

SPECIAL ARTICLE

MH17: the Malaysian experience

KHOO Lay See,^{*,**} HASMI Ahmad Hafizam,^{**} ABDUL GHANI AZIZ Sarah Aziz,^{*} IBRAHIM Mohamad Azaini^{***} and MAHMOOD Mohd Shah^{**}

Institute of Environment and Development (LESTARI), Universiti Kebangsaan Malaysia, **National Institute of Forensic Medicine (NIFM), Hospital Kuala Lumpur, and *Department of Forensic Medicine, Hospital Serdang, Malaysia*

Abstract

A disaster is a natural or man-made (or technological) hazard resulting in an event of substantial extent causing significant physical damage or destruction, loss of life, or drastic change to the environment. It is a phenomenon that can cause damage to life and property and destroy the economic, social and cultural life of the people; and overwhelms the capacity of the community to cope with the event. The recent tragic aviation accidents in 2014 involving Malaysia Airlines flights MH370 and MH17 shocked the world in an unprecedented manner. This paper focuses on the Malaysian experience in the MH17 mission in Ukraine as well as the first ever international Disaster Victim Identification (DVI) operation for the Malaysian DVI team. The DVI operations in Hilversum, the Netherlands were well described in stages. The Netherlands' *Landelijk Team Forensische Opsporing* as the lead DVI team in Hilversum operated systematically, ensuring the success of the whole mission. This paper discusses the lessons learned by the Malaysian team on proper DVI structure, inter- and intra-agency cooperation, facilities planning and set up, logistics and health and safety aspects, as well as effective communication and collaboration with other international delegates. Several issues and challenges faced by the Malaysian team were also documented. In addition, the authors shared views, opinions and recommendations for a more comprehensive DVI operation in the future.

Keywords: disaster, Disaster Victim Identification (DVI), MH17, Malaysia

INTRODUCTION

Flight MH17, a Malaysian Airlines (MAS) flight in airworthy condition, departed from Schiphol International Airport in Amsterdam, the Netherlands at 1320 UTC on the 17th July 2014. The aircraft was a Boeing type 777-2H6ER, registration 9M-MRD, carrying 283 passengers and 15 flight and cabin crew members, heading for Kuala Lumpur International Airport, Malaysia. The National Bureau of Air Accident Investigation of the Ukraine (NBAAI) was notified by the Ukrainian State Air Traffic Service Enterprise (UkSATSE) that communication with the flight crew had been lost at 0600 UTC 18th July 2014 and later it was confirmed that Flight MH17 had crashed at Hrabove, Donetsk, East of Ukraine approximately 50km from the Ukraine-Russia border.

The MH17 incident was an aviation tragedy that involved victims of many nationalities. There were no survivors and occupants of the

aircraft were citizens from the Netherlands (193), Malaysia (43), Australia (27), the Republic of Indonesia (12), the United Kingdom (10), the Federal Republic of Germany (4), Belgium (4) the Republic of the Philippines (3), Canada (1) and New Zealand (1). The occurrence took place over open farmland south and west of the village of Hrabove in eastern Ukraine. At the time of the occurrence, an armed civil conflict was ongoing in the Ukraine, between armed groups and Ukrainian armed forces. The aircraft parts and wreckage came down in an area that was under the control of the armed groups.¹

Following the instruction of the Prime Minister of Malaysia, the Malaysia National Security Council (MNSC) held a coordination meeting to discuss the necessary preparations for the delivery of the Special Malaysia Disaster Assistance Rescue Team (SMART) to the disaster area and to involve other agencies in this mission i.e. for coordination and search and rescue,

Address for correspondence: Khoo Lay See, National Institute of Forensic Medicine, Hospital Kuala Lumpur, Jalan Pahang, 50586 Kuala Lumpur, Malaysia. Email: khoolaysee@yahoo.com

