

Full participation and promising results from the Paris Meeting on Mass Casualty Management supported by Orthofix

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Introduction

Major mass emergencies – natural disasters, humanitarian crises and terror attacks – have become more frequent in the last few years, and not only in middle and low income countries. Their effective management requires strong technical competencies, a quick capacity to plan resources and react, and a new way of looking at problems, whereas sharing knowledge, good communication skills and team work have become mandatory.

This was the focus of the two days seminar with the challenging title *Mass Casualty Preparedness and Management – lessons learnt from the recent terror incidents*, organized with the collaboration of Harald **Veen**, a Dutch expert and lead surgeon for the ICRC (International Committee of the Red Cross) project on complex attacks preparedness. The event was supported by Orthofix, a worldwide leading Company that researches, develops and produces innovative surgical tools and orthopaedic devices.

The meeting was held in Paris at *la Maison de la Chimie* on the 30th November and 1st December 2017; the two days seminar was preceded by a Faculty Committee on the 29th November, during which all the key points, unmet needs and goals of the meeting were previously debated and shared among the speakers.

The goals of the meeting

- a. Sharing knowledge and on-field experiences to prevent and respond to major mass emergencies;*
- b. Enlarge the capacity of the different worldwide health systems to manage mass casualties trauma injuries effectively, training specific competences and keeping in stock the necessary medical and surgical tools;
- c. Summarize the emerged key points and the common views on a consensus basis, putting in evidence eventual controversial matters;
- d. Revise the already existing white-plans, following the indications that come from the Faculty.

* also a recommendation in **Harris T**, 2016

The Faculty members and the outlined topics

A group of 20 international experts, most of them (civil and military) health professionals or senior clinicians, trauma orthopaedic and paediatric orthopaedic, cardiothoracic, maxillofacial and plastic surgeons who have distinguished themselves in managing mass casualty emergencies all over the world. In alphabetical order:

- Imri **Amiel**, an Israeli general surgeon at Sheba Medical Center, and instructor at MSR Israel's medical simulation center – *Simulation of trauma scenarios: in situ and in vitro*
- Olivier **Barbier**, a French military orthopaedic surgeon at the HIA Bégin – *Terrorist incidents in Paris & The French "Plan Blanc" conception and implementation*
- Elhanan **Bar-On**, an Israeli trauma orthopaedic surgeon and associate professor at Tel Aviv University, Faculty of Medicine – *DCO, Damage Control Orthopaedics, Forum on Paediatric victims*
- Kornelis A. **Bartlema**, a Dutch orthopaedic trauma surgeon at HMC The Hague and at Leiden University Medical Center (LUMC) – *Forum on Patients' distribution dilemma*
- Murvin **Chan**, a Dutch expert on safety and security management and national coordinator of emergency medical teams for Dutch Red Cross – *Forum on Patients' distribution dilemma*
- Miriam B. **de Jong**, a Dutch trauma surgeon at University Medical Center of Utrecht and instructor for medical response in case of major incidents – *Utrecht Major Incident Hospital*
- Maurizio **De Pellegrin**, an Italian paediatric orthopaedic surgeon at IRCCS San Raffaele Milan, and teaching professor at "Vita Salute" San Raffaele University of Milan – *Emergency protocols for Paediatric patients, Forum on Paediatric victims*
- Roberto **Faccincani**, an Italian trauma surgeon, head of the Emergency/First Aid department at the IRCCS

- San Raffaele in Milan – *Emergency protocols for Paediatric patients*, Forum on *Paediatric victims*
- Simone **Lazzeri**, an Italian orthopaedic surgeon, head of the Paediatric Trauma Center at the University Hospital Meyer in Florence – *Emergency protocols for Paediatric patients*, Forum on *Paediatric victims*
 - Justine J. **Lee**, a British trauma maxillofacial surgeon at the Queen Elizabeth Hospital in Birmingham, with a previous military experience in Kosovo and Iraq – *NHS Clinical Guidelines for major incidents and terrorist attacks*
 - Ofer **Merin** an Israeli cardiothoracic surgeon, head of the trauma Unit at Shaare Zedek Medical Center in Jerusalem – *Ethical dilemmas*, Forum on *Ethical aspects and required training*
 - Pål A. **Naess**, a Norwegian general and paediatric surgeon and professor of Traumatology at University of Oslo – *The terrorist incident in Oslo*
 - Ingelise **Nieuwenhuijse**, a Dutch captain in the army and a physical therapist, chief of the Major Incident Hospital at MinDef in Utrecht – *Utrecht Major Incident Hospital*, Forum on *Patients' distribution dilemma*
 - Hasu D.L. **Patel**, a British plastic and reconstructive surgeon at the Royal London Hospitals, expert on blast injuries – *The terrorist incident in London*
 - Liat **Pessach Gelblum** an Israeli officer and psychologist instructor for medical training in the MESR simulation training center in Tel Hashomer – *Training the Trainers*
 - Nelson N. **Pita de Olim**, a Portuguese senior surgeon and WHO-EMRO EMT Regional Advisor – *Triage, an attempt for global consensus & The WHO contribution to mass casualty management*
 - Chaim **Rafalowski**, an Israeli Disaster Management coordinator and expert for the MDA's in Tel Aviv – *MDA command and control system*
 - Amer A. **Shoab** a British consultant orthopaedic surgeon at Manchester's Central Teaching University Hospital-Manchester Royal Infirmary – *The terrorist incident in Manchester*
 - Thomas **Wilp**, a German pre-hospital care and First Aid coordinator of the Health Unit for the ICRC in Geneva – Forum on *Should Emergency Services be deployed in the hot zone?*

