MAJOR ACCIDENT RESPONSE PLANNING

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PART I: BACKGROUND

There is evidence that a significant percentage of victims who die in disasters and accidents, where mass casualties occur, could have been saved by improved medical rescue techniques and disaster management strategy.

The successful management of mass casualty incidents (MCI) requires that a clear understanding of the obstacles which have prevented effective response in the past, be confronted and resolved. In order to accomplish this objective it is necessary to clearly identify and create strategy that addresses each formidable obstacle. Although the Caribbean has unique geographic conditions to consider, these basic obstacles exist for any location in the world and is simply a matter of degree.A MCI exists when:

1. the number of patients and the nature of their injuries make the normal level of stabilization and care unachievable;

2. and/or, the number of Emergency Medical Technicians (EMT) and ambulances that can be brought to the field in the time allowed is not enough;

3. and/or, the stabilization capabilities of the hospitals that can be reached in the time allowed are insufficient to handle all the patients."

PART II: PROBLEMS OF ACCIDENT MANAGEMENT

A. Experience

Constraints to effective management of an MCI start with a lack of recognition among officials, planners and responders that mass casualty reponse requires expertise beyond the scope of daily emergency managment. Obstacles encountered at MCI's are as follows:

1. Failure in adequate alerting.
2. Lack of rapid "primary" stabilization of all patients.
3. Failure to rapidly move, collect, and organize patients at a suitable place.
4. Failure to provide proper (or any) triage.
5. Use of time-consuming and inappropriate care methods.
6. Premature commencement of transportattion.

7. Improper use of personnel in the field.
8. Lack of proper distribution of patients, resulting in improper use of medical facilities.
9. Lack of recognizable EMS command in the field.
10. Lack of proper preplanning and adequate training of all personnel.
11. Failure to recognize and compensate for unexpected problems and failures.
12. Lack of adequate or proper communications.

B. Disaster and Accident Reality

Some people tend to assume that the incidents are so diverse, bizzare and unpredictable that the problems cited are a function of the type of disaster. However, field experience reveals:

1. The events (disasters) are predictable.
2. The chain of events (response) is predictable.
3. The problems are predictable.
4. The failures are predictable.

C. PROBLEM: Caribbean

One of the main problems is the lack of well trained first-responders. Firefighters and police in the region are not routinely trained in first-aid and CPR, so while they are usually the first to arrive at an accident scene they are rarely capable of providing emergency resuscitation, i.e. CPR and management of shock and trauma. Another problem is the stabilization capability of the local hospital(s). What remains unknown is the operational level of services and facilities (laboratory, X-ray, surgery) because their capcity is not proportional to the number of beds. Likewise the number of specialists available to deal with thoracic, neurological or burn trauma cannot be deduced from the total number of doctors in the community.

D. Issues

1. Liability

Unlike natural disasters, a MCI caused by fire, explosion, air

crash or other accident will result in some liability being assigned. The country or company involved will bear some liability for damages and injury. it is more difficult to ascertain what uniformity, if any, exists in their policies.

2. Reimbursement

Because of the high probability of insurance company liability responders probably would be able to recover all or most of the cost incurred for a MCI response, if mutual-aid agreements are negotiated.

3. Legal Concerns

The authority and procedures for making a disaster declaration are too varied for an effective MCI response. These procedures need to be evaluated, modified or standardized for special-case application.

4. Timely Notification

Efforts must be made to simplify cumbersome, complicated chains of command to eliminate the possibility that assistance might not be requested soon enough to be effective. The potential problem is that easy access to outside resources might serve as a disincentive to develop and promote an effective local MCI capability.

5. Evacuation

If an evacuation is necessary, the determination of priorities must be a medical decision. Any other criteria would be unacceptable to airlines, industry, local government, contradict medical practice and be inconsistent with the humanitarian mission.

6. Hospital Costs

The prior guarantee of payment to all hospitals that might become involved in a regional plan could be negotiated by Caribbean Underwriters Association and written procedures established.

PART IV: STRATEGIES

Planning for disaster response includes the utilization of long and short term strategies. Short term strategies require the utilization of outside resources, mutual aid agreements, etc. while long term strategies may require assistance in training, technical consultation, technology, etc. Long and short term activities can take place simultaneously and both will require thorough

collaboration by governments, communities and the private sector.