Disaster Victim Identification (DVI), news and information coverage and management and repatriation of the human remains. In view of the scene being located in an area of conflict, the army and security control forces were also called to participate in this mission. The mission was led by the Secretary of the MNSC acting as the Head Coordinator.²

THE MALAYSIAN TEAM IN KIEV, THE UKRAINE

A total of 116 personnel were deployed to Kiev, the Ukraine on 18th July 2014, comprising of the coordinating team from MNSC, the Ministry of Foreign Affairs and the Department of Civil Aviation (DCA), the SMART team, the media coverage team, the Naval Special Warfare Forces (PASKAL), the Armed Forces Religious Affairs Corps (KAGAT) and the *ad hoc*-formed DVI team.² The Directive from the MNSC was to commence the Search and Recovery mission and the subsequent forensic investigation aspects in Hrabove, Donetsk. The initial mission of recovery of the flight recorders was considered successful when the flight recorders were handed over to Malaysian officials in Donetsk on 21st July 2014 by representatives of the armed group controlling the area. The recorders were transported by train from Donetsk to Kharkiv in the custody of the Malaysian officials and accompanied by the Dutch officials to be handed over to the Dutch Safety Board.

In accordance with paragraph 5.1 of the International Civil Aviation Organisation (ICAO) Annex 13, the State of Occurrence shall institute an investigation into the circumstances of the accident and be responsible for the conduct of the investigation to another State by mutual arrangement and consent.³ In this case, the Ukraine requested the Netherlands to conduct the investigation. This was formally agreed upon in writing, on 23rd July 2014, and the investigation was then the responsibilities of the Dutch Safety Board.¹ Thus, all recovered bodies and personal belongings were transported by train from Donetsk to Kharkiv and flown by military aircraft C130 and C17 to Eindhoven, the Netherlands followed by a *Coffin Ceremony for the arrival of the dead* before the DVI operations.

STRUCTURAL IMPLEMENTATION OF DVI

The National Coordinator for Security and Counterterrorism (NCSC) under the Ministry

of Security and Justice of the Netherlands had appointed The National Forensic Investigation Team known locally as *Landelijk Team Forensische Opsporing* (LTFO), to be the coordinator of the MH17 DVI operations. The MH17 DVI operations involved an international cooperation headed by LTFO as DVI commander and assisted by the German Federal Criminal Police Office and the Metropolitan Police, United Kingdom as Deputy DVI Commanders. The countries of Malaysia, Belgium, Australia and Indonesia, were involved in the DVI operations. For the Malaysian Team, out of 116 personnel on the mission to Ukraine, only 24 *ad hoc*-formed DVI team members (Forensic Medicine Service of the Ministry of Health, the Royal Malaysian Police, the Malaysian Armed Forces and the Chemistry Department of Malaysia) were deployed to Hilversum.

DVI operations in Hilversum

The DVI operations were conducted in the *Korporaal van Oudheusden Kazerne* (KvOK) in Hilversum, a military camp situated about 35 km from Amsterdam. The camp is used specially for medical education and training of the Netherlands Armed Forces. This site was chosen because it can provide security to all DVI personnel and ensure confidentiality for the victim and the records database. The DVI personnel were stationed in military barracks, very close to the DVI operational facilities. A multipurpose hall was used as a temporary mortuary while the adjacent parade square area served as a temporary area to house cold containers for coffins containing the remains (Figures 1 & 2). This operation area was divided into zones of green, orange and red to demarkate levels of security and safety (Figure 3).

The protocols used in the DVI MH17 operations were the internationally recognised INTERPOL DVI protocol. The software used was the *PLASSDATA*® DVI built for INTERPOL. This software has the ability to compare between antemortem (AM) and post-mortem (PM) data as well as expedite the process of matching and identity verification.

The Database Software *PLASSDATA*® centre was located in Building 11, in the KvOK, which housed the main server, the AM section, PM data entry and reconciliation section. Each team was given 10 computer work stations to carry out their tasks. All data were collected in the Data Centre.