The attending participants

More than 50 attendees – expert clinicians, trauma surgeons and health professionals – coming mainly from Europe, Middle East and the US. Present countries were

(in alphabetical order): Belgium, France, Estonia, Germany, Italy, Israel, Netherland, Norway, Spain, Sweden, Switzerland, UK and US. Some participants usually operate in University Hospitals, public and private Research Foundations, Health Organizations; some others spoke on behalf of ICRC, WHO, British NHS, European Commission and Military Forces – such as the Israeli Army, or the French “*Hôpital d'Instruction des Armées Begin*”. Max Dubois, an expert on military strategies and weapons management, also took part in the discussion. He said that there is a constant, general need of understanding new threats and evolving attack methodologies, as well as training and preparation of effective response plans.

Lessons learnt from recent terror incidents

1. Optimal crisis chain command

The meeting started with the detailed analysis of the **Paris multisite terror attack** (6 attacks, every 6 minutes) which took place on Nov. 13th 2015 at the Bataclan Theatre, the stadium and some restaurants in the city, in which 129 people died and 415 were injured, most of them youngsters.

Dr. Olivier Barbier presentation included key messages about how to manage the crisis event, how to triage victims (NATO triage: T1, T2 etc.) and treat them. His key message was “*the goal is to do for the greatest numbers*”. He recommends to **involve the staff personnel** of the command crisis unit from the beginning, and **prepare the operating rooms** – increasing their capacity, the blood bank and the equipment stocks; **only the one on command informs the press and coordinates medical resources** (nurses, general surgeons, orthopaedic surgeons etc).

2. Understand the pathogenesis of blast injuries.

The second experience was presented by dr. Hasu **Patel**. She was the surgeon on duty on the morning of July 7th 2005 when there was a **terror attack with suicide bombings in London Transport** (4 bombs made with Peroxide Hydrogen and pepper, 3 inside metropolitan trains, one in a bus), where 56 people were killed and 700 injured. She took care of the victims in the operation theatre with tireless dedication, and after this challenging experience she conducted a tremendous work of research and analysis, based on the comparison of all police reports, patients' pre-hospital/in-hospital data, and classification of injuries provoked by the bombs. She studied the effect of blasting on human body, proving a strong interconnection among blast waves and their impact on human body, exact location of the victim on the train and type/severity of injury. According to dr. Patel's experience, **for a mass casualty surgeon is essential to**

understand the pathogenesis of blast injuries – acceleration, spalling and implosion – for offering the most effective treatment to the victims.

3. A *plan blanc* focused on children

The third terror incident presented was the one which took place in France on the July 14th 2016, when a **cargo truck driver ran over people while celebrating the Bastille Day along the Nice Promenade**.

86 people died, 10 of them were children, and 434 were injured; 56 wounded children were admitted into the nearby hospital, 6 of them were absolute emergency. The speaker was dr. Maurizio **De Pellegrin**, who pointed out how the possibility of spontaneous, massive and uncontrolled arrival of victims in a first step, and overflow in a second step – after a mass casualty event – must be planned in advance, in order to offer an effective pre-hospital and hospital organization and care (*the right patient to the right place at the right moment*).

Dr. De Pellegrin also illustrated the state of some hospitals in different areas of Italy, finding out if there is an emergency *plan blanc* focused on children treatment. “*Still now – he said – there is a big gap among the Italian health structures, due to different protocols, heterogeneous buildings/logistics and grades of preparedness, but may be also depending on diverse economical, cultural and geographical contexts of the Italian regions*”.