A. Immediate Needs

1. Personnel/Training

a. Doctors specialized in burn and trauma care should be identified within the region to participate in the detailed planning and execution.

b. Firefighters, police and other emergency personnel should be given first-aid and CPR training.

c. Other medical personnel should be trained in triage procedures.

2. Material/Equipment

a. Trauma kits (or deluxe first-aid kits) should be furnished to mobile units or stations.

b. Plywood backboards for moving mass casualty patients from the accident site should be acquired and stored aboard mobile units or at station houses. These boards will immobilize and support every part of the patient's body, preventing further injury.

3. Communications

A primary community emergency communications network needs to be established. Initially, at a minimum, the network should link police, fire and medical services.

4. Administrative Arrangements

Standard operating procedures should be agreed upon between vital services, government,organizatios and private sector concerns. These can be formalized by memoranda of understanding. The memorandum would cover, in general, allocation of costs incurred, procedures for alert, initiation of action, command, termination of action, procedures for payment, replacement etc.

B. Long-Term

1. Training

The key to making any training program successful is that it must be goal-oriented, incremental and repetitive. In the private sector, first-aid and CPR training should be given to employees whose work place is subject to an MCI. These people will

not only be available to assist with work-related accidents but will become an asset to the entire community. Previously trained emergency service personnel will recieve advanced training.

2. Networks

The second most important step in developing a long-range MCM plan is creating networks within the region. A communication network is the most critical to establish. Many such networks already exist but are not organizad for the purpose of a MCI response.

The next most important requirement is for a transportation network that will allow for the rapid movement of supplies and possibly personnel to the accident site. The transport problems of evacuation must also be addressed.

3. Simulations

A plan that has never been tested is not a plan. Simulations require total community involvement, provide goal-oriented training, define command relationships, establish lines of communication, and identify coordination problems. Mass casualty accident management should be established as a program goal with systematic preparation to stage annual or bi-annual MCM exercises as a means to develop the total community disaster program.

PART IV: RECOMMENDATIONS

1. Identify a Task Force of Industry (Airlines, Shipping and their insurers), Governments (US, Caribbean and others with tourists in the region) and International Organizations to finalize a Caribbean Accident Response Plan which can be circulated for approval by governments, international organizations, industry and private organizations.

a. Review and test emergency notification processes and communication systems to ensure that rapid notification occurs to all involved;

b. Clearly identify which resources will respond to what type accidents and who will have coordination and support responsibility in each event

c. Identify if there are gaps (financial, legal or other considerations) which need to be addressed by the cooperating members of the Accident Response Planning Group.

2. Encourage the development of Memorandums of Understanding or formal agreements between/among key organizations to ensure continuing cooperation and training for preparedness and response

3. Review emergency medical capabilities and stockpiles of medical supplies and materials to ensure the availability and appropriateness of each.

a. Request PAHO to form a review team to finalize emergency medical response plans, identify team(s), define their operational responsibilities, review medical and supply needs and recommend where stocks should be located and how they should be maintained Particular emphasis should be on the capabilities of the Barbados Defense Force, Government of France (Martinique and Guadeloupe), Metro Dade Fire Service (Florida), U.S. Coast Guard, Port au Prince Airport and facilities in the Dominican Republic.

4. Establish dates and benchmarks for the completion of the emergency response plan, training and simulation exercises and the long term prevention/mitigation activities.

1. Timely notification;
2. Rapid mobilization of personnel and resources;
3. Readily available air transport;
4. Access to accident site;
5. Identification of specialized or alternate facilities for evacuation.

APPENDIX A

MASS CASUALTY MANAGEMENT (MCM) NOTES

General

1. Emergency resuscitation includes CPR and emergency management of shock and trauma.

   Emergency care includes management of non-life threatening emergencies and emergency transportation.