FIG.1: The parade square was used as a temporary body storage area



FIG. 2. The multi-purpose hall was used as a temporary mortuary

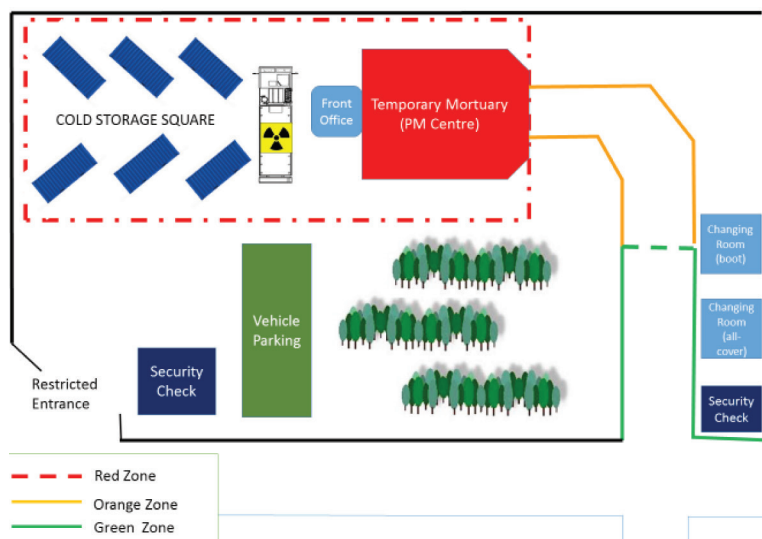


FIG. 3: Zones surrounding the DVI Operation

The AM Section

The AM section was led by an AM Team Leader. The AM data was sent by the AM team from each of the respective countries and this data was managed by the AM section consisting of representatives from each country involved. The AM Personnel would incorporate all existing data into the software PLASSDATA®. The Team Leader would update the AM data to be reported to the captain at 0800 hours and 1830 hours daily.

The PM Data Entry Section

The PM section was led by a PM Team Leader. He was assisted by several officers consisting of (a) 'Front office' Manager, (b) Manager of victim's remains, (c) Head of Radiology, (d) the Chief Forensic Pathologist, (e) Chief of Forensic Odontology, (f) Chief Specialist on Fingerprints and (g) Chief of Quality Control. A complete PM form had been sent to the PM Section for data entry into the PLASSDATA® software. The Malaysia DVI team placed two officers in this section to assist in data entry procedures.

The Reconciliation Section

The reconciliation section was headed by a Reconciliation Team Leader, assisted by several experts comprising fingerprint experts, Forensic Odontology experts, Forensic Pathologist/ Anthropologist and DNA experts. The reconciliation team would provide a Positive Identity Verification Report to the Board of Identification. Out of 227 coffins received, only 156 bodies were complete (complete body) and there were 641 body parts identified. A total of 797 PM records were generated into the PLASSDATA® software.

In the temporary mortuary, where the dead body management centre was located, there were three sections that managed the bodies before the bodies were sent for the forensic post-mortem examination.

CBRNE Screening

CBRNE Screening was performed right after the coffin was removed from the chilled container by the Rapid Forensic team to detect signs of harmful CBRNE pollution (Chemical, Biological, Radiological, Nuclear and Explosives).

Postmortem Computed Tomography Section (PMCT)

The PMCT Scan section was led by a Radiologist. The CT scan used was a mobile CT scanner

provided by the UK DVI team (Figure 4). Body bags in the coffins were scanned through using PMCT before being sent to the temporary mortuary. It was scanned to detect metal fragments for criminal investigation purposes and to determine the number of victims that may be contained in each body bag.

Front Office

The 'Front Office' was responsible for managing and monitoring the entire post-mortem activity including issuing a unique 'barcode' and sequential numbering for each coffin, movement of coffins from chilled containers into the temporary mortuary and return to its place of origin after inspection. Complete PM forms were sent to the PM Section in the Data Centre. Incomplete forms were sent back to the respective PM station in the temporary mortuary.

