



World Health Organization  
Western Pacific Region

# **FIELD MANUAL FOR CAPACITY ASSESSMENT OF HEALTH FACILITIES IN RESPONDING TO EMERGENCIES**



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## Introduction

The term *health facility* refers to a hospital, clinic, outpost or institution that provides comprehensive medical care to a significant number of people in a given area. Health facilities play a pivotal role in the everyday life of communities. In most instances, the services they render are the primary means of addressing public health needs. By providing emergency services and 24 hour operation during disasters, community dependence on health facilities is greatly magnified and they will be seen as the main resource for prompt diagnosis and treatment.<sup>1</sup> The survival and treatment of the greatest number of disaster victims will largely depend on a facility’s preparedness in dealing with the public health consequences of a disaster.

### Objective of Preparedness Assessment

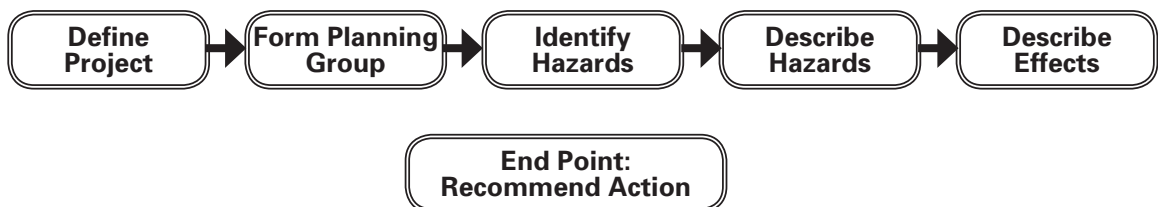
Emergency preparedness is a necessity at all levels of the community. For a health facility, this involves a logical process:<sup>2</sup>



The series of activities range from the formulation of emergency preparedness policies to continuous improvement and fine-tuning of institution practices through constant monitoring and evaluation. Following this process assures the health facility that all important aspects of emergency preparedness are adequately addressed.

The interaction between a health facility’s *susceptibility* (inherent factors in a facility that allows a hazard to cause an emergency) and *resilience* (the ability of the facility to withstand damage caused by an emergency) determines its vulnerability.<sup>3</sup> A health facility’s preparedness for emergencies is based on a sound assessment of vulnerability. Performing regular vulnerability assessments allows a health facility to effectively identify and modify factors that increase its susceptibility and decrease its resilience. This creates a foundation for effective prevention within the broader context of sustainable development.

Vulnerability Assessment also follows a logical process:



1 American Hospital Association, *Hospital Preparedness for Mass Casualties Final Report*, 2000.

2 World Health Organization, *Health Sector Emergency Preparedness Guide: Making a Difference to Vulnerability* (WHO Emergency Preparedness Program – Department of Emergency and Humanitarian Action), 1998, p. 6.

3 WHO, *Health Sector Emergency Preparedness Guide*, p. 12.

The entire process begins by defining the objectives and scope of the vulnerability assessment and the identification of intended tasks and needed resources. The formation of a planning group facilitates coordination between activities and key players in the facility. Once this groundwork is in place, hazards facing the health facility can be identified, described, and evaluated with regard to possible effects on the facility's operation. The results of this assessment, coupled with other emergency management activities, will guide the formulation of an emergency plan of action.<sup>4</sup>

The effectiveness of a health facility's emergency plan of action, therefore, is built on a sound assessment of its vulnerability. A keen awareness of current strengths and weaknesses will enable the management team to efficiently take action steps in order to enhance the preparedness of the health facility for emergency situations.

### ***Using the Manual***

Although the present title deviates from the original publication, *Protocol for Assessment of Health Facilities in Responding to Emergencies* (WHO, 1999), this document serves as an updated second edition. Similar to the first edition, this updated edition is a management tool for health professionals evaluating the preparedness of their respective health facilities for dealing with disasters.. The needs of professionals who manage health facilities, including national and provincial emergency coordinators and regional emergency focal points, were kept in mind during revision of the original manual. The authors utilized input from several representatives in different public health fora in order to validate the applicability and usefulness of guidelines. It must be emphasized, however, that the recommendations given in this publication are not meant to be prescriptive. Rather, readers are advised to view the entire process as a form of self-assessment for every facility and customize the application of the evaluation according to the resources, capabilities, and acceptable norm in their respective regions.

The manual is divided into three main parts. We recommend that the reader accomplish the *Main Questionnaire* found in the first part of the manual prior to using the other sections. The questionnaire, presented in a checklist format, will provide an overview of the health facility's present capabilities. The reader can then deepen this awareness by delving into the details offered in succeeding sections. The second part, *Assessment of General Emergency Preparedness*, deals with aspects of preparedness in any level of emergency. Here, evaluation is to be done within the context of three basic elements: *Structural vulnerability*, *Non-structural vulnerability*, and *Functional vulnerability*. The third part, *Assessment of Preparedness for Specific Emergencies*, is the major addition to this updated edition. This section tackles specific emergencies that are becoming increasingly relevant: *Industrial Emergencies*, *Infectious Disease Outbreaks*, and *Biological, Chemical and Radiologic Emergencies*.

The manual presents a series of evaluation checklists that were formulated based on information from current literature. By correlating findings with current data, formulated action plans will be more effective and relevant according to

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<sup>4</sup> WHO, *Health Sector Emergency Preparedness Guide*, p. 14.

the facility's needs. Definitions and relevant case studies are provided whenever possible. Additional data are given in the Appendix Section of the document for reference purposes.

It is the authors' hope that this manual will help health facilities in the region make a realistic and sustainable difference in their respond to emergencies.

## Part I Questionnaire for Capacity Assessment of Health Facilities in Responding to Emergencies

The questionnaire serves as an evaluation tool that tackles both general and specific emergencies. The reader is encouraged to complete the entire questionnaire and then analyze the results using the essential details presented in the succeeding sections.

### I. General Information

1. When was the health facility built? \_\_\_\_\_
2. What is the bed capacity? \_\_\_\_\_
3. How many operating rooms does your facility have?
  - \_\_\_\_\_ 1
  - \_\_\_\_\_ 2
  - \_\_\_\_\_ 3
  - \_\_\_\_\_ > 3, specify : \_\_\_\_\_
4. How many stretchers (used for transporting patients) does the facility have? \_\_\_\_\_
5. Where are the stretchers placed when not being used? *(Please check all applicable areas.)*
  - \_\_\_\_\_ ER
  - \_\_\_\_\_ Waiting area
  - \_\_\_\_\_ Ward area
  - \_\_\_\_\_ Storage room
  - \_\_\_\_\_ Lobby
  - \_\_\_\_\_ Others, specify: \_\_\_\_\_
6. How many wheelchairs does the facility have? \_\_\_\_\_
7. Where are wheelchairs placed when not in use? *(Please check all applicable areas.)*
  - \_\_\_\_\_ Nurses' station
  - \_\_\_\_\_ Ward area
  - \_\_\_\_\_ Treatment room
  - \_\_\_\_\_ Storage room
  - \_\_\_\_\_ Lobby
  - \_\_\_\_\_ Others, specify: \_\_\_\_\_
8. Where are the carts used for transporting and storing medical supplies located? *(Place the number of carts found in all the applicable areas.)*

	No. of carts
a. nurses' station of each ward	
b. emergency department	



c. OPD section	
d. treatment room	
e. physiotherapy/ exercise room	
f. operating room	
g. other areas, specify:	

9. Are there extra beds in the facility?  
 Yes  
 No

*If you answered yes, please proceed to questions 9a-9b; otherwise go to question 10.*

9a. Where are they located? *(Please check all applicable areas.)*

- Rooms
- Receiving areas
- Stock rooms
- In-patient areas
- Visiting rooms
- Others, specify: \_\_\_\_\_

9b. Are the beds secured in place?

- Yes
- No

*If you answered yes, please proceed to question 9c; otherwise go to question 10.*

9c. If yes, how? *(Please check all applicable methods.)*

- Wheel lock
- Manually fastened
- With metal
- With wood
- With rope
- Others, specify: \_\_\_\_\_

10. Has the health facility experienced any form of disaster during the last 10 years?

- Yes
- No

*If you answered yes, please proceed to questions 10a-10c; otherwise go to question 11.*

10a. What is the nature of the disaster? *(Please check all applicable answers.)*

- Earthquake
- Landslide
- Tsunami
- Typhoon
- Fire
- Volcanic eruption

- Flood
- Explosion (caused by bombs, fuel tanks, etc.)
- Armed conflict
- Industrial/Technological
- Infectious Disease Outbreak
- Radiologic/Chemical
- Others, specify: \_\_\_\_\_

10b. Was evaluation of the structural integrity of the building done after the disaster?

- Yes
- No

10c. Has the facility suffered any structural damage due to the said disaster?

- Yes
- No

*If you answered yes, please fill in the table below; otherwise go to question 11.*

Nature of disaster	Date of Occurrence	Structural Damage	Repairs Done	Cost of Repairs

11. Has the facility responded to an external disaster situation in the past?

- Yes
- No

*If you answered yes, please fill in the table below; otherwise proceed to question 12.*

Nature of Disaster	Date of Occurrence	Total Number of Casualties	Number of Casualties Treated by the Health Facility

## II. Assessment of Structural Vulnerability

12. Where is the health facility located? *(Please check appropriate answer/s.)*

- On a slope
- On a valley
- On top/close to active faults
- On a plain/flat land

- \_\_\_\_\_ On a flood plain
- \_\_\_\_\_ In a tsunami prone area
- \_\_\_\_\_ On a highly elevated area
- \_\_\_\_\_ Others, specify: \_\_\_\_\_

13. How many buildings does the institution have?

- \_\_\_\_\_ 1
- \_\_\_\_\_ 2
- \_\_\_\_\_ 3
- \_\_\_\_\_ >3, specify: \_\_\_\_\_

14. Is/Are the shape/s of the building/s symmetrical?

Building	Symmetry	
	Yes	No

15. Is/Are the shape/s of the building/s simple or complex?

Building	Shape	
	Simple	Complex

16. How many stories do the buildings of the institution have?

*(Please fill in the table below.)*

Building	No. of Stories

17. What is/are the angle/s of the roof/s on the health facility building/s? *(Please fill in the table below.)*

Building	Roof Angle						
	1°-<10°	10° - <20°	20° - <30°	30° - <40°	>40°	Flat, no angle	Do not know

18. Are ramps present in appropriate areas of the health facility for moving bed patients and for use by people with disabilities?