   Intensive care is extended, long-term resuscitation. (36)

2. Life supporting first aid skills can be acquired by the lay public. (36)

3. Major problems in handling masss casualty situations are logistical more than medical (assuming emergency resuscitation is performed). (29)

4. Manual of Medical Procedures for On-Site Casualty Management is based on the concept of rapid assessment, prioritization by injury severity, then reassessment within injury category, then reprioritization followed by stabilization, resuscitation, and orderly evacuation. (29)

5. Emergency resuscitation expanded to include first aid, life-saving procedures such as airway maintenance, hemostasis, intravascular volume maintenance and the proper preparation of the injured for transport with the dressings, splints, and analgesics. (36)

6. Importance of establishing the right flow patterns and the need for clearly defined priorities with victims sorted for immediate intervention for evacuation. (29)

7. Patients randomly entering hospitals without stabilization or order can only be considered a mobile disaster transferred from the field to the hospital. (28)

8. Evacuation is not urgent, only emergency state resuscitation and preparation for evacuation are urgent. (28)

9. The feasibility, woth-whileness, and costs of bringing resuscitation to mass disasters early enough to be effective has not yet been determined. (36)

10. Continuing problem of developing and training persone with expertise based only on sporadic experience with the management of mass-casualty civilian situations. (29)

11. The delivery of EMS will be more difficult in the future because of the probability of worse disasters. (31)

A1

OHIO STATE STUDY

* "Few community health care systems have undertaken realistic overall planning for handling large numbers of casualties. In over half the communities studies it is generally assumed that everyday EMS can be extended in mass emergencies, i.e., that a system that functions adequatly during normal time will also do so in disasters. But our research found that everyday and disaster EMS are not simply two point on the same continuum. Mass emergencies create demands that dioffer qualitatively, as well as quantitatively, from everyday EMS demands."

* "There was a greater tendency to transport victims to hospital facilities immediately rather than to triage and stabilize them at the disaster site. Actual on-site triage occurred in relatively few of the cases examined, with only half these being done according to some predesigned plan."

* "...in only about one-third of the cases was patient distribution done according to some overall plan..."

* "...in the majority of these instances over half of the casualties ended up clustered in one hospital."

* "In the events studied, hospitals often failed to receive word of a disaster until the first victims arrived in the emergency room."

* "In one-half of the events examined, no authority was exercised at all at the disaster site, and in only about one-third of the events was there any overall coordination of the distribution of the casualties."

* "...our research suggests that disaster related EMS planning and response is...one of the least satisfactory aspects in the provision of EMS in general. The area is marked by lack of knowledge both of disasters and of EMS systems operations, by inadequate and incorrect planning, and especially, by poor response times at mass emergencies. Response is characterized by inefficiency and ineffectiveness both in processes and outcomes..."

* "Much of the planning is either inadequate or based on incorrect notions."

* "...we can say that, overall, the delivery of EMS in mass emergencies is not very good, either in absolute or relative terns." (i.e., relative to daily EMS quality)

A2

CASE STUDIES MCM

1. 1971 San Francisco Valley Earthquake--of 56 deaths, 73% were considered potentially salvageable under significantly improved conditions of preparation and medical rescue. (41)

2. 1980 Mount St. Helens Eruption--74% of 23 deaths were potentially preventable had simple protective equipment been distributed during rescue attempts or as a preparatory effort. (41)

3. 1982 Air Florida Crash--25% of 74 deaths were salvageable by modern medical techniques and would have survived. (41)

4. El Salvador relief workers estimated that 80% of those rescued were saved by friends, co-workers, family and passersby and 38% of those injured died before rescue could be effected. (35)

5. Italian Earthquake--a significant portion of victims were not killed instantly. (36)

6. A study done for FEMA in 1984 found that:

   (A) there is a multidecade gap between the state of the art of civilian disaster medical rescue including triage formulae and present levels of trauma care in the United States;

   (B) there is evidence that a significant percentage of victims who die in disasters could be saved by improved medical rescue techniques and disaster management strategy. (41)

A3
AIRPORT MCM

1. Airports are extraordinarily subject to potential accidental disasters where extrication slows the flow of patients, egress traffic congestion and distance significantly hamper hospital delivery. (29)

2. The speed with which airport rescue and firefighting operations can be applied is the key factor in survival. (37)

3. Each airport should have at least two airport firefighters per shift trained as paramedics or EMTs. (14)

4. The means for dealing with an aircraft accident occurring at or in the immediate vicinity of an airport assumes primary importance because it is there that the greatest opportunity exists for saving lives. (37)

5. The airport operator is required to establish coordinated plans with the local juristictions of rescue, fire, police, hospitals and surrounding communities for any assistance which may be needed. The operator is also required to provide transportation and medical services for the maximum number of persons to be carried on the largest aircraft served by the airport.