Post-mortem examination

The forensic post-mortem examination took place in the temporary mortuary. All coffins that had been confirmed to be safe from any harmful CBRNE elements were sent to the temporary mortuary as shown in Figures 5 & 6. The temporary mortuary was divided into two main areas, which were the DVI area and the criminal investigation area.

The *DVI teams* were divided into five lines and each line consisted of five fixed stations, which were the fingerprints station, the personal items station, the DNA and autopsy station, the Odontology station and the Quality Control (QC) station. Each body or body part needed to go through every station in the line and through a process as described below:

- (a) To ensure Quick Scan record forms were the same (consistent) with period examined.
- (b) To take digital photographic images.
- (c) To enter each record into PLASSDATA® at the respective stations.

The *DNA station* mentioned above was manned by Forensic Pathologists and Anthropologists, assisted by DNA Chemists (Malaysia and Indonesia), Medical Officers and Forensic Science Officers (Malaysia). Their tasks were as follows:

- (a) To examine the body and document all injuries.
- (b) To take appropriate DNA samples (such as bone and bone marrow samples)



FIG. 4: Portable PMCT scanner



FIG. 5: At the entrance of the 'Front Office' in the temporary mortuary

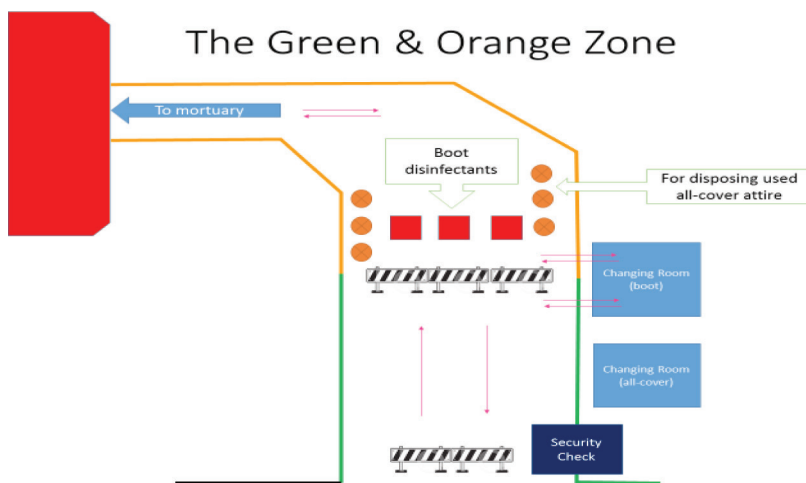


FIG. 6: Operation area layout for zone to mortuary

The Forensic Science Officers (Malaysia) were also in charge of the QC of each DVI line to ensure that the protocols were in strict compliance with the recommended standards of the LTFO practice.

The *Identification Board* was headed by the DVI Commander and Prosecutors from the Ministry of Justice of the Netherlands. Other members consisted of the Reconciliation Team Leader, the AM Team Leader, the Malaysian and Australian DVI Team Leaders and assisted by other forensic specialists (Odontology / DNA / fingerprint). The Identification Board was responsible for confirming the positive identity of the victims before handing the remains over to the heirs or next-of-kin. Body release protocols were drafted by the Dutch. Documents related to the victims were identified and approved by the Board of Identification, and handed over to the respective embassies.

DISCUSSION

Lessons learned

While the horrifying news of the MH17 disaster shocked and saddened Malaysians and the whole world, we were given an opportunity to be part of the Malaysian DVI team involved in the PM planning and process. This incident gave us a whole new experience working with other international DVI experts, being able to make observations on disaster operations and giving us an insight on how a proper DVI process should be conducted. For Malaysia, there is much to improve on aspects of planning, particularly coordination and training for those in the front line of disaster management as well as having a proper DVI organisational structure and facility set-up.

