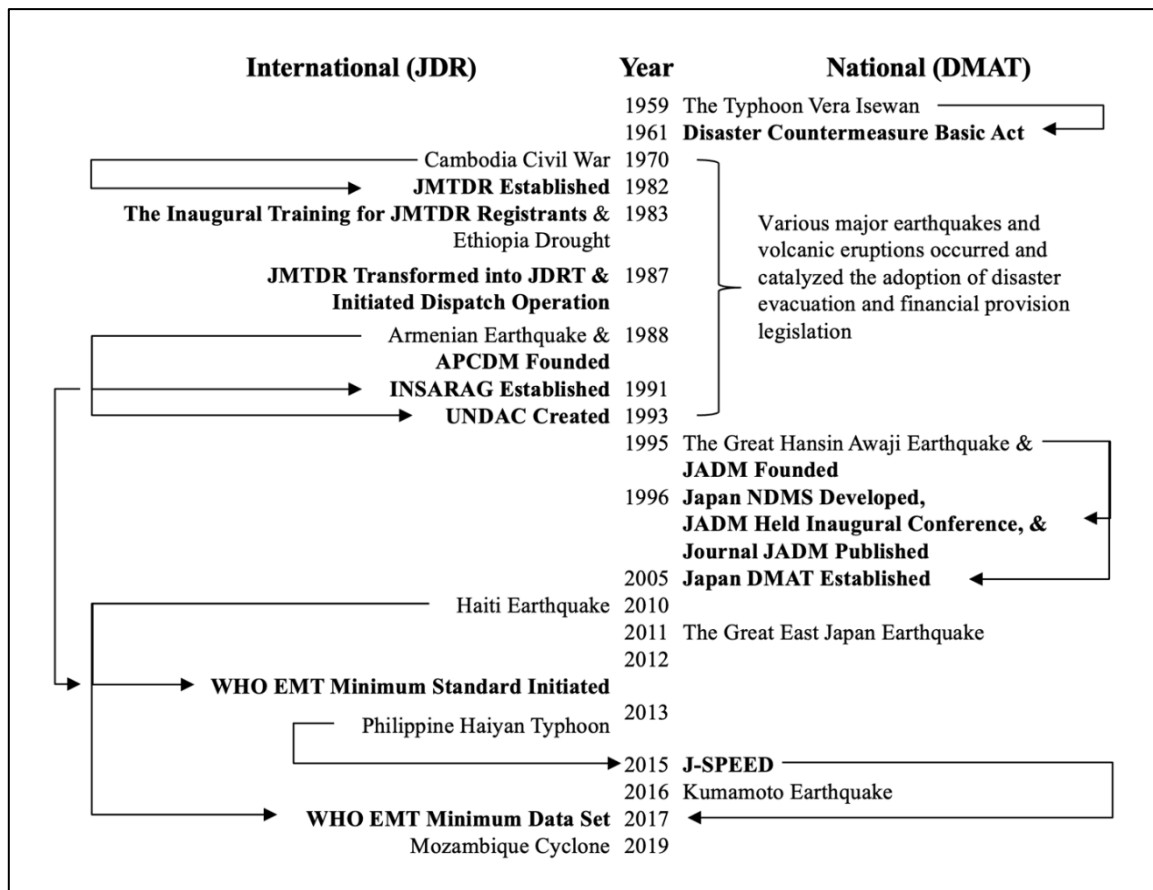


Figure 2: Timeline of Key Events Development Japan's Disaster Management Development

Source: Koido., 2015; Yumiya et al., 2018

The Synergy of JDR and JDMAT in Strengthening Disaster Medical Response

The development of Emergency Medical Teams (EMT) in Japan has been significantly influenced by both international and domestic aid response activities, and the synergistic relationship between these activities has also been crucial to both their development as separate strategies and the evolution of emergency response in Japan as a whole.