6. Activities include training and certification of EMTs and paramedics as well as providing advanced and basic life support training for all ranks of airport personnel indcluding all public contact airline employees.

7. The airport-based disaster team represents a large disaster-oriented team familiar with each other and their equipment. (29

8. True concern for disaster preparedness at airports remains only an episodic feature. (29)

A4
AIRPORT-BASED COMMUNITY DISASTER PLANNING

(ABC Disaster Planning)

1. Effective, coordinated emergency plans will be of benefit not only to airports but to the entire community and are readily adaptable to any emergency. It is common for airports to serve as the focus of relief efforts during disasters. (14)

2. It is sensible to designate the airport as the core of any community disaster plan. The airport can function as the hub for coordinating services for fire control, rescue, medical services and transportation in mass disaster situations. This is true whether the mass disaster involves a wide-bodied jet aircraft, an air crash in a populated area, an industrial accident, a gas explosion and other man-made or natural disasters occurring within a wide designated area. (29)

3. Simulations help define the roles to be played by each responding agency and establish command, communications and coordination between airport departments and community agencies. (37)

4. A drill gives airport personnel and local emergency agencies an opportunity to experience a simulated crash situation first hand. These agencies will likely be in charge if the accident occurs outside the airport boundry. (37)

APPENDIX B

HOSPITALS

Number of Short-term Beds in General Hospitals, with Ratios per 1,000 Population, by Country, Around 1978*

Country	Year	Total Beds	Ratio	General Beds
Antigua	1978	227	3.1	227
Bahamas	1978	495	2.2	495
Barbados	1978	681	2.7	661
Cayman Islands	1978	40	3.3	40
Dominica	1974	312	4.2	312
Dominican Republic	1973	10,747	2.4	9,641
Grenada	1971	306	3.3	306
Gouadeloupe	1977	3,316	9.1	3,316
Haiti	1976	3,279	0.7	2,963
Jamaica	1974	4,188	2.1	3,752
Martinique	1974	2,467	6.9	2,467
Monserrat	1975	57	4.7	57
Netherland Antillies	1968	1,259	5.9	---
Puerto Rico	1973	9,093	3.1	9,069
Saint Lucia	1976	410	3.7	398
St.Kitts-Nevis Anguila	1977	271	4.0	271
St.Vincent	1974	264	2.9	264
Trinidad and Tobago (k)	1978	2,044	1.8	2,044
Turks and Caicos Isl.	1979	21	3.5	21
United States	1977	1,075,833	5.0	1,073,167
Virgin Islands (UK)	1977	42	3.5	42

* Source: Pan American Health Organization

B1

MEDICAL PERSONNEL

Number of Physicians and Nurses per 10,000 Population
Around 1979*

Country	Year	Physicians		Nurses	
		Number	Ratio	Number	Ratio
Antigua	1978	32	4.3	127	16.9
Bahamas	1979	198	8.8	449	20.0
Barbados	1979	201	8.0	764	30.4
Cayman Islands	1979	16	9.4	56	34.1
Dominica (d)	1973	13	1.8	152	20.8
Dominican Republic	1973	2,374	5.4	500	0.9
Grenada	1978	25	2.3	107	9.7
Gouadeloupe	1977	275	8.6	749	23.4
Haiti	1979	600	1.2	771	1.5
Jamaica	1979	759	3.5	2,252	d 10.4
Martinique	1979	364	7.1	724	e 20.2
Monserrat	1979	7	6.4	43	39.1
Puerto Rico	1980	4,057	11.7	7,181	20.6
St.Kitts-Nevis Anguila	1979	16	2.4	207	37.3
Saint Lucia	1976	32	2.9	272	22.7
Trinidad and Tobago	1978	780	6.9	3,840	33.7
Turks and Caicos Isl.	1979	3	5.0	27	45.0
United States	1979	375,066	16.7	1,112,000	50.1
Virgin Islands (UK)	1978	10	4.2	20	16.7
Northern America		418,322	16.8	1,267,674	50.5
Latin America		313,317	9.2	151,573	4.2

* Source: Pan American Health Organization

B2

ROSTER OF HOSPITALS AND ALLIED ORGANIZATIONS (1)