The success of the MH17 DVI mission was due mainly to the existing LTFO DVI system. The organisation structure, operation and coordination as well as the communication plan were well executed in a short time and with international collaboration and assistance from various countries. The safety and logistics of all DVI international delegates were well taken care of by the assigned person-in-charge. Strict safety measures were adhered to i.e. the formalin level inside the temporary mortuary was closely monitored throughout the operation. Full *Personal Protective Equipment* (PPE) dress was a priority in order for team members to work inside the temporary mortuary safely, without

which they would be requested to leave the premise immediately.

Despite numerous minor hiccups and limitations, the DVI MH17 mission was a success for the Malaysian team. It was a valuable experience for all the agencies involved, especially for the national forensic science and medicine services. The professionalism, expertise and excellent cooperation demonstrated by the Malaysia DVI team was acknowledged and recognised by the International DVI team. All 43 Malaysian victims were successfully identified and the remains handed over to their next-of-kin in Malaysia.

Challenges

At present, the MNSC is the principal policy making and coordinating body for disaster management.⁴ The MNSC coordinates and plans all activities related to disaster preparedness, prevention, response or relief operations and recovery or rehabilitation in disaster management. It is the lead agency in charge at the federal level for overall security in Malaysia. Under the MNSC in the Prime Minister's Department, the Inland Major Disaster Management mechanism was formulated in May 1994 to coordinate all emergency agencies and handle relief activities during any major on-land disaster incident. This document became known as the NSC Directive 20.⁵ This came as a result of the Highland Towers tragedy as an exemplar and reference for future disaster management.

In a simpler version, the MNSC Directive 20 means a standard operational procedure (SOP) for all departments involved in disaster management.⁶ The main purpose of the Directive is to put in place a comprehensive emergency management program which seeks to mitigate the effect of various hazards, to prepare for measures which will preserve life and minimise damage to the environment, to respond during emergencies and provide assistance and to establish a recovery system to ensure the affected community quickly returns to normalcy. However, the proper lines of authority in activating a DVI exercise, the structure and the roles of the DVI teams in mass fatality incidents are not mentioned in the Directive 20.

The MH17 tragedy is the first ever incident whereby Malaysia is involved in an international DVI operation. In this event and other previous mass fatality incidents, the Malaysia DVI team was established on an *ad hoc* basis according to the situational needs. There is definitely a

need to establish a permanent well-organised DVI team for Malaysia as there is currently no clear function of the DVI team, resulting in poor coordination between the agencies and unclear directions. The DVI team, comprising multiple types of expertise from various agencies, has no leading agency appointed to take responsibility and to plan for the operations. Currently, in Malaysia, the appointment of the DVI commander to lead the investigation of any major incident is done verbally and on an *ad hoc* basis. These issues should be explored further as insufficient regulation and legislation result in a gap between coordination and performance. The different expertise that exists in the various agencies in Malaysia are not systematically combined and coordinated under the MNSC Directive 20. The roles and tasks of each of these agencies are not clearly documented and structured.

During the DVI operations, a duplicity and redundancy of tasks performed by the various agencies involved was observed. From the initial 116 men and women deployed to the Ukraine, only a team of 24 personnel were involved in the DVI activities in Hilversum. This raises concerns over effectiveness and human resource management. Furthermore, there is no monetary allocation for DVI operations, especially for equipment and other DVI preparations. In terms of human resource and training, the Royal Malaysian Police need to be trained in the latest technology i.e. methods of acquiring fingerprints from the dead and from decomposed victims in a major incident.