One such example of synergy is found in the management and coordination at headquarters. International responses in Japan are coordinated by the Ministry of Foreign Affairs and executed by JICA, deploying as the JDRT (41). The JDRT is comprised by a comprehensive team of medical, rescue, and other expert personnel. Both the JDR medical team and the JDR rescue team adhere to international classification standards. From 1982 to 2024, the JDRT has successfully deployed 62 teams across more than 30 countries worldwide. In 2016, following the World Health Organization's initiative to standardize EMT that began in

2015, the JDR medical team was certified as the fourth EMT Type 2 in the world (8,23,60). With this vast experience of international deployments (60), JDRT medical teams have responded to various disaster medical management systems, significantly contributing to the development of Japan's unique medical coordination and management framework (9,24,63,64). Conversely, the domestic disaster medical response system is managed by the Ministry of Health, Labor and Welfare, with the Japan DMAT Secretariat coordinating the response framework and overseeing Japan DMAT activities (59). The necessity for DMAT emerged from lessons learned during the Great Hanshin-Awaji Earthquake, and through various processes, Japan DMAT was established in all prefectures by 2005. DMAT is a mobile team comprised of trained doctors, nurses, and logisticians who can be rapidly deployed within 48 hours during the acute phase of a disaster. The DMAT registration process establishes the status of DMAT registrants and supervisors. All DMAT registrants are classified as team members eligible to be dispatched to disaster sites during the acute phase, while DMAT supervisors possess specialized knowledge of DMAT operations and are accredited by the MHLW. In the event of a disaster, DMAT supervisors play a crucial role in guiding operations and serve as the designated person-in-charge (11,18,21,59,61,62). The domestic teams have built training systems informed by their experiences with international headquarters management and coordination protocols, leading to standardization (11). This synergistic approach not only enhanced domestic response capabilities but also facilitated technology transfer to the ASEAN region and the global implementation of the Minimum Data Set (45,52). Although the international and domestic disaster medical response teams in Japan are established under different ministries and governed by various laws, it is clear that they remain highly interconnected.

Synergy is also particularly evident in the efficient exchange of information and shared personnel between the JDRT and the DMAT, many of whom have played critical roles in both teams including physicians and specialists. Emerging from the lessons learned during the Great Hanshin-Awaji Earthquake, DMAT was constructed on the foundational principles of the JDRT (21). In turn, both teams have worked collaboratively to enhance the disaster emergency support system through mutual knowledge sharing. Synergy between the JDRT and DMAT has also facilitated human resource sharing, joint capacity building, and knowledge transfer. Outside of shared personnel, the training programs of the JDRT were also utilized in the initial development of human resources for the DMAT. The DMAT's training program was designed

based on the methodologies used by international emergency response teams (10,21,37,51). The JADM, through its annual conference and the JADM Journal, also facilitates information and knowledge sharing among members of the DMAT and JDRT, academics, as well as disaster medicine and humanitarian practitioners in Japan.

Furthermore, the development of J-SPEED and its subsequent integration into the EMT Data Set exemplifies another dimension of synergy in Japan's international and domestic disaster response (58). During the Kumamoto Earthquake and the Western Japan Floods, J-SPEED enhanced the capability of disaster medical care to be data-driven, demonstrating its effectiveness (27, 53–56). These experiences underscored the critical importance of data collection during disasters (46). Prompting Japan to propose J-SPEED to the World Health Organization, who subsequently adopted it as an EMT Minimum Data Set international standard (45,67).

Employing a synergistic approach has facilitated the evolution of both the JDRT and DMAT, enabling rapid and effective disaster response by mitigating the impact of bureaucratic divisions and allowing for swift decision-making (58,59). Collectively, these experiences have markedly improved Japan's disaster response capabilities, both domestically and internationally.

DISCUSSION

Evolution in Disaster Medical Response

The timeline of important events in Japan's disaster response and the growth of medical teams shows a remarkable journey of change, shaped by how international initiatives and national efforts have come together over time (65). The transformation of the JMTDR into the JDRT in the 1980s represents the early integration of international best practices into national Japan's disaster response framework. By establishing the JDRT, Japan not only enhanced its own capabilities, but also positioned itself as a significant player in international disaster response (7).

Moreover, the establishment of the Japan DMAT in 2005 reflects the lessons learned from major disasters, particularly the Great Hanshin-Awaji Earthquake in 1995, which highlighted the need for a structured and rapid response to medical emergencies during disasters across Japan. The incorporation of insights from international standards, such as those developed by INSARAG, further reinforced Japan's commitment to improving its domestic response systems

(37). By integrating international frameworks and collaborating with global agencies, Japan developed a comprehensive disaster medical response system capable of addressing both national and global needs.

Furthermore, the creation of J-SPEED system underscores Japan's proactive approach to enhancing its disaster health management data. Developed in response to the challenges experienced during significant disasters, J-SPEED aims to provide real-time data and improve coordination among healthcare providers. Its establishment is a testament to how domestic innovations can bolster international standards, aligning Japan's practices with global expectations, particularly in the context of the World Health Organization's EMT Minimum Data Set. The synergy of J-SPEED into the EMT MDS not only improves domestic preparedness but also contributes to the establishment of global best practices.