Name of Institution	Licensed Beds	Emergency Room Capacity*
Baptist Hospital of Miami	513	2-3
Cedars Medical Center	700	2-3
Coral Gables Hospital	285	2-3
Coral Reef Hospital	248	5-6
Doctor's Hospital (CG)	285	4-5
Golden Glades Regional Medical Center	352	3-4
Hialeah Hospital	411	2-3
Humana Hospital Biscayne	458	4-5
James Archer Smith Hospital	128	3-4
AMI Kendall Regional Medical Center	412	2-3
Mercy Hospital	538	5-6
Mount Sinai Medical Center	699	5-6
North Miami Medical Center	359	2-3
North Shore Medical Center	357	2-3
AMI Palmetto General Hospital	360	2-3
Palm Springs General Hospital	247	1-2
Pan American Hospital	146	2-3
AMI Parkway Regional Medical Center	412	4-5
St. Francis Hospital	253	4-5
AMI Southeastern Medical Center	224	2-3
South Miami Hospital	528	2-3
South Shore Hospital	178	2-3
^U of M/Jackson Memorial Med. Center	1,250	7-8
USAF Hospital, Homestead	70	2-3
Veterans Admin. Medical Center	839	3-4
TOTAL	9,992	73-99

(1) Derived from South Florida Hospital Association Roster 9/88. Only Dade County hospitals with emergency room facilities are listed. Does not include Broward or Monroe Counties.

* Emergency room (ER) capacity is the number of critical trauma patients the ER staff estimates they could accommodate given a 2-3 hour lead time. The estimated average time in the ER for a critical trauma patient varied from 1 to 3 hours. Some facilities can not handle certain types of trauma due to a lack of specialists. Information collected by Douglas Jewett, Metro-Dade County Fire Department.

APPENDIX C

CONVENTION ON INTERNATIONAL CIVIL AVIATION

Article 25: "..each contracting State undertakes to provide such measures of assistance to aircraft in distress in its territory as it may find practicable, and to permit, subject to control by its own authorities, the owner of the aircraft or authorities of the State in which the aircraft is registered to provide such measures of assistance as may be necessitated by the circumstances. Each contracting State, when undertaking search for missing aircraft, will collaborate in coordinated measures which may be recommended from time to time persuant to this convention."

International Standards and Recommended Practices for Seach and Rescue

Annex 12, 2.1.2 - "Subject to the control of its own authorities, a contracting State shall permit immediate entry of aircraft, equipment and personnel necessary to search for aircraft in distress, or rescue survivors of aircraft accidents, into any areas other than prohibited areas in which it is believed that such aircraft or survivors are lovated. Each contracting State shall publish all necessary information concerning authorities and the measure of control exercised by them."

Aerodromes

Annex 14, 2.11 Rescue and Firefighting

2.11.1 - Information concerning the level of protection provided at an aerodrome for aircraft rescue and fire fighting purposes shall be made available.

2.11.2 - RECOMMENDATION - The level of protection normally available at an aerodrome should be expressed in terms of the category of the rescue and fire fighting services as described in 9.2. and in accordance with the types and amounts of extinguishing agents normally available at the aerodrome.

2.11.3 - Significant changes in the level of protection normally available at an aerodrome for rescue and fire fighting shall be notified to the appropriate air traffic services units to enable those units to provide the necessary information to arriving and departing aircraft. When such a change has been corrected, the above units shall be advised accordingly.

2.11.4 - RECOMMENDATION - A significant change should be expressed in terms of the new category of the rescue and fire fighting service available at the aerodrome.

Emergency and Other Services

9.1. - Aerodrome emergency planning

9.1.1. - An aerodrom emergency plan shall be established at an aerodrom, commensurate with the aircraft operations and other activities conducted at the aerodrome.

9.1.2. - The aerodrome emergency plan shall provide for the co-ordination of the action to be taken in an emergency occurring at an aerodrom or in its vicinity.

9.1.3. - The plan shall co-ordinate the response or participation of all existing agencies which, in the opinion of the Airport Authority, could be of assistance in responding to an emergency.

Note: Examples of agencies are:

On the aerodrome: air traffic control unit, rescue and fire fighting services, aerodrome administration, medical and ambulance services, aircraft operators, security services and police;

Off the aerodrome: fire department, police, medical and ambulance services, hospitals, military and harbour patrol or coast guard.