4. The dual surgical command model

The fourth experience, presented by dr. Pål **Naess**, was about the **twin terror attack in Norway** on the 22nd July 2011, with a bomb explosion in **central Oslo** and a **shooting spree on Utoya Island**, where a gunman opened fire on a summer camp for young members of the Labour party. 86 people were killed at the scene and hundreds injured. The focus was on preparedness of hospital systems, and effectiveness of the dual surgical command model: a first command at Emergency Dept triage, with control of personnel and communication, as well as the supervision of the treatment and re-triage; a second command at the operating rooms with the optimal use of trauma surgical resources. In emergency crisis, **a trauma centre can treat effectively many patient with severe acute injuries (and low outcome of mortality) when protected from the large number of walking wounded patients (through immediate separation sick/non sick victims) (Gaarder C et al. 2012).**

5. Go back to the basics: train and drill

The last most recent experience to be commented was the **terrorist attack in England** on 22nd May 2017 with a **suicide bombing** with an improvised explosive device in

the ticket area of **Manchester Arena**, following a concert by Ariana Grande. The tragic result was 22 people killed (19 in situ, 2 in ED, 1 in Paediatrics Dept.) and 59 wounded, most of them children and adolescent fans of the American pop singer. The speaker was Dr. Amer **Shoib**. He practised most urgent surgical procedures/surgical resuscitation (hemostasis, revascularization, reduction of luxation, aponevrotomy) and bone fixation with monolateral external fixators and then Truelok circular system. He stated how in Damage Control Orthopaedics surgery is important to **stabilize the fractures, without much caring for the position**, which can be managed later. Repeated checks and sequential debridements are needed, to treat infections and allow weight bearing. He insisted on the need to **go back to the basics: train, drill and practice** (i.e. wounds: *do not close them on first setting!*). What is necessary is **well prepared people** in the right role, and **a good team coordination**.

The key points from the Faculty

Indications

AMBULANCE-PARAMEDICS

- 1 Triage must start over the scene. Well trained Paramedics for the *pre-hospital triage* (pre-triage) to distinguish critical/unstable patients from stable ones. Paramedics should decide on the ambulance what is better for patients and where to bring them.
 - 2 Paramedics have to start to record/identify patients (ID tag: name, photo for tracking and tracing), using the same method of the destination trauma hospital.
 - 3 Bring the unstable patient to the first place capable to practice Damage Control/Surgical resuscitation/ Blood transfusion.
 - 4 Get more info from the hot zone (even through a special APP or WhatsApp, or other social networks: how many patients on the scene, how many ambulances available, nearby hospitals capability, if the attack is terminated, how many hot zone scenarios etc; transmit the available info to hospitals (competent trauma staff is limited!) before patients arrival.
 - 5 ECG must be transmitted in real time from ambulance to doctors in hospital.
 - 6 Time of chain of survival (call answering, data collection, dispatching, and arrival on scene): 8 minutes average – ideal should be 4', generally in 10'.
 - 7 Improve technology, which is an enabling factor.
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LIFE-SAVINGS PROCEDURES

- 1 Stop bleeding – control severe hemorrhage, control the physiological vital state of the patient.
- 2 Opening airways. Resuscitative thoracotomy.
- 3 Orthopaedic Damage Control – minimal surgery to stabilize fractures.
- 4 Consider using regional anaesthesia, and conscious sedation.
- 5 Debridement: wounds, bones.
- 6 If, when (in poor contexts) necessary, consider using home drill, and fixation without C-arm.

Life Saving Treatment Goal: *Save patient's life (before limb)*, controlling the physiological vital functions, first treating the hemorrhagic shock or the acute ischemia (a bad prognostic factor), *but do not amputate limbs as a first emergency choice*. Amputation is a third stage of debridement.

SURGERY

- 1 Operating surgeons in mass casualty must be trained to act quickly, in the simplest, confident and safest way.
- 2 Decision to operate must be taken by a senior.
- 3 Operating surgeons must be also trained to manage blast injuries.
- 4 Knowledge of the medical consequences of various injuries (i.e. burns, blast, crush, chemical, biological, radio-nuclear (CBRN) injuries) is critical.
- 5 Vascular and plastic surgeons are necessary.
- 6 Need of sequential re-debridement, even if necrotic tissues have been removed.
- 7 Suggested use of common antibiotics, short treatments.

PAEDIATRIC VICTIMS

- 1 Do not over treat children – i.e. using complicated procedures (plating instead of casting etc). Keep it simple and quick.
- 2 Maternal and new born emergency care.
- 3 Supplementation of both manpower and equipment specifically suited for treatment of paediatric patients (Bar-On 2015).
- 4 Need of a special psychological support for children, in some cases they can feel totally lost – no name/identification, no parents with them.