The timeline (Figure 2) also shows how international experiences have shaped Japan's domestic disaster response activities, ultimately leading to the adoption of global standards. The introduction of the EMT MDS, achieved through international collaboration, highlights how Japan's progress is closely connected to and influenced by global standards. Events such as the Cyclone Idai response in Mozambique showcased the effectiveness of these standards in real-world scenarios, reinforcing the importance of data-driven disaster response. By continually integrating international strategies and enhancing domestic capabilities, Japan has established itself as a leader in global disaster health response, effectively bridging the gap between local practices and international standards.

Synergetic Collaboration

Synergy between JDRT and the Japan DMAT serves as a noteworthy example of how integrated disaster response frameworks can enhance the operational efficiency of international-national efforts. This synergy is particularly significant in the context of Japan's multifaceted disaster events, where rapid and coordinated healthcare delivery is paramount. The JDRT's extensive experience in international deployments provides valuable insights and expertise, while the DMAT is deeply embedded within national disaster response mechanisms. Their collaborative efforts enable streamlined resource allocation, efficient information sharing, and strategic decision-making during emergencies and disasters, resulting in improved patient outcomes and health service system effectiveness (66).

Instrumental in the success of JDRT and DMAT is the robustness of their training programs, which are vital for preparing medical team to manage the complexities of health crises or disaster. These training processes encompass specialized areas such as radiation safety, primary care, and logistics, which are essential for a holistic disaster response. For instance, managing radiation exposure becomes critical in nuclear emergencies, thereby enhancing the overall safety and efficacy of medical interventions. Logistics training ensures optimal mobilization of medical logistics, resources, allowing rapid and effective responses to patient needs. Joint training exercises further cultivate an environment of collaboration, enabling both teams to refine their skills and establish seamless operational protocols (10,37,67).

Despite this collaboration offering many advantages, several challenges remain in achieving cohesive coordination among the various agencies involved in disaster management. Bureaucratic impediments can often make it difficult to communicate quickly, complicating rapid decision making and resource mobilization efforts. Additionally, discrepancies in information sharing mechanisms can prevent the flow of crucial data, which reduces the overall effectiveness of medical teams. To address these challenges, it is essential to develop and implement standardized protocols and procedures that facilitate inter-agency collaboration and streamline communication channels (2,61). Enhancing training programs to incorporate inter-agency coordination as a focal point could also help make disaster response efforts more efficient and effective.

LIMITATION

This study has some limitations that should be considered when interpreting the findings. First, historical and contextual bias may influence the conclusions derived from the examination of historical materials, government reports, and academic literature, as the perspectives of these sources and the political or social contexts in which they were produced can skew the analysis. Additionally, while insights from Japan's disaster response systems are valuable, they may not be directly applicable to nations with divergent socio-economic, geographical, and political circumstances. Future research could focus on comparative studies with other countries to identify adaptable lessons. Furthermore, the manuscript predominantly emphasizes major disaster events, which may overshadow smaller incidents that could provide significant insights. A balanced approach that includes a thorough examination of both major and minor

events would yield a more comprehensive understanding. Moreover, subjectivity in the analysis regarding the historical evolution and synergy between the JDRT and DMAT could introduce bias. Engaging multiple authors for diverse viewpoints and conducting peer reviews may help mitigate this issue. Finally, the analysis might not fully capture the complexities of inter-agency coordination in disaster response. To address this, future research should include qualitative studies that investigate the challenges faced by different organizations, thereby providing a holistic view of Japan's disaster management framework.

CONCLUSION

This study describes the evolution of Japan's disaster medical teams, highlighting key milestones and the synergetic collaboration between JDRT and DMAT. Japan's international and domestic disaster response systems have facilitated the advancement of disaster response capabilities and lead to more sophisticated responses. Strengthening domestic and international cooperation will be essential to further enhance the synergy in disaster response. By analysing historical lessons, this research offers valuable insights into the effectiveness of EMTs. Ultimately, these insights provide a framework for colleagues worldwide to strengthen their disaster medical response systems and contribute to global best practices in emergency and disaster health management.

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CONFLICT OF INTEREST

The authors declare no conflict of interest

ETHICAL APPROVAL

This study does not involve human subjects, identifiable personal data, or clinical interventions, and therefore does not require ethical approval. It falls outside the scope of research requiring review by an Institutional Review Board or Ethics Committee.

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