The protocols used in the MH17 DVI operations is the internationally recognised INTERPOL DVI protocol with the *PLASSDATA@* software. According to the INTERPOL DVI Guide (2014), DVI is a terminology used to identify individuals involved in a catastrophic event of such magnitude or severity that it overwhelms the resources of the community directly affected and their capacity to cope or respond without external assistance. The main aim of DVI is to correctly identify the deceased victims of a disaster or incident where there are multiple fatalities which is not a quick or easy process; or where the identity of the deceased victims is in dispute, before returning them to their respective families.⁷ A significant number of countries throughout the world have minimal to non-existent DVI capability, including Malaysia. Up to this point, there have been no clearly defined guidelines and international principles in

DVI causing confusion among authorities and in the countries in which disaster has occurred. The INTERPOL DVI Guide can be of great use to assist these countries by recommending standards and protocols as a basis for the coordination of tasks, responsibilities and authorities within the DVI process. For Malaysia however, a death investigation needs to comply with the requirements of the Criminal Procedure Code under the provision of law.⁸ The DVI terminology has been widely used but the DVI structure is not legalised and formalised by any authority in this country.

In the past, disasters in Malaysia were handled by the local authorities and post-mortem procedures were done in local government hospital settings. A sudden influx of dead bodies or body parts in a mass fatality incident would overwhelm most, if not all Malaysian forensic mortuaries. The hospital facilities under the Ministry of Health are not able to accommodate a large scale DVI operation. There is also no emergency management plan to develop an emergency mortuary facility (EMF). The fundamental requirements for an EMF include the ability to cater for both storage and examination of bodies, whilst maintaining respect for the deceased. The mortuaries of major hospitals in the country are not considered viable options as they would be inundated with the injured and the need to deal with their day-to-day autopsy requirements. These factors, combined with the security and access issues and likely prolonged DVI activity, adds to the need to look further afield for a viable alternative.⁹⁻¹²

Among the difficulties faced by the DVI teams in this tragedy were (a) the mass fatality incident happened in a land involved in a political and armed conflict, (b) the victims' bodies and belongings were initially recovered by another party, and (c) DVI operations were headed by and conducted in a country different to where the incident occurred and transportation of victims needed to be done by air and land over a distance of 2000 km.

Recommendations

The MH17 DVI operations in Hilversum focused on the positive identification of the victims. However, in our opinion, management of the dead in any disaster, be it a mass fatality incident or a small-scale disaster, should take on a holistic approach. A complete system ought to entail: (a) the investigation from autopsy procedure to identification, (b) cause of death certification and

(c) writing of the autopsy report for future legal proceedings and for other purposes, such as for the Air Accident Safety Investigation Bureau. DVI is not just about identification *per se*. It has instead, more to offer.

During the PM phase of the MH17 operations, each DVI line was set up with five fixed stations. These are the fingerprints, personal items, DNA, Odontology and QC stations. This was a very systematic production line to ensure the flow of the examination of each victim ran smoothly and the coordination between the experts from the different countries can be managed by the LTFO DVI commander. Nevertheless, this concept of compartmentalization of specific tasks did not allow the experts to be involved in every station as each stayed fixed at his own station. For example, the victim's personal belongings had been removed by the team from Station 2 and by the time the victim's body was transferred to Station 3, the forensic pathologist / anthropologist did not have the advantage of examining the belongings but focused only on DNA sampling. From our point of view, we suggest that experts from the different disciplines be engaged in one team. The full examination of the victim should be done by this one team at one station instead of the victim being moved from one station to another throughout the PM phase. The experts in the DVI team will then have a better comprehensive involvement from the beginning till the end of the process. This gives the experts a greater understanding of all aspects for report writing as well as cause of death certification.

The modern world has brought with it occurrences of man-made disasters of an unprecedented scale and complexity, from large aircraft accidents to nuclear mishaps. Throughout the years, the Malaysian government has undertaken various measures to prevent disasters and mitigate its effect, improving the response to disasters and streamlining its relief and recovery efforts. The MNSC, currently the principal policy making and coordinating body for disaster management, needs to review the Directive 20 in order to organise a comprehensive DVI structure for Malaysia in mass fatality incidents, locally or abroad. To address the issue of lines of authority, there is a need to establish a MOU/MOA (Memorandum of Understanding/Memorandum of Agreement) between the various stake holders in a DVI activity to set clear roles among the main agencies, which are the Ministry of Health, the Ministry of Defence (MINDEF)

and the Ministry of Home Affairs as well as the Ministry of Science, Technology and Innovation (MOSTI). In this way, experts can be engaged from any agency to be part of the DVI team.