- Yes  
 No

19. What is the main material used in the construction of the buildings?

- Reinforced concrete  
 Brick masonry  
 Wood  
 Others, specify: \_\_\_\_\_

20. Were there any major alterations done in any of the buildings of the health facility?

- Yes  
 No

If you answered yes, please fill in the table below; otherwise proceed to question 21.

Building	Alteration done	Year

**III. Assessment of Non-Structural Vulnerability**

21. Which of the following are available in your institution?

*(Please fill in the table below.)*

Equipment	Present in the health facility ?		No. of units
	Yes	No	
Central Air-conditioning Unit			
Electric Generators			
X-ray Equipment			
Boiler			
CT-Scan Machine			
Hydrotherapy Pool			
MRI Machine			
Respirators			
Anesthesia Machine			

22. Where are the following located? *(Please put the number of units in the appropriate spaces.)*

Equipment	Building location	Basement	Ground Floor	Second Floor	Third Floor	Above 3 <sup>rd</sup> Floor
Central Air-Con Unit						
X-ray Equipment						

CT Scan Machine							
MRI Machine							
Electric Generator							
Boiler							
Hydrotherapy Pool							
Respirator							
Anesthesia Machine							

23. How are the following anchored? *(Please check all appropriate spaces.)*

Equipment	Anchorage		Material			Location of Anchorage		
	<i>Attached to wall</i>	<i>Not anchored</i>	<i>Use of metal</i>	<i>Use of wood</i>	<i>Use of rope</i>	<i>At the base</i>	<i>On top</i>	<i>At the sides</i>
Central Air Conditioning Unit								
X-ray Equipment								
CT Scan Machine								
MRI Machine								
Electric Generators								
Boilers								
Hydrotherapy Pools								
Respirators								
Suction Machines								
Substations								
Refrigerator/Freezer								
Television Sets								

24. Where do you store chemicals? *(Please check all applicable answers.)*

- Storage with shelves
- Storage without shelves
- On top of cabinets
- On the floor
- Others, specify: \_\_\_\_\_

25. Where do you store other potentially hazardous substances? *(Please check all applicable answers.)*

- Storage with shelves
- Storage without shelves
- On top of cabinets
- On the floor
- Others, specify: \_\_\_\_\_

26. Are these storage containers anchored?

- Yes
- No

*If you answered yes, please proceed to question 26a; otherwise go to question 27.*

26a. How are these storage containers anchored?

- At the base  
 At the sides  
 On top  
 All of the above

27. Who is/are responsible for storage and safekeeping of these chemicals and substances?

- Laboratory technician  
 Utility personnel  
 Others, specify: \_\_\_\_\_

28. Did the personnel in charge of handling and storing the chemicals and potentially hazardous substances receive proper training regarding his/her tasks?

- Yes  
 No

29. Are guidelines set by Material Safety Data Sheets (MSDS) being followed with regard the storage, handling, and disposal of these chemicals and substances?

- Yes  
 No

#### IV. Assessment of Functional Vulnerability

##### A. Site and Accessibility

30. Is the health facility located in the town/city proper?

- Yes  
 No

*If you answered no, please proceed to questions 30a-30b; otherwise go to the box after question 30b.*

30a. How far is the facility from the main town/city? \_\_\_\_\_

30b. Is the facility separated from the main town/city by a bridge?

- Yes  
 No

31. Is the health facility located along the main street/highway?

- Yes  
 No

*If you answered no, please proceed to question number 31a; otherwise go to question 32.*

31a. How far is the facility from the main street/highway? \_\_\_\_\_

32. How many roads lead to the health facility?

- 1
- 2
- 3
- >3, specify: \_\_\_\_\_

33. What are the conditions of the roads that lead to the health facility?

(Please fill in the table below.)

Road	No. of lanes	Road Condition		
		Well paved, no potholes	Paved but with potholes	Unpaved
1				
2				
3				
4				

**B. Areas in the Health Facility**

34. What are the major areas of your institution? (Please check all applicable answers.)

- Administration
- Ambulatory Care Units (Outpatient)
- General Services
- Emergency Services
- In-patient Care Units
- Laboratory
- Pharmacy
- Radiology
- Operating Rooms
- Others, specify: \_\_\_\_\_

35. Where are the points of entry to the health facility? (Please check all applicable answers.)

- ER area
- Administration area
- OPD area
- Others, specify: \_\_\_\_\_

36. What comprise the General Services area? (Please check all applicable answers.)

- Boilers
- Kitchen area
- Laundry area
- Communication
- Machinery area
- Storeroom
- Others, specify: \_\_\_\_\_

37. Is the General Services area located in a separate building?

Yes

No

38. What specific areas of the health facility can be converted into spaces for patients during disaster situations? *(Please check all applicable answers.)*

Waiting areas/lobby

Physician's offices

Parking lots

Physiotherapy room

Park/ free area

Outpatient consultation

Diagnostic and treatment room

Others, specify: \_\_\_\_\_

39. What provisions are located in these areas? *(Please check all applicable answers.)*

Adequate lighting

Electrical outlets

Water supply

Bathroom

Telephone outlets

None

### C. Equipment and Supplies

40. Are the following equipment/supplies available in your institution?  
*(Please fill in the table below.)*

Equipment/Supply	No. of units available	Functional	Properly labeled	
			YES	NO
a. Stethoscope, adult				
b. Stethoscope, pediatric				
c. Sphygmomanometer				
d. Thermometer				
e. Tongue depressors				
f. Light source (flashlight)				
g. Tape measure				
h. Vision testing chart (Snellen)				
i. Reflex hammer				
j. Head mirror				
k. Mirror, laryngeal set				
l. Oscope set				
m. Pelvimeter (Collyer, external)				
n. Speculum, nasal				
o. Scale, spring/infant				



p. Scale, adult				
q. Ambu-bags (infant, child, adult with masks)				
r. Laryngoscope				
s. Suction Machine				
t. Oropharyngeal airway				
u. Endotracheal tubes with cuffs				
v. Intubating forceps				
w. Endotracheal tube connectors				
x. Examination table				

41. Are there stocks of the necessary supplies and equipment in the health facility?

- Yes  
 No

42. Is inventory of resources done by the institution?

- Yes  
 No

*If you answered yes, please proceed to questions 42a-42b; otherwise go to question 43.*

42a. How often is the inventory conducted?

- Every month  
 Quarterly  
 Annually  
 Others, specify: \_\_\_\_\_

42b. What benefits have been realized from this practice? *(Please check all applicable answers.)*

- Identification of resources needed for effective emergency management  
 Identification of resources currently available within the community  
 Identification of variation (shortfall/surplus)

43. Is there a detailed list showing the destination (intended use) of these supplies?

- Yes  
 No

44. How many months of supplies (medical and surgical items, essential medicines and other supplies) are stocked for use by the health facility?

- 1 month  
 2 months  
 3 months  
 >3 months, specify: \_\_\_\_\_

45. Is there an arrangement with vendors regarding procurement of supplies and equipment during a disaster?

- Yes  
 No

46. Does the health facility have a system in place for emergency procurement of supplies?

- Yes  
 No

*If you answered yes, please proceed to question 46a; otherwise go to question 47.*

46a. How long does the procurement of supplies take under emergency conditions?

- 1 week  
 2 weeks  
 3 weeks  
 Others, specify: \_\_\_\_\_

47. Is there an arrangement for sharing resources with other health facilities and / or potential emergency suppliers of resources?

- Yes  
 No

48. Is rotation of items with expiry dates done?

- Yes  
 No

49. Who coordinates resource allocation? *(Please check all applicable answers.)*

- Staff of emergency controller<sup>5</sup>  
 Administrative staff  
 Volunteers  
 Others, specify: \_\_\_\_\_

50. Does your health facility have an emergency kit?

- Yes  
 No

*If you answered yes, please proceed to questions 50a-50b; otherwise proceed to question 51 .*

50a. Are the contents of your emergency kit consistent with the WHO's prescribed *New Emergency Health Kit*?

- Yes  
 No

<sup>5</sup> An **emergency controller** is a member of the emergency planning group who is assigned the responsibility of controlling and coordinating the entire emergency response.

## 50b. Are the following medicines included in your emergency kit?

MEDICINE		Yes	No	No. of units available
<b>Anesthetics</b>				
Ketamine, 50mg/ml in 10-ml vial (as hydrochloride), for injection				
Thiopental, 1 g (sodium salt), powder for injection				
Lidocaine	1% (as hydrochloride), for injection			
	5% with 7.5% glucose solution for spinal in 2-ml ampoule anesthesia			
Bupivacaine, 0.5% (as hydrochloride), for injection				
<b>Pre-operative medication</b>				
Atropine, 1 mg/ml (as sulfate), for injection				
Diazepam, 5 mg/ml in 2-ml ampoule, for injection				
<b>Analgesics, Antipyretics, NSAIDS</b>				
Acetylsalicylic Acid	300 mg tablet			
	500 mg tablet			
Ibuprofen	200 mg tablet			
	400 mg tablet			
Paracetamol	100 mg tablet			
	500 mg tablet			
Morphine, 10mg/ml (as sulfate or hydrochloride), for injection				
Pethidine, 50 mg/ml (as hydrochloride), for injection				
<b>Anti-allergics</b>				
Epinephrine, 1 mg/ml (as hydrochloride or hydrogen tartrate), for injection				
Hydrocortisone, 100 mg in vial (as sodium succinate), powder for injection				
Prednisolone, 5 mg tablet				
<b>Antidote</b>				
Naloxone, 0.4mg/ml (as hydrochloride), for injection				
<b>Anti-convulsants</b>				
Phenobarbital, 50 mg tablet				
Phenytoin, 50 mg (as sodium salt) capsule or tablet				
<b>Anti-infectives</b>				
<i>Intestinal antihelminthics</i>				
Mebendazole, 100 mg tablet				
<i>Antibacterials</i>				
Amoxicillin, 250 mg capsule or tablet				
Ampicillin, 500 mg (as sodium salt), powder for injection				
Benzylpenicillin, 3 g (5 million IU), (as sodium or potassium salt), for injection				

<b>MEDICINE</b>		Yes	No	No. of units available
Cloxacillin	500 mg (as sodium salt), powder for injection			
	500 mg tablet			
Phenoxyethyl penicillin, 250 mg tablet				
Procaine Benzylpenicillin	1 g (1 million IU)			
	3 g (3 million IU), powder for injection			
Chloramphenicol	250 mg capsule			
	1 g (as sodium succinate), powder for injection			
Doxycycline, 100 mg (as hyclate or monohydrate) capsule or tablet				
Erythromycin, 250 mg (as stearate or ethyl succinate) Capsule or tablet				
Gentamycin, 40 mg/ml (as sulfate), for injection				
Metronidazole,	200 mg tablet			
	250 mg tablet			
	500 mg/100 ml, injection			
Sulfamethoxazole + Trimethoprim	100 mg + 20 mg tablet			
	400 mg + 80 mg tablet			
<i>Anti-fungals</i>				
Nystatin, 100,000 IU non-coated tablet				
<i>Anti-malarials<sup>a</sup></i>				
Chloroquine	100 mg tablet (as sulfate or phosphate)			
	150 mg tablet (as sulfate or phosphate)			
Quinine	200 mg (as sulfate) tablet			
	300 mg (as bisulfate) tablet			
	300mg/ml, for injection			
Sulfadoxine + Pyrimethamine, 500mg+25 mg tablet				
Mefloquine, 250 mg tablet <sup>b</sup>				
<b>Anti-anemia Medications</b>				
Ferrous sulfate + folic acid, 200 mg + 0.25 mg tablet				
Folic acid, 5 mg tablet				
<b>Plasma substitutes <sup>c</sup></b>				
Polygeline, 3.5% injectable solution				
<b>Cardiovascular Medications</b>				
Glyceryl trinitrate, 0.5 mg sublingual tablet				
Hydralazine, 20 mg (as hydrochloride), powder for injection				
Atenolol, 50 mg tablet				
Methyldopa, 250 mg tablet				

<b>Dermatological Medications</b>		Yes	No	No. of units available
<i>Anti-fungals</i>				
Benzoic Acid + Salicylic Acid, 6% + 3 % ointment or cream				
<i>Anti-infectives</i>				
Methylrosanilinium chloride (gentian violet), 0.5% aqueous solution or crystals				
Silver sulfadiazine 1% cream				

<i>Scabicide and pediculicide</i>			
Benzyl benzoate, 25% lotion			
Soap			
<i>Ultraviolet-blocking agent</i>			
Zinc oxide, 15% ointment			
<b>Disinfectants and antiseptics</b>			
Chlorhexidine <sup>d</sup> , 5%(digluconate) solution, for dilution			
Polyvidone iodine, 10% solution			
Calcium hypochlorite, 70% available chlorine, powder for solution			
<b>Diuretics</b>			
Furosemide, 10mg/ml, for injection			
Hydrochlorothiazide, 25 mg tablet			
<b>Gastrointestinal medications</b>			
<i>Antacid</i>			
Aluminum hydroxide, 500 mg tablet			
Magnesium trisilicate compound, 500 mg tablet			
<i>Anti-emetic</i>			
Promethazine,	25 mg tablet		
	25 mg/ml, injection		
<i>Oral rehydration</i>			
Oral rehydration salts, powder for solution			
<b>Contraceptives</b>			
<i>Hormonal</i>			
Ethinylestradiol + levonorgestrel, 30 ug + 150 ug tablet			
<i>Barrier</i>			
Condoms, with or without spermicide			
<b>Muscle relaxants</b>			
Alcurinium, 5mg/ml (as chloride), for injection			
Neostigmine	0.5mg/ml		
	2.5mg/ml, for injection		
Suxamethonium, 50 mg/ml (as chloride), powder for injection			
Vecuronium, 10 mg (as bromide), powder for injection			
<b>Ophthalmological preparations</b>			
Tetracycline, 1% (as hydrochloride), eye ointment			
Gentamycin, 0.3% eye drops			

<b>Oxytocics</b>			
Ergometrine	0.2 mg tablet, (as hydrogen maleate)		
	0.2 mg/ml, for injection		
Oxytocin, 10 IU/ml, for injection			
<b>Psychotherapeutic medications</b>			
Chlorpromazine	25 mg/100mg tablet (as hydrochloride)		
	25 mg/ml, for injection		
<b>Anti-asthma</b>			
Aminophylline, 25 mg/ml, for injection			
Salbutamol	4 mg/tablet (as sulfate)		
	0.1 mg per dose aerosol		
<b>Parenteral solutions</b>			

Glucose	5% isotonic, injectable solution			
	50% hypertonic injectable solution			
Sodium chloride, 0.9 % isotonic injectable solution				
Compound solution of sodium lactate				
Water for injection, 10 ml ampoule				
<b>Vitamins and minerals</b>				
Ascorbic acid, 50 mg tablet				
Retinol	200,000 IU (110 mg) (as palmitate)			
	100,000 IU (5.5 mg) for pregnant women			
<p><sup>a</sup> Only antimalarials which conform to national malaria treatment guidelines should be used. Failure to do so will have a negative impact on national malaria treatment programmes.</p> <p><sup>b</sup> This medicine should be reserved for therapy of confirmed <i>Plasmodium falciparum</i> malaria either known or suspected to be resistant to chloroquine or sulfa/pyrimethamine.</p> <p><sup>c</sup> Intravenous solutions must always be supplied in plastic containers with an infusion set and needle/s. Glass containers are not acceptable.</p> <p><sup>d</sup> Chlorhexidine 20% should be avoided as it needs distilled water for dilution otherwise precipitation will occur. 5% solution is the WHO standard. Alternatives include the combination of chlorhexidine 1.5% + Cetrimide 15%.</p>				

51. Does your health facility have the capacity to store blood products?

Yes

No

*If you answered no, please proceed to question 51a; otherwise, proceed to question 52.*

51a. Where do you get blood and other blood products? *(Please check all applicable answers.)*

Commercial blood banks

Other health facilities

Blood donors

Others, please specify: \_\_\_\_\_

## D. Utilities

52. How is water supplied to the health facility? *(Please check all applicable answers.)*

From a water company

Deep Well

Others, specify: \_\_\_\_\_

53. Does the health facility have suitable means of storing water?

Yes

No

54. Is there an alternative source/s for water in case the main supply gets cut off?

Yes

No

*If you answered yes, please proceed to questions 54a-54c; otherwise proceed to question 55.*

54a. What is the alternative source of water? \_\_\_\_\_

54b. How is the water from the alternative source treated? *(Please check all applicable answers.)*

- Filtration
- Chlorination
- Sedimentation
- Boiling
- Water tablets
- Not treated

54c. How long would the health facility continue to function using the alternative source of water? \_\_\_\_\_

55. How is electricity supplied?

Voltage :  110 V  220 V

Amperage: \_\_\_\_\_

Cyclage: \_\_\_\_\_

56. Where are the control panels and electric power distribution lines located?  
\_\_\_\_\_

57. Is there an alternative source of electrical supply (emergency power generator)?

Yes

No

*If you answered yes, please proceed to questions 57a-57c; otherwise proceed to question 58.*

57a. What is the capacity of the emergency power generator? \_\_\_\_\_

57b. What fuel is utilized by the emergency power generator? \_\_\_\_\_

57c. What proportion (in %) of the facility's energy requirement can it supply? \_\_\_\_\_

58. Does the health facility have emergency lights (for use between periods of power interruption and restoration of electrical supply with generator set)?

Yes

No

*If you answered yes, please proceed to questions 58a-58b; otherwise proceed to question 59.*

58a. How are the emergency lights activated?

- Manual  
 Automatic

58b. Where are they located?

- Nurses' stations  
 Emergency room  
 Wards  
 Operating room  
 Individual patients' rooms  
 Laboratory  
 Hallways  
 Lobby  
 Stairwells  
 Others, specify: \_\_\_\_\_

59. How are medical gases supplied?

- Main pipeline  
 Individual tanks  
 Others, specify: \_\_\_\_\_

60. Are there safety measures to ascertain prevention of gas spills/leaks?

- Yes  
 No

## E. Warning System and Safety Equipment

61. Is there a system of signs instituted in response to a disaster situation?

- Yes  
 No

*If you answered yes, please proceed to question 61a; otherwise go to question 62.*

61a. What signs are included? *(Please check all applicable answers.)*

- escape route indicators  
 fire-fighting equipment indicators  
 building layout diagram

62. Does the institution have fire detection equipment (e.g. smoke alarms)?

- Yes  
 No

*If you answered yes, please proceed to question 62a; otherwise go to question 63.*

62a. Is the fire detection equipment strategically located?

- Yes  
 No



63. Does the institution have fire extinguishers?

- Yes
- No

*If you answered yes, please proceed to questions 63a-63c; otherwise go to question 64.*

63a. How many fire extinguishers does the institution have? \_\_\_\_\_

63b. Are fire extinguishers strategically located?

- Yes
- No

63c. How often are the fire extinguishers replenished/serviced?

- Once a year
- Once in two years
- As needed
- Never
- Others, specify: \_\_\_\_\_

## F. Security

64. Does the health facility have a security unit?

- Yes
- No

*If you answered yes, please proceed to questions 64a-64b; otherwise go to question 65.*

64a. Who provides the personnel for the security unit?

- Health Facility
- Private security agency

64b. What areas in the health facility are given top priority in terms of security especially during disasters? *(Please check all that apply.)*

- Entrance / Exit points
- Main thoroughfares
- Storage area for controlled substances
- Storage area for high-value medical equipment
- Others, specify: \_\_\_\_\_

## G. Transportation and Communication

65. What forms of internal communication are being used by the institution?

*(Please check all the applicable answers.)*

- Regular telephone
- Cellular telephone
- Pager
- Public address system

- Short-wave radio
- Intercoms
- Runners
- Others, specify: \_\_\_\_\_

66. What forms of external communication are being used by the institution? *(Please check all applicable answers.)*

- Telephone with landline
- Cellular telephone
- Pager
- Facsimile machine
- Short-wave radio
- Runners
- Others, specify: \_\_\_\_\_

66a. If the health facility is using telephones (whether landline or cellular), what are the alternative forms of communication in case the phone system breaks down? *(Please check all applicable answers.)*

- Short-wave radio
- Runners
- Others, specify: \_\_\_\_\_

67. What means of patient transport are used by the institution? *(Please check all applicable answers.)*

- Buses, minibuses and vans
- Ambulance
- Trucks
- Private vehicles
- Boats (if applicable)
- Aircraft (both fixed-wing and helicopters)
- Motorcycles
- Others, specify: \_\_\_\_\_

*If your facility has at least one ambulance, please answer question 67a; otherwise, please proceed to question 68.*

67a. What are the capabilities of your ambulance/s? *(Please fill in the table below).*

Ambulance capabilities	No. of ambulances in the facility	Personnel assigned to the ambulance			
		Driver	Paramedic	Nurse	Doctor
Purely for transport, No special equipment					
With supplies for Basic Life Support					

With supplies for both Basic Life Support and Advance Cardiac Life Support					
Others, specify:					

**H. Public Information**

68. Is there a public information centre in the institution?

- Yes
- No

*If you answered yes, please proceed to questions 68a-68e; otherwise go to question 69.*

68a. Who coordinates the public information centre? *(Please check all applicable answers.)*

- Social worker
- Administrative staff
- Volunteer
- Others, specify: \_\_\_\_\_

68b. Which personnel are tasked to staff the public information centre? *(Please check all applicable answers.)*

- Social workers
- Administrative staff members
- Volunteers
- Others, specify: \_\_\_\_\_

68c. What services are provided at the information centre? *(Please check all applicable answers.)*

- Information about patients admitted and discharged
- Finding addresses and whereabouts of family members of patients admitted to the health facility
- Assisting in the identification of victims
- Assisting family members to locate relatives
- Others, specify: \_\_\_\_\_

68d. Will the Public Information Centre continue to provide the above-mentioned services during disaster situations?

- Yes
- No
- Not sure

68e. Does the Public Information Center have the capacity to coordinate with the following external entities in the event of a disaster? *(Please check all that apply.)*

- National emergency preparedness agency

- Red Cross and other emergency management agencies
- Other specialized health facilities in the vicinity
- Fire department
- Police department
- Local utility companies
- Transport companies (for external means of transporting patients)
- Local funeral homes (for temporary morgue facilities)
- Medical supply vendors

69. Are there means to create public awareness of the disaster preparedness plan of the institution?

- Yes
- No

*If you answered yes, please proceed to question 69a; otherwise go to question 70.*

69a. What are these measures? *(Please check all the applicable answers.)*

- Posters
- Hanging signs
- Signboards
- Public meetings
- Labels on necessary equipment
- Labels on exit doors
- General evacuation route
- Others, specify: \_\_\_\_\_

70. How is the public informed of a disaster situation in your catchment area? *(Please check all applicable answers.)*

- Mass media
- Audible and visual signs
- Community network
- Loud speakers
- Door-to-door announcements
- Others, specify: \_\_\_\_\_

71. What methods are used to disseminate emergency plans to the public? *(Please check all applicable answers.)*

- Local press
- Radio
- Television
- Public meetings
- Visits to schools, offices, etc.
- Brochures
- Others, specify: \_\_\_\_\_

## V. Assessment of Human Resources

### A. Emergency Planning Group

72. Is there an existing emergency planning group in your institution?

Yes

No

*If you answered yes, please proceed to questions 72a-72e; otherwise go to question 73.*

72a. When was this group formed? \_\_\_\_\_

72b. Who are the members of this planning group? *(Please check all applicable answers.)*

Health facility chief executive officer

Chief of medical personnel

Head of administration

Director of nursing services

Public Information Centre head

Security services supervisor

Maintenance chief

Staff representative

A health department representative

Engineer

Architect

Other organizations with which the health facility may interact in emergency management

Others, specify: \_\_\_\_\_

72c. Are all members of sufficient seniority to commit the organization to planning group decisions?

Yes

No

72d. Are they capable of contributing to the planning group's work?

Yes

No

72e. What activities are done by the emergency planning group? *(Please check all applicable answers.)*

Hazard/potential problem analysis

Structural vulnerability assessment

Non-structural vulnerability assessment

Functional vulnerability assessment

Determine operating capacity during disaster situations

Plan for mobilization of resources

Define roles and responsibilities of each member/group

- Ensure training and education of personnel as required
- Provide for a monitoring and evaluation system for the emergency preparedness program
- Provide pre-disaster photographic documentation of facility buildings and equipment for insurance purposes
- Others, specify: \_\_\_\_\_

73. What type/s of disaster does the health facility prepare for?

- External disasters only
- Internal disasters only
- Both internal and external disasters

74. Does the health facility have an emergency preparedness plan?

- Yes
- No

*If you answered yes, please proceed to questions 74a-74e; otherwise go to question 75.*

74a. Is the health facility emergency plan documented in writing?

- Yes
- No

74b. How often do you evaluate your disaster preparedness plan?

- Semi-annually
- Annually
- Biannually
- Others, specify: \_\_\_\_\_

74c. How do you evaluate your disaster preparedness plan?

- By discussion
- By performing drills
- By performing simulation exercises
- Others, specify: \_\_\_\_\_

74d. When was the plan last updated? \_\_\_\_\_

74e. What is your evaluation of your most recent emergency plan?

- Effective
- Needs changes/improvement

75. Is there an existing/updated organizational chart for disaster situations?

- Yes
- No

*If you answered yes, please proceed to question 75a; otherwise proceed to question 76.*

75a. Does the organizational chart follow the structure recommended by the Hospital Emergency Incident Command System (HEICS)?  
 Yes  
 No

76. How are the members of the emergency planning group made aware of these management roles? *(Please check all applicable answers.)*  
 Distribution of copies  
 Regular meetings  
 Others, specify: \_\_\_\_\_

77. How are the members encouraged to actively be involved in preparedness, response or recovery? *(Please check all applicable answers.)*  
 Meetings  
 Drills/ exercises  
 Others, specify: \_\_\_\_\_

**B. Subcommittees**

78. Is the emergency preparedness committee divided into subcommittees or subgroups?  
 Yes  
 No

*If you answered yes, please proceed to questions 78a-78d; otherwise go to question 79.*

78a. What are these subcommittees/subgroups? *(Please check all applicable answers.)*  
 Health  
 Rescue  
 Transportation  
 Communication  
 Mutual assistance and welfare  
 Engineering  
 Others, specify: \_\_\_\_\_

78b. Are the roles and responsibilities of these subcommittees/subgroups clearly defined by the planning committee?  
 Yes  
 No

78c. How are these responsibilities assigned to them?  
 According to existing function  
 According to assessed capability of a group  
 By random selection  
 By volunteerism  
 Others, specify: \_\_\_\_\_

78d. What subcommittee/subgroup is directly involved among the following: *(Please identify.)*

<b>TASKS/DUTIES</b>	<b>Name of Subcommittee or Subgroup</b>
1 servicing and testing of emergency equipment regularly in accordance with relevant standards and manufacturers' recommendations	
2 providing advice to management regarding new equipment or existing safety equipment	
3 implementing a yearly plan of hospital hazard audits to determine that good housekeeping is being maintained and to identify remedial action	
4 planning & coordinating emergency planning group meetings	
5 disseminating emergency plans	
6 reviewing emergency planning at least once a year	
7 exercising emergency plans at least once a year	
8 providing all new, temporary and casual personnel, with a summary of emergency plans at the time of appointment	

### C. Inventory of Personnel

79. How many doctors does your health facility have? *(Please fill in the table below.)*

<b>Areas of Specialty</b>	<b>No. of consultants</b>	<b>No. of Residents</b>	<b>No. of Interns</b>
Family Medicine			
Internal Medicine			
Obstetrics and Gynecology			
Pediatrics			
Surgery			
Anesthesiology			
ENT			
Ophthalmology			
Orthopedics			
<i>Others, please specify:</i>			



80. How many staff members does the health facility have per ward/area?  
(Please fill in the table below.)

Ward/ Area	Bed capacity of ward/area	No. of Staff Nurses/Shift	No. of Nursing Aides/Shift	No. of Orderlies/Shift

81. How many laboratory/radiology technicians does your health facility have?

Laboratory/ Radiology Area	No. of Technicians/Shift	No. of Shifts

#### D. Mobilization of Personnel

82. How are alarms raised during disaster situation? (Please check all applicable answers.)

- Alarm  
 Bell  
 Megaphone  
 Verbal  
 Siren  
 Others, specify: \_\_\_\_\_

83. Who may activate the alarm? (Please check all applicable answers.)

- Special committee  
 Administrator  
 Director of health facility  
 Others, specify: \_\_\_\_\_

84. Does the administration have an updated list of addresses and telephone numbers of all staff involved in the emergency preparedness plan?

- Yes  
 No

If you answered yes, please proceed to question 84a; otherwise, proceed to question 85.

84a. Is the list of addresses and telephone numbers of hospital staff always located in an accessible area?

Yes

No

85. Does the health facility have a diagram of the communication network?

Yes

No

86. Is there a pre-assigned emergency operations centre (EOC) in the institution?

Yes

No

*If you answered yes, please proceed to questions 86a-86b; otherwise go to question 87.*

86a Where is it located? \_\_\_\_\_

86b. Who is/are assigned to run the operation centre?

Administrative personnel

Physician

Nurse

All of the above

Others, specify: \_\_\_\_\_

87. Does the health facility have an on-site disaster response team?

Yes

No

*If you answered yes, please proceed to questions 87a-87b; otherwise go to question 88.*

87a. Who are the members of the on-site disaster response team?

*(Please check all applicable answers.)*

ER Physician-on-duty

Family Medicine Resident-on-duty

Surgery Resident-on-duty

ER Nurse-on-duty

Emergency Medical Technicians (EMTs)

Volunteers

Others, specify: \_\_\_\_\_

87b. Which of the following are team members trained to do?

*(Please check all applicable answers.)*

Analyze the magnitude of the disaster

Coordinate efforts of various hospitals/support groups

Basic Life Support

- Advanced Cardiac Life Support
- Perform limited surgery when necessary (e.g. doing amputation to free trapped victims)
- Relieve pain and anxiety of the injured
- Indicate the order of how casualties must be rescued according to medical condition (Initial triage)

88. Do you have a pre-assigned area for reception of victims at the health facility?

- Yes
- No

If you answered yes, please proceed to question 88a; otherwise go to question 89.

88a. Where is the pre-assigned area for reception located?

- Inside the emergency room
- Outside the emergency room but inside the health facility
- Outside the health facility
- Others, specify: \_\_\_\_\_

89. Do you have a pre-assigned area for triage in the health facility?

- Yes
- No

If you answered yes, please proceed to questions 89a-89c; otherwise go to question 90.

89a. Where is the pre-assigned area for triage located?

- Inside the emergency room
- Outside the emergency room but inside the health facility
- Outside the health facility
- Others, specify: \_\_\_\_\_

89b. Who is/are tasked with staffing the triage area? (Please check all applicable answers.)

- General Practitioners
- Surgeons
- Internists
- Physicians trained in traumatology
- Nurses
- Volunteers
- Paramedical personnel
- Others, specify: \_\_\_\_\_

89c. What functions are assigned to the triage team? (Please check all applicable answers.)

- Classification of patients according to priority of treatment

- Referral of patient/s to the appropriate place within the health facility
- Referral of patient/s to other treatment centres following stabilization
- Updating the Health Facility Emergency Committee of the situation

90. Do you have an established system for proper categorization and tagging of patients/casualties (e.g. color-coding)?

- Yes
- No

91. Are there specific people assigned to security and crowd-control?

- Yes
- No

*If you answered yes, please proceed to question 91a; otherwise go to question 92.*

91a. What are these people tasked to do?

- Close off other points of entry that are not vital to the emergency operations of the health facility
- Control the flow of people entering the health facility
- Direct people to appropriate areas inside the health facility
- Act as marshals in case evacuation is necessary
- Others, specify: \_\_\_\_\_

## **E. Hazard and Vulnerability Analysis**

92. Has the emergency preparedness group conducted hazard and vulnerability analysis?

- Yes
- No

*If you answered yes, please proceed to question 92a-92c; otherwise go to question 93.*

92a. What techniques were involved? *(Please check all applicable answers.)*

- Identification of hazard
- Listing of possible effects
- Listing of potential problems
- Determining causes
- Develop preventive strategies
- Develop response and recovery strategies and trigger events for this strategies

92b. What benefits have been realized from this tool? *(Please check all applicable answers.)*

- Obtained a list of possible hazards
- Identified the most likely and damaging hazards
- Identified the effects of those hazards in the health facility infrastructure and community
- Obtained a firm basis for health facility emergency management planning

92c. What types of hazard does the health facility prepare for? *(Please check all the applicable answers.)*

- Earthquake
- Flood
- Fire
- Tsunami
- Hurricane
- Volcanic eruption
- War/Armed conflict
- Epidemic
- Infectious Disease Outbreak
- Chemical/Radiologic Emergency
- Industrial/Technological
- Others, specify: \_\_\_\_\_

## F. Training and Drills

93. Does the institution support the training and education of staff members for emergency preparedness?

- Yes
- No

*If you answered yes, please proceed to question 93a-93d; otherwise go to question 94.*

93a. What strategies have been tried? *(Please check all the applicable answers.)*

- Workshops, seminars, conferences
- Self-directed learning
- Individual tuition
- Exercises
- Pamphlets, videos, media
- Informal/formal presentations
- Public displays, meetings
- Others, specify: \_\_\_\_\_

93b. What stages are involved in training? (Please check all applicable answers.)

- Analyze training needs  
 Design training  
 Develop instruction  
 Conduct instruction  
 Validate training

93c. How often does the institution conduct training?

- Biannually  
 Annually  
 As necessary  
 Others, specify: \_\_\_\_\_

93d. How many attended the most recent training conducted by the institution?

- \_\_\_\_\_ (actual number)  
\_\_\_\_\_ % (proportion of those who attended among those who need to be trained)

94. Is there a regular drill/exercise being conducted in preparation for any disaster occurrence?

- Yes  
 No

*If you answered yes, please proceed to question 94a-94b; otherwise go to question 95.*

94a. How regular are these drills done?

- Quarterly  
 Semi-annually  
 Annually  
 Others, specify: \_\_\_\_\_

94b. Who heads the drills?

- Special committee  
 Administrator  
 Director of health facility  
 Others, specify: \_\_\_\_\_

95. Is there financial support for the training and drills mentioned above?

- Yes  
 No

*If you answered yes, please proceed to question 95a-95b; otherwise go to question 96.*

95a. What are the sources of financial support? *(Please check all applicable answers.)*

- Donation
- Insurance
- Allotment from the health facility’s budget
- Others, specify: \_\_\_\_\_

95b. How much is the budget for these preventive measures?  
 \_\_\_\_\_/year

**G. Evacuation**

96. Is there a system for the evacuation of the institution?

- Yes
- No

*If you answered yes, please proceed to question 96a-96c; otherwise go to question 97.*

96a. Which among the following stages of evacuation are being conducted in the institution? *(Please check all applicable answers.)*

- Warning
- Withdrawal
- Return

96b. In general, what activities are done in connection with the evacuation? *(Please check all the applicable answers.)*

- Identifying options of vertical or horizontal evacuation<sup>6</sup> within the health facility
- Identifying the type of signal or alarm that will signify an evacuation is required
- Outlining the evacuation routes
- Identifying the assembly areas
- Establishing the means of accounting for evacuees
- Anticipating types of support or assistance likely to be required by patients
- Establishing the type of “all clear” signal<sup>7</sup> that will be given

96c. Is there an evacuation warden assigned for each part of the health facility?

- Yes
- No

6 **Vertical evacuation** within a building involves movement to another floor/storey of a building, while **horizontal evacuation** entails movement to another part of the building within the same floor.

7 An “all clear” signal is an example of a signal given to signify that no imminent danger is present.

## H. Health Facility Networking

97. Is your disaster plan coordinated with those of other health facilities in your area?

- Yes  
 No

*If you answered yes, please proceed to question 97a-97b; otherwise go to question 98.*

97a. Is your coordination part of a formal agreement?

- Yes  
 No

97b. Do you perform drills together?

- Yes  
 No

## I. Community Involvement

98. Does the institution take into consideration the characteristics of its community in responding to emergency situations?

- Yes  
 No

*If you answered yes, please proceed to question 98a; otherwise go to question 99.*

98a. What characteristics of the community are taken into account?

*(Please check all applicable answers.)*

- Demography  
 Environment (plants, animals, waters, air and soil)  
 Infrastructure  
 Culture  
 Economy  
 Disease pattern  
 Others, specify: \_\_\_\_\_

99. Does the local community have its own disaster preparedness plan?

- Yes  
 No

*If you answered yes, please proceed to question 99a; otherwise go to question 1 in the next subsection.*

99a. Is the health facility disaster preparedness plan coordinated with the community disaster preparedness plan?

- Yes  
 No



### Part III Assessment of Preparedness for Specific Emergencies

#### I. Assessment of Industrial Emergency Preparedness

1. Is there an industrial firm within your health facility’s catchment area?  
 Yes  
 No

*If you answered yes, please proceed to question 1a; otherwise, go to question 2.*

- 1a. What is the distance of the industrial firm from the health facility? \_\_\_\_\_
2. Is the health facility near a roadway which is frequently used by vehicles conveying potentially hazardous substances going to or coming from industrial firm/s?  
 Yes  
 No
3. What kind of substances are used or produced by the industrial firms and/or transported by the vehicles? *(Please check all applicable answers.)*  
 Acids  
 Ammonias  
 Bases  
 Chlorines  
 Cyanides  
 Herbicides  
 Insecticides  
 Polychlorinated biphenyls  
 Radioactive substances  
 Volatile organic compounds  
 Do not know  
 Others, specify: \_\_\_\_\_

4. Are antidotes for the substances identified in question number 3 present in your health facility?  
 Yes  
 No  
 Not applicable

*If you answered yes, please fill in the table below; otherwise, proceed to question no. 5.*

Substance	Antidote	Indication	# of units in stock

## 5. Are there nearby sources of antidotes?

 Yes No

If you answered yes, please fill in the table below; otherwise, proceed to question number 6.

Source	Antidote	Time to reach source	How to reach source

## 6. Is the health facility capable of contacting any poison control or assistance centre?

 Yes No

If you answered yes, please proceed to question 6a-6d; otherwise, go to question number 7.

## 6a. Which poison control/assistance centre can you easily get in touch with?

\_\_\_\_\_

## 6b. Is this centre accessible 24 hours a day, everyday of the week?

 Yes No

## 6c. What means can you use to get in touch with the centre? (Please check all applicable answers.)

 Telephone Short-wave radio Internet Electronic mail Others, specify: \_\_\_\_\_

## 6d. Do all relevant personnel know how to get in touch with the poison control/assistance centre?

 Yes No

## 7. Does the health facility have local experts who may offer assistance in the management of these patients?

 Yes No

If you answered yes, please proceed to question 7a; otherwise, go to question 8.

7a. What are their areas of expertise?

- Toxicology
- Pharmacology
- Industrial hygiene
- Occupational medicine
- Chemistry
- Others, specify: \_\_\_\_\_

8. Does the health facility coordinate regularly with the nearby industrial firms and local authorities ?

- Yes
- No

*If you answered yes, please proceed to questions 8a-8d; otherwise, go to question 9.*

8a. What are the areas of coordination that exist?

- Drafting of disaster plans
- Conducting joint hazardous materials disaster drills
- Conducting training seminars regarding industrial disasters
- Conducting periodic medical evaluation of the industrial firm's employees
- Conducting public information campaign regarding industrial disasters
- Others, please specify: \_\_\_\_\_

8b. Is the health facility constantly updated with regard possible hazards present in nearby industrial firms?

- Yes
- No

8c. What are the health facility's responsibilities in the event of an industrial disaster?

- Send a team for search and rescue operations
- Act as the primary receiving hospital for victims
- Assist in the transportation of victims to other health facilities
- Others, please specify: \_\_\_\_\_

8d. Who are the identified key players during an industrial emergency?

*(Please check all that apply.)*

- Health facility liaison officer
- Police services
- Fire protection service
- Civil defense agencies
- Public works and utilities
- Industrial firm management
- Public information outlets
- Public health agencies
- Environmental agencies
- Others, please specify: \_\_\_\_\_

9. Does the health facility have adequate amenities for decontamination?

Yes

No

10. Does the health facility have the capacity to evacuate its patients and personnel in the event that the facility itself becomes contaminated?

Yes

No

*If you answered yes, proceed to questions 10a-10d; otherwise proceed to question 11.*

10a. Where do you refer contaminated patients?

Referral health facility	Distance from your health facility

10b. Are there transportation procedures for these patients?

Yes

No

10c. Are medical personnel required to accompany the patient/s to other health facility/ies?

Yes

No

10d. Is there provision for decontamination of the vehicle/s that transport contaminated patient/s?

Yes

No

11. After a significant industrial emergency, does the health facility have the means to follow-up all persons exposed to hazardous substances?

Yes

No

*If you answered yes, proceed to questions 11a-11b; otherwise, proceed to question 12.*

11a. Are all exposed persons, regardless of presence or absence of symptoms, registered for short- and long-term follow-up?

Yes

No

11b. Are biological samples taken from those who were exposed as soon as possible after an incident?

Yes

No

12. Are there procedures in place that will accommodate sharing of information regarding the short- and long-term effects of acute exposure to hazardous substances between the health facilities, industrial firms, local government, and other involved parties, after an incident?

- Yes
- No

**II. Assessment of Infectious Disease Outbreak Preparedness**

**A. Infrastructure Assessment**

13. Does the health facility have an existing evaluation or triage area/s for all incoming patients?

- Yes
- No

*If you answered yes, proceed to questions 13a-13b; otherwise, go to question 14.*

13a. Where is/are the evaluation area/s located? *(Please check all applicable answers.)*

- Outside the emergency department
- Inside the emergency department
- Outside the outpatient department
- Inside the outpatient department

13b. In the event of an epidemic, can this area be adequately isolated from the rest of the facility?

- Yes
- No

14. Are there specially designed infectious disease isolation units in the hospital?

- Yes
- No

*If you answered yes, proceed to questions 14a-14b; otherwise, go to question 15.*

14a. What provisions are found in these units? *(Please check all applicable answers.)*

- Individual rooms
- Partitioned beds in one big ward
- Negative air pressure
- Separate air control / ventilation system
- Individual handwashing facilities
- Shared handwashing facilities
- Individual toilets
- Shared toilets
- Sealed windows
- Self-closing doors

- \_\_\_\_\_ Anterooms with gloving / gown-donning facilities  
 \_\_\_\_\_ Separate waste disposal units

14b. What is the total bed capacity of all isolation units? \_\_\_\_\_

15. What other areas in the facility can be temporarily converted into an isolation unit in the event of an epidemic?

Area	Bed Capacity	With Negative Pressure? (Y/N)	Individual rooms? (Y/N)	Separate exhaust? (Y/N)

16. Is there a heating, ventilation, air conditioning (HVAC) system installed in your facility?

- \_\_\_\_\_ Yes  
 \_\_\_\_\_ No

*If you answered yes, proceed to questions 16a-16c; otherwise, go to question 17.*

16a. How long has the HVAC system been installed? \_\_\_\_\_

16b. What is the ambient temperature in the facility? \_\_\_\_\_ ; ambient humidity? \_\_\_\_\_

16c. How much Air Changes per Hour (ACH )are provided for by the HVAC system? \_\_\_\_\_

17. Does the facility's HVAC systems utilize filtration devices?

- \_\_\_\_\_ Yes  
 \_\_\_\_\_ No

*If you answered yes, proceed to questions 17a-17b; otherwise, go to question 18.*

17a. What kind of filtration devices are currently installed in the hospital?

- \_\_\_\_\_ Fixed High Efficiency Particulate Air (HEPA) filters  
 \_\_\_\_\_ Portable HEPA filters  
 \_\_\_\_\_ Others, specify: \_\_\_\_\_

17b. What type of frame, if any, was used for the filters?

- \_\_\_\_\_ None  
 \_\_\_\_\_ Metal  
 \_\_\_\_\_ Wood  
 \_\_\_\_\_ Plastic

Fiberglass  
 Others, specify: \_\_\_\_\_

18. Are Ultraviolet Germicidal Irradiation (UVGI) devices installed in the health facility?

Yes  
 No

19. Do isolation units contain pressure-controlled rooms?

Yes  
 No

*If you answered yes, proceed to questions 19a; otherwise, go to question 20.*

19a. Please specify the specific type of pressurization method used.

Negative room / Airborne Infection Isolation Room (AIIR)  
 Variable pressure room  
 Others, specify: \_\_\_\_\_

20. When was the present ventilation system installed? \_\_\_\_\_

21. Does the ventilation system undergo regular inspection?

Yes  
 No

*If you answered yes, proceed to questions 21a-21d; otherwise, go to question 22.*

21a. When was the last formal inspection / maintenance check? \_\_\_\_\_

21b. How long has it been since the time of installation or last formal inspection? \_\_\_\_\_

21c. According to manufacturer's specifications, how often should maintenance be done? \_\_\_\_\_

21d. Who carries out the regular inspection of the ventilation system?

Manufacturer  
 Facility Administrator (Please specify) \_\_\_\_\_  
 Government contractor  
 Private contractor  
 Others, specify: \_\_\_\_\_

*If the facility has pressure-controlled rooms, answer the next question. Otherwise, proceed to question 23.*

22. Are pressure differentials constantly monitored for accuracy?

Yes  
 No

*If you answered yes, go to question 22a; otherwise, go to question 23.*

22a. What indicators are used to determine the direction of air stream?

(Please check all applicable answers.)

\_\_\_\_\_ Qualitative

\_\_\_\_\_ Flutter strips

\_\_\_\_\_ Ping-pong balls

\_\_\_\_\_ Others, specify: \_\_\_\_\_

\_\_\_\_\_ Quantitative

\_\_\_\_\_ Manometer tests

\_\_\_\_\_ Others, specify: \_\_\_\_\_

23. Are alternative generators available in order to avoid disruption of ventilation control during a power outage?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

If you answered yes, go to question 23a-23b; otherwise, go to question 24.

23a. How long does it take before the alternative power source engages?

\_\_\_\_\_

23b. How long does the back-up power last? \_\_\_\_\_

24. In your facility, the following procedures would entail movement / transport of infected patients out of the isolation areas: (Please check all applicable answers.)

\_\_\_\_\_ Radiologic procedures

\_\_\_\_\_ X-ray

\_\_\_\_\_ Ultrasound

\_\_\_\_\_ CT / MRI

\_\_\_\_\_ Minor procedures

\_\_\_\_\_ Thoracentesis

\_\_\_\_\_ Paracentesis

\_\_\_\_\_ Central line insertion

\_\_\_\_\_ Venous cutdowns

\_\_\_\_\_ Intubation

\_\_\_\_\_ Suctioning

\_\_\_\_\_ Major procedures

\_\_\_\_\_ Chest tube insertions

\_\_\_\_\_ Major operations (e.g. thoracotomies, laparatomies, etc.)

25. How many of the following are available for the sole use of infected patients in your health facility?

Provision	No. of Units
Trolleys	
Wheelchairs	
Disposable linen	

26. In the event that infected patients have to be transported:



26a. Are there elevators/lifts reserved for these patients?

Yes

No

26b. Are there dedicated corridors that will allow these patients to access services as necessary?

Yes

No

26c. Are the receiving staff given ample notice prior to any transport / movement?

Yes

No

## B. Functional Assessment

27. Are the following Personal Protective Equipment (PPE) available in your health facility? *(Please fill in the table below.)*

PPE	No. of units	Supplier
Disposable particulate respirators (N95 or higher)		
Personal air-purifying respiratory hoods		
Eye protection devices		
Face shields		
Disposable gloves		
Disposable long-sleeved gowns		

28. Are the following materials used for cleaning possibly infected surfaces readily available in your health facility? *(Please fill in the table below.)*

Equipment	No. of units	Supplier
Alcohol-impregnated wipes		
Antiseptic hand cleansers		
Antiseptic surface cleansers		

29. Does the health facility have an adequate supply of surgical masks for all incoming patients with respiratory symptoms?

Yes

No

30. In the event of an increased demand for supplies, is there a contingency plan in place for both government and private sourcing?

Yes

No

*If you answered yes, go to question 30a; otherwise, proceed to question 31.*

30a. Who oversees the adequacy of PPE for the entire facility?

\_\_\_\_\_

31. Which component(s) of the universal respiratory etiquette strategy is/are strictly enforced in the facility during an epidemic? *(Please check all applicable answers.)*

\_\_\_\_\_ All patients with respiratory illness are provided with surgical masks and given instructions regarding proper use.

\_\_\_\_\_ Hand hygiene materials are present in the evaluation areas, and all patients and staff are encouraged to practice hand hygiene.

\_\_\_\_\_ Patients with respiratory symptoms are segregated from other patients.

\_\_\_\_\_ Health-care personnel use proper protective equipment when evaluating infected patients.

\_\_\_\_\_ In the absence of barriers, health-care personnel maintain a distance of at least one metre from possibly infected patients.

\_\_\_\_\_ Droplet precautions are consistently observed until it is determined with certainty that the patient's respiratory illness does not require any safety measures beyond standard precautions.

32. Is there an established system for handling soiled linen, patient laundry, and used utensils in the facility?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

33. How are possible cross-infections between health-care personnel, visitors, and infected contacts monitored? *(Please check all applicable answers.)*

\_\_\_\_\_ Vigilant recording of vital signs and telltale symptoms before and after each work shift by all health-care personnel with high-risk exposure.

\_\_\_\_\_ Updated personal diary of contacts for all health-care personnel throughout the duration of the epidemic.

\_\_\_\_\_ Regular medical evaluation for all health-care personnel.

\_\_\_\_\_ Quarantine of all symptomatic health-care personnel.

\_\_\_\_\_ Availability of a venue where health-care personnel with questionable health status can direct their queries and concerns.

\_\_\_\_\_ Registration of all visitors, with full contact details.

\_\_\_\_\_ Others, specify: \_\_\_\_\_

### C. Human Resources Assessment

34. Does the health facility have an Infectious Disease Central Committee that addresses all technical concerns with regard to infection control in the facility during an outbreak?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

*If you answered yes, go to question 34a-34c; otherwise, proceed to question 35.*

34a. Who are the members of the committee, and what is the specific role of each member? *(Please fill up the table below)*

Member	Department	Specific Role

34b. How often do the committee members meet?  
 Prior to an outbreak \_\_\_\_\_  
 During an outbreak \_\_\_\_\_

34c. Does the committee enlist the help of outside institutions and experts for technical concerns when necessary?  
 \_\_\_\_\_ Yes  
 \_\_\_\_\_ No

35. Does the health facility conduct training on disease outbreak preparedness for its personnel?  
 \_\_\_\_\_ Yes  
 \_\_\_\_\_ No

*If you answered yes, go to question 35a-35d; otherwise, proceed to question 36.*

35a. Who is/are the intended audience of the training program? *(Please check the most appropriate option.)*  
 \_\_\_\_\_ Medical personnel  
 \_\_\_\_\_ Non-medical personnel  
 \_\_\_\_\_ All personnel who are possibly exposed to infected patients  
 \_\_\_\_\_ Others, specify: \_\_\_\_\_

35b. Is the training program a prerequisite prior to a health worker's assignment to his/her area of responsibility?  
 \_\_\_\_\_ Yes  
 \_\_\_\_\_ No

35c. How often is the training program given? \_\_\_\_\_

35d. What knowledge items are covered by the training program on disease outbreak preparedness? *(Please check all applicable answers.)*  
 \_\_\_\_\_ Basic and essential knowledge on the infectious disease in question

- \_\_\_\_\_ Major components of the health facility's formal written plan of action on epidemics
- \_\_\_\_\_ Standard precautions
- \_\_\_\_\_ Airborne precautions (including universal respiratory etiquette strategy)
- \_\_\_\_\_ Others, specify: \_\_\_\_\_

36. What kind of medical evaluations, if any, are given to health-care personnel in your health facility? *(Please check all applicable answers)*

- \_\_\_\_\_ Pre-employment
- \_\_\_\_\_ Periodic (Please state frequency) \_\_\_\_\_
- \_\_\_\_\_ Post-exposure
- \_\_\_\_\_ As-needed basis
- \_\_\_\_\_ None

37. Are vaccines made available for health-care personnel with possible high-risk exposures?

- \_\_\_\_\_ Yes
- \_\_\_\_\_ No

*If you answered yes, go to question 37a-37b; otherwise, proceed question 38.*

37a. Which vaccines are made available for health workers in your health facility? *(Please place a check mark in the appropriate space)*

Vaccine	Available, without fee	Available, with fee	Not available
MMR			
Measles			
Varicella			
Influenza			
Polyvalent Pneumococcus			
Tetanus Toxoid			
Hepatitis A			
Hepatitis B			

37b. Are health workers regularly followed-up for appropriate booster doses?

- \_\_\_\_\_ Yes
- \_\_\_\_\_ No

38. Does the health facility maintain an updated database of medical records of its health-care personnel?

- \_\_\_\_\_ Yes
- \_\_\_\_\_ No

*If you answered yes, go to question 38a-38b; otherwise, proceed to question 39.*

38a. What information regarding personnel is/are contained within the database? *(Please check all applicable answers.)*

- Past Medical History
- Immunization Status
- High Risk Exposures
- Post-exposure Prophylaxis
- Work-related injuries
- Others, specify: \_\_\_\_\_

38b. Who has access to personnel health records? *(Please check all that apply)*

- Health worker in question
- Hospital Director
- Direct Supervisor
- Human Resources Department official
- Health Facility Infectious Disease Central Committee
- Others, specify: \_\_\_\_\_

39. Does the health facility have the capacity to investigate all reports of high risk exposures by health-care personnel?

- Yes
- No

40. Do different departments in the facility coordinate with a central committee in order to facilitate exposure surveillance and post-exposure treatment?

- Yes
- No

41. In the event of an epidemic, are health-care personnel divided into multiple task-independent yet coordinating teams?

- Yes
- No

*If you answered yes, go to question 41a-41c; otherwise, proceed to question 42.*

41a. Are high-risk tasks distributed to different teams in order to minimize high-risk exposures for individual personnel?

- Yes
- No

41b. Does your setup prevent any unnecessary interactions between personnel of various departments with different responsibilities?

- Yes
- No

41c. Please outline the organization of health-care personnel in your facility during an infectious disease outbreak.

Personnel		Assigned Area	Specific Task(s)
Team 1	1. 2. 3. 4. 5.		
Team	1. 2. 3. 4. 5.		
Team	1. 2. 3. 4. 5.		

42. Are health-care personnel discouraged from interacting with workers from other health facilities throughout the duration of an epidemic?

- Yes  
 No

43. Does the facility temporarily close all shared common areas for personnel (e.g. coffee lounges) during an epidemic as a precautionary measure?

- Yes  
 No

44. Which of the following groups can your health facility utilize in the event of a staffing shortage during an infectious disease outbreak? *(Please check all applicable answers.)*

- Retired health-care personnel previously affiliated with the facility  
 Other personnel in the facility, previously with non-health-related responsibilities  
 Health-care trainees  
 Volunteers  
 Others \_\_\_\_\_

45. What is the average length of each health-care worker's work day? \_\_\_\_\_

33a. On average, how many hours during a shift does each worker spend using PPE's? \_\_\_\_\_

46. Does the health facility have the means of communicating with involved government agencies and public information systems during an epidemic?

- Yes  
 No

47. Is there a Liaison Officer in your health facility who monitors the status of

infectious disease outbreaks in both the facility and the community?

Yes

No

48. Does the health facility ensure that, prior to discharge, every infected patient with resolved symptoms can be adequately followed-up?

Yes

No

### III. Assessment of Biological, Chemical, and Radiologic Emergency Preparedness

#### A. Infrastructure Assessment

49. During a mass casualty incident, does the health facility have the capacity to establish a temporary reception area for incoming patients?

Yes

No

*If you answered yes, go to questions 49a-49h; otherwise, proceed to question 50.*

49a. Where will the temporary reception area be located? *(Please check the most appropriate response.)*

Within the existing emergency room

Within the hospital compound, but outside the emergency room

Outside the hospital compound

Others, specify: \_\_\_\_\_

49b. How large is the space available for the reception area? *(Please state in square meters.)* \_\_\_\_\_

49c. Which of the following are present in the reception area? *(Please check all applicable answers.)*

Arrival point

Triage area

Emergency treatment area

Decontamination area

"Hot Line"

Others, specify: \_\_\_\_\_

49d. How far is the temporary reception area from the main treatment facility? *(Please state in meters)* \_\_\_\_\_

49e. Is the reception area: *(Please check one)*

Upwind?

Downwind?

49f. How many pathways lead into or out of the reception area? *(Please check the most appropriate response)*

- One: for both ingress and egress
- Two: one for ingress, one for egress
- Four: separate points of ingress and egress for patients and staff
- Others, specify: \_\_\_\_\_

49g. Are pathways and perimeters clearly marked?

- Yes
- No

49h. Do vehicles entering and leaving the site have their own point of access?

- Yes
- No

50. Does the health facility have pre-arranged formal agreements with other facilities in the community that cover transfer procedures in the event that the hospital can no longer accommodate the influx of patients?

- Yes *(Please fill in the table below)*
- No

Health Facility	Contact Number	Liaison Officer

51. Do patients going through the reception area get triaged to the proper level of care according to their particular needs?

- Yes
- No

52. What procedures are expected to be performed in the emergency treatment area? *(Please check all applicable answers.)*

- Venoclysis
- Loading IV therapy
- Minor Suturing
- Resuscitation
- Repair of any defects in protective garments
- Initial decontamination
- Others, specify: \_\_\_\_\_

53. How far is the decontamination area from the main treatment facility? *(Please state in meters.)* \_\_\_\_\_

54. Is the decontamination area downwind in relation to the main treatment facility?

- Yes
- No



55. Is the decontamination area upwind from the arrival point and triage area?  
 Yes  
 No
56. Can the location of the decontamination area be easily transferred according to prevailing winds at any given moment?  
 Yes  
 No
57. Is the decontamination site big enough that a distance of 75 meters can be maintained between decontamination facilities and any contaminated areas?  
 Yes  
 No
58. Can the perimeter of the reception area be adequately secured against possible external attack?  
 Yes  
 No
59. Is the main treatment facility accessible by any other route that bypasses the temporary reception area?  
 Yes  
 No
60. Which of the following decontamination methods can your health facility employ during a mass casualty incident? *(Please check all applicable answers.)*  
 Physical decontamination  
      Flushing with water and aqueous solutions  
      Adsorbent materials (Please specify) \_\_\_\_\_  
      M291 (Polystyrene Polymeric + ion exchange resins)  
      Others, specify: \_\_\_\_\_  
 Chemical decontamination  
      Soap wash  
      Hypochlorite solutions  
      Neutralizing agents (Please specify) \_\_\_\_\_  
      Others, specify: \_\_\_\_\_
61. Is there an alternative water source that the hospital can use for decontamination in order to supplement the present water supply during a sudden increase in demand?  
 Yes *(Please specify)* \_\_\_\_\_  
 No
62. Does the health facility have a contingency plan in place for quickly replenishing its stock of decontamination solutions during a mass casualty incident?  
 Yes  
 No

63. Are there skilled technicians in the health facility who can conduct rapid radiologic surveys of incoming patients and the facility itself in order to detect possibly harmful radiologic contamination?  
\_\_\_\_ Yes  
\_\_\_\_ No
64. In the event of a radiologic incident, does the health facility have the means to handle contaminated casualties and equipment in accordance with accepted guidelines?  
\_\_\_\_ Yes  
\_\_\_\_ No
65. Does the health facility have adequate stocks of the following essential supplies needed during a radiologic emergency? *(Please check all that apply and indicate the number of units in the parenthesis after each blank).*  
\_\_\_\_ ( ) Intravenous therapy  
\_\_\_\_ ( ) Intravenous fluids  
\_\_\_\_ ( ) Anti-diarrheals  
\_\_\_\_ ( ) Anti-emetics  
\_\_\_\_ ( ) Potassium iodide
66. Are germicidal cleaning agents readily available in your health facility?  
\_\_\_\_ Yes  
\_\_\_\_ No
67. Does your health facility have an efficient system for sterilizing all reusable equipment?  
\_\_\_\_ Yes  
\_\_\_\_ No
68. Does the health facility comply with accepted guidelines for disposal of contaminated single-use equipment?  
\_\_\_\_ Yes  
\_\_\_\_ No
69. Does your health facility have the necessary instruments to check for possible radiologic contamination in patients, health care workers, and equipment?  
\_\_\_\_ Yes  
\_\_\_\_ No

*If you answered yes, go to questions 69a-69c; otherwise, proceed to question 70.*

- 69a. Which radiation measurement device(s) is/are available in your health facility? *(Please check all that apply, and indicate the number of units within the parentheses after each blank)*  
\_\_\_\_ ( ) Thermoluminescent dosimeters  
\_\_\_\_ ( ) Self-reading dosimeters  
\_\_\_\_ ( ) Dosimeter cards

- ( ) Geiger-Mueller counters
- ( ) Pancake probes
- ( ) Portable spectrometers
- ( ) Area monitors
- ( ) Portal monitors
- ( ) Air monitors
- Others (Please specify) \_\_\_\_\_

69b. Does the health facility have skilled personnel who can operate the instruments?

- Yes  
How many? \_\_\_\_\_
- No

69c. Are the instruments checked and calibrated periodically while not in use?

- Yes
- No

**B. Functional Assessment**

70. Does your health facility have an existing system of monitoring all patient areas for signs of possible disease outbreak or bioterrorist attack?

- Yes
- No

*If you answered yes, go to questions 70a-70c; otherwise, proceed to question 71.*

70a. Who are the key participants in the facility's infectious disease surveillance system? *(Please check all applicable answers)*

- Infectious disease control professional / committee
- Chief Nurse
- Attending Physicians
- Staff Nurses
- Others, specify: \_\_\_\_\_

70b. Are the medical records of new patients with telltale signs and symptoms of a possible biologic incident immediately put on review?

- Yes
- No

70c. Does the facility observe close coordination with the local health department for early detection and / or reporting of possible intentional biologic incidents?

- Yes
- No

71. Does the community where your health facility is located have an existing mass casualty emergency preparedness plan?

Yes

No

*If you answered yes to question 71, answer questions 71a-71d.*

71a. When was the plan formulated? \_\_\_\_\_

71b. Was the health facility involved in the formulation of the plan?

Yes

No

71c. When was the plan last updated? \_\_\_\_\_

71d. Does the health facility have a representative in the committee that oversees the periodic review of the emergency plan?

Yes *(Please specify the name of the representative.)*

\_\_\_\_\_

No

*If you answered no to question 71, answer question 71e.*

71e. Does the health facility have a representative in the community's health committee who can facilitate the formulation of a mass casualty emergency preparedness plan?

Yes *(Please specify the name of the representative.)*

\_\_\_\_\_

No

72. Does your facility participate in community-wide emergency drills?

Yes

No

73. In the event of a mass casualty incident secondary to biologic, chemical, or radiologic agents, what subset of patients can your facility accommodate?

*(Please check the most applicable response.)*

Exposed patients only

Unexposed patients only

Both exposed and unexposed patients

The subset of patients has not been determined in the hospital's emergency plan

74. Which communication devices can the health facility utilize during a mass casualty incident? *(Please fill in the table below.)*

Communication Device	Number of Units
Regular telephones	
Cellular phones	
Fax machines	
Short wave radios	
Internet consoles	

75. Are there back-up communication systems in place?  
 Yes *(Please specify)* \_\_\_\_\_  
 No

76. Does the health facility have an assigned representative who coordinates with the press and media during a mass casualty incident?  
 Yes *(Please specify the name of the representative.)* \_\_\_\_\_  
 No

**C. Human Resources Assessment**

77. In addition to the standard PPE enumerated in the previous section of the manual, are the following items readily available in your health facility? *(Please fill up the table below.)*

Equipment	Number of Units
Disposable shoe coverings	
Standard issue chemical protective masks	
Standard issue MOPP-4 suits	
Rubber gloves	
Rubber aprons	

78. Which of the following materials are readily available for use by the facility’s health-care workers? *(Please check all applicable answers.)*  
 Plastic wrap  
 Plastic bags  
 Plain paper for the floors  
 Personal dosimeters for heavily exposed personnel  
 Others, specify: \_\_\_\_\_

79. Are the health care workers in the facility required to wear photo identification cards while on duty?  
 Yes  
 No
80. Can the health facility rapidly issue standard identification cards to reserve staff and volunteers during a mass casualty incident?  
 Yes  
 No
81. During mass casualty incidents, does the health facility allow physicians who are not regular members of its medical staff to admit and attend to victims?  
 Yes  
 No
82. Does the health facility have a contingency plan for maximizing and augmenting its work force during a mass casualty incident?  
 Yes  
 No
83. Does the health facility provide regular training regarding biological, chemical, and radiologic incidents for its health care workers?  
 Yes  
 No

*If you answered yes, go to question 83a; otherwise, proceed to question 84.*

- 83a. What components are included in the training program? *(Please check all applicable answers.)*
- Universal Precautions
  - Health Facility Emergency Plan
  - Decontamination Procedures
  - Specific roles during a mass casualty incident
  - Maintenance of physical and psychological well-being during a mass casualty incident
  - Others, specify: \_\_\_\_\_

84. Does the health facility conduct regular emergency preparedness drills?  
 Yes  
 No

*If you answered yes, go to questions 84a-84b; otherwise, proceed to question 85.*

84a. How frequent does the facility hold drills? \_\_\_\_\_

- 84b. Is the health facility's emergency plan modified according to the results of drills?  
 Yes  
 No

## Part II Assessment of General Emergency Preparedness

### I. General Information

**This section deals with basic facts about the health facility that should be known to pertinent personnel. Aspects covered include the capacity, inventory of some basic furnishings, and history of the facility’s past experiences with internal and external disaster situations. All of these are important in giving a general overview of the facility’s ability to withstand catastrophic events and provide services to disaster victims.**

When a building is constructed, it is designed to last for a certain number of years. This is the proposed ‘useful life of a building’ and is agreed upon by the building owner and contractor.

Most of the time, a building outlasts its projected useful life. If so, it may be prudent to have professionals evaluate the structural integrity of the building.

1. When was the health facility built? \_\_\_\_\_
2. What is the bed capacity? \_\_\_\_\_
3. How many operating rooms does your facility have?
  - \_\_\_\_\_ 1
  - \_\_\_\_\_ 2
  - \_\_\_\_\_ 3
  - \_\_\_\_\_ > 3, specify : \_\_\_\_\_
4. How many stretchers (used for transporting patients) does the facility have? \_\_\_\_\_
5. Where are the stretchers placed when not being used? *(Please check all applicable areas.)*
  - \_\_\_\_\_ ER
  - \_\_\_\_\_ Waiting area
  - \_\_\_\_\_ Ward area
  - \_\_\_\_\_ Storage room
  - \_\_\_\_\_ Lobby
  - \_\_\_\_\_ Others, specify: \_\_\_\_\_
6. How many wheelchairs does the facility have? \_\_\_\_\_
7. Where are wheelchairs placed when not in use? *(Please check all applicable areas.)*
  - \_\_\_\_\_ Nurses’ station
  - \_\_\_\_\_ Ward area

- Treatment room  
 Storage room  
 Lobby  
 Others, specify: \_\_\_\_\_

8. Where are the carts, used for transporting and storing medical supplies, located? *(Place the number of carts found in all the applicable areas.)*

	<b>No. of carts</b>
a. nurses' station of each ward	
b. emergency department	
c. OPD section	
d. treatment room	
e. physiotherapy/ exercise room	
f. operating room	
g. other areas, specify:	

Stretchers, wheelchairs, and carts are means of intra-hospital transportation. Stretchers and wheelchairs would be used in case there is a need to transfer the patients to other parts of the health facility or outside in case of evacuation. Carts are used to convey special equipment and supplies.

Proper inventory of these items, together with identification of their location, is vital to maximize their use in times of emergency. Preferably, the stretchers and wheelchairs should be located near the nurses' station so that nurses can distribute them promptly. Carts should be located in all patient care areas. The objects they contain should be fastened to shelf walls to avoid accidental damage.<sup>8</sup>

9. Are there extra beds in the facility?

- Yes  
 No

*If you answered yes, please proceed to questions 9a-9b; otherwise go to question 10.*

- 9a. Where are they located? *(Please check all applicable areas.)*

- Rooms  
 Receiving areas  
 Stock rooms  
 In-patient areas  
 Visiting rooms  
 Others, specify: \_\_\_\_\_

<sup>8</sup> Pan America Health Organization (PAHO), *Mitigation of Disasters in Health Facilities: Architectural Issues*, Volume 3, (PAHO/WHO), 1993, p. 62.



9b. Are the beds secured in place?

- Yes
- No

If you answered yes, please proceed to question 9c; otherwise go to question 10.

9c. If yes, how? (Please check all applicable methods.)

- Wheel lock
- Manually fastened
- With metal
- With wood
- With rope
- Others, specify