- 5 Keep children and parents together.
- 6 At least one anaesthetist for children must be present in trauma/general hospitals.
- 7 Check the paediatric sterile equipments in stocks.
- 8 Do not operate on child and parent on the same day.
- 9 Repeated audiology in case of blast injures.
- 10 Rehabilitation starts immediately.

IN-HOSPITAL ORGANIZATION

- 1 *Crisis Management Unit/Team*: manage resources and logistics, assign well trained people to the key roles, control the surge of supply and sterile equipments in stock, prevent hospital disruption, communicate internally and externally to authorities and press/media (possibly only one person – the spokesperson or the Coordinator).
- 2 *CMU Coordinator*: the most adapt to run, manage, control, respond, communicate, not directly involved in the operation theatre.
- 3 *Triage*: Separate standing-by victims (they should not enter ED!) from injured ones. Sick or non-sick simple classification, done by senior not junior doctors. No more than one person performs triage at one time.
- 4 *Immediate ID record and track systems*, to facilitate the patient's recognition and guarantee the patient's safety. Only one ID method, only one system in pre-hospital and in-hospital phases.
The ID tag – registration, photo, X-rays, therapies etc. stays with the patient in a plastic folder since the first in-hospital admission. Easier to use the same track system used on an ordinary basis. Do not use serial numbers to identify, it can be confusing with large numbers. Use three letters and three numbers, not sequential.
- 5 *Debrief medical and health professional on duty*. Talking and sharing problems helps everyone, also the CMU Coordinator.
- 6 *Care for Personnel on duty*: provide food and drinks, staff rotation and psychological support, especially for the nurses who are strictly in touch with the wounded victims, which can be exhausting.

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- 7 *White-plan (Plan Blanc)*. How can it be defined? It is the hospital way to run sudden massive afflux of patients, victims of a mass casualty event or of a terrorist attack, with crash and/or blast and/or weapon and/or chemical, biological, radio-nuclear (CBRN) injuries.
- it should be standardized for all major trauma hospitals in the country
 - it must be known by all personnel
 - it is the CMU which declares the official start, the stand-by and the end of the white-plan, and decides the publication of data
 - it should be inserted in the official documents of the hospital
 - it should be tested through simulation and update each year
 - it must be officially adopted *before* mass casualty incidents!
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- 8 CMU Coordinator must *start planning* on day 1 for the *next days*
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- 9 *Improve Communication* which is a strong and critical issue. **Internal communication**, with continuous *multidisciplinary meetings*, as well as share of information among departments. Be attentive: inform each other, know better each other. The top chain command must keep informed the Personnel. **External communication**: prevent communication breakdown. Only one talks to media (traditional and social networks). Communicate to families and relatives of the victims. Involve them, keep them updated, in order to make them understand why a therapy decision was taken, and the possible outcomes.
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- 10 Keep *Administration Dept away from ED*.
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- 11 *Publish data and results*; outcomes count, maybe those lives could have been saved with a different approach.
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INTER-HOSPITALS AND COMMUNITY ORGANIZATION

- 1 Inter-organizational, inter-departmental, inter-hospitals knowledge – based on different situations – is critical.
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- 2 Considering that mass casualty incidences have the potential to rapidly overwhelm the local capacity to respond, cooperation among *health agencies, non-health agencies, hospitals and private industries* – both in the planning preventive phase, and the management phase – to *share know-how and resources* has become mandatory.
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Some fundamental statements from the Faculty

“Medicine and management in theory are considered two different competences, but when we face mass casualty events we have to mix technical knowledge and leadership, especially if we are called to assume the responsibility of coordination and decision making”.

“In mass casualty management one must switch from normal emergency medical response into mass casualty response. Both are trauma responses but the turning point is due to the overwhelming number of victims”.

“Involve the staff members (at all organizational levels) in the management process, in order to reach their total commitment and full collaboration since the beginning”.

“When you face a mass casualty incident you have to pass over difference of languages, cultures, beliefs. All staff members are precious, each one in his/her proper role. The final scope is to quickly rebuild order after chaos”.

“Keep it simple and quick; Keep on thinking; Keep on learning and drilling”.

Training

Some Dos and future improvements

1. Provide *continuous, cross practical medical and management training*, both in vitro (also with advanced simulation technology tools) and in vivo
2. Improve *training on war injuries*
3. Improve *e-learning* on mass casualty trauma management
4. Improve *Trauma Telemedicine*, for trauma evaluation and specialized assessments for patients in remote areas, and better decisions regarding patients transfer.
5. Improve follow-up.

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See also:

Shamah D. 2016. Israel a role model for disaster medicine, says Red Cross chief surgeon Harald Veen: "Israelis have the knowledge and experience to excel in emergencies", in: www.timesofisrael.com