In Malaysia, officers report to and take directives from their respective ministries. It is thus not possible, for instance, for a police officer working in the Ministry of Home Affairs into issue instructions to a Forensic Pathologist working in the Ministry of Health or *vice versa*. An understanding needs to be endorsed by the stake holders in order to give authority to the DVI commander to take command during any major incident. With this consensus among agencies, better coordination and planning can eventually lead to better resource and financial management. In terms of facility preparedness, a MOU with the MINDEF, will enable a military base to be utilised as first choice facility to set up a temporary mortuary where DVI operations can be conducted in a safe and secure environment without the need to interrupt the day-to-day hospital mortuary activity. Effective cooperation in the event of any major incident between different agencies play a prominent role, such as (a) the Royal Malaysia Police as the overall investigator, (b) the DVI team headed by a Forensic Pathologist as the DVI commander responsible for the identification of the victims, (c) the judiciary to facilitate all matters pertaining to the inquest and court proceedings, and (d) the MNSC and the Ministry of Foreign Affairs to facilitate international DVI activities.

According to the INTERPOL DVI guide (2014), there are four phases in the DVI process which are the scene phase, the PM phase, the AM phase and the reconciliation phase. It is recommended that the DVI team be involved in every phase throughout the whole operation.⁷ The different phases of a DVI exercise and the experts involved are given in Table 1.

Conclusion

Disasters are events that are often unexpected causing damage of unexpected magnitudes. They are events that threaten human life and property in a way that require swift and urgent response. The MH17 disaster was a tragedy that affected not only Malaysians but also the world. The DVI operation of MH17 was a cooperative effort undertaken internationally in accordance with international standards. All participating countries showed dedication, professionalism and good camaraderie in executing this operation successfully and enthusiastically. The overall

TABLE 1: Summary of the team involvement in the DVI process

| DVI Phase | Team | Reason |
|------------------|---|--|
| Scene | Police assisted by Forensic Pathologist/Anthropologist/Odontologist | The experts give advice to the search and recovery team on the proper methodology used to remove the bodies from the site taking into account local environmental and biological hazard. Advise on transportation of remains. |
| AM | Police assisted by Medical Officer (MO)/Dental Officer (DO) | MO and DO are trained to communicate with the victims' family, take proper antemortem history and to advise on DNA sampling. |
| PM | Led by a Forensic Pathologist with a team comprising of: <ul style="list-style-type: none"> • Fingerprint expert • Forensic Anthropologist • Forensic Odontologist | A multidisciplinary approach with various experts from different agencies. The Forensic Pathologist is the key person in the examination of a dead body. |
| Reconciliation | Led by a Forensic Pathologist assisted by a DNA expert and a Forensic Odontologist | To obtain positive identification of each victim through a series of tedious matching of AM and PM data of reliable primary identifiers. The Forensic Pathologist and the other experts assisting are suitably trained to review the data. |

engaging experience in the MH17 operation gave a valuable insight in strategizing direction and improving future management of major incidents with multiple fatalities in Malaysia and abroad. This experience has provided significant contribution to planning the way forward in fostering DVI international bilateral cooperation, linkages and networking.

ACKNOWLEDGEMENT

The National Institute of Forensic Medicine (NIFM) greatly acknowledges the International DVI team, especially the LTFO as the DVI lead, the Embassy of Malaysia in the Netherlands, the MNSC in the Prime Minister's Department as well as the Director General of Health Malaysia. The NIFM would also like to thank the various agencies and relevant divisions that have contributed to the success of the mission. Finally, the NIFM is indebted to the work provided by all Malaysia DVI team members, the AM and PM teams, who worked many hours, whether in Malaysia or in the Netherlands, in supporting this operation until its end.

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