9.1.4. - 9.1.10. Deleted

9.1.11. - Procedures shall be established for testing the plan and reviewing the results in order to improve the effectiveness of the plan.

9.1.12. - RECOMMENDATION - The response of individual participating agencies, and components of the plan such as the communications system should be
C2
tested and reviewed at intervals not exceeding one year.

9.2. - 9.2.16. Deleted

9.2.17. - RECOMMENDATION - The operational objective of the rescue and fire fighting service should be to achieve response time of two minutes, and not exceeding three minutes, to the end of each runway in optimum conditions of visibility and surface conditions.

C3

LLOYD'S AIRCRAFT LIABILITY POLICY (USA)
(Approved by Lloyd's Aviation Underwriters Association)

WE, UNDERWRITERS AT LLOYD'S, London, agree with the Insured, named in the Declarations made a part hereof, in consideration of the payment of the premium, and in reliance upon the statements in the Declarations and subject to the limits of liability, Exclusions, Conditions and other terms of this policy

Insuring Agreements

I. COVERAGE A - BODILY INJURY LIABILITY (EXCLUDING PASSENGERS)
To pay on behalf of the Insured all sums which the Insured shall become legally oblogated to pay as damages, including damages for care and loss of services, because of bodily injury, sickness or disease, including death at any time resulting therefrom, sustained by any person, excluding any passenger, caused by an occurrence and arising out of the ownership, maintenance or use of the Aircraft.

COVERAGE B - PROPERTY DAMAGE LIABILITY
To pay on the behalf of the Insured ..... etc.

COVERAGE C - PASSENGERS BODILY INJURY LIABILITY
To pay on behalf of the Injured all sums which the Insured shall become legally obligated to pay as damages, including damages for care and loss of services, because of bodily injury, sickness or disease, including death at any time resulting therefrom, sustained by any passenger, caused by an occurrence and arising out of the wnership, maintenance or use of the Aircraft.

COVERAGE D - SINGLE LIMIT - BODILY INJURY (INCLUDING PASSENGERS) AND PROPERTY DAMAGE LIABILITY
To pay on behalf of the Insured all sums which the Insured shall become legally obligated to pay as damages, including damages for care and loss of services, because of bodily injury, sickness or disease, including death at any time resulting therefrom, sustained by any person, and for damages because of injury to or destruction of property, including loss of use thereof, caused by an occurrence and araising out of the ownership, maintenance or use of the Aircraft.

COVERAGE E - SINGLE LIMIT - BODILY INJURY (EXCLUDING PASSENGERS) AND PROPERTY DAMAGE LIABILITY

To pay on the behalf of the Insured all sums which the Insured shall become legally obligated to pay as damages, including damages for care and loss of

services, because of bodily injury, sickness or disease, including death at any timne resulting therefrom, sustained by any persone, excluding any passenger, and for damages because of injury to or destruction of property, including loss of use thereof, caused by an occurrence and araising out of the ownership, maintenance or use of the Aircraft.

COVERAGE F - MEDICAL PAYMENTS

To pay all reasonable expenses incurred within one year from the date of accident for necessary medical, surgical, ambulance, hospital, professional nursing and funeral services, to or for each person except the pilot or crew unless specifically stated as "included" in the Declarations, who sustains bodily injury, sickness or disease, caused by accident, while in, entering or alighting from the aircraft if the aircraft is being used by the named Insured or with his permission.

With respect to Insuring Agreements IV and V the insurance afforded by this coverage shall be excess insurance over any other valid and collectible medical payments insurance applicable thereto.

II. DEFENSE, SETTLEMENT, SUPPLEMENTARY PAYMENTS

Coverages A, B, C, D and E.

As respects such insurance as is afforded by the other terms of this Policy the Underwriters shall:

(a) defend in the name of and on behalf of the Insured .....etc.

(b) pay all premiums on bonds...etc.

(c) pay all costs taxed against the Insured...etc.

(d) PAY EXPENSES INCURRED BY THE INSURED FOR SUCH IMMEDIATE MEDICAL AND SURGICAL RELIEF TO OTHERS AS SHALL BE IMNPERATIVE AT THE TIME OF THE ACCIDENT. (emphasis added)

(e) pay all expenses incurred by the Underwriters for investigation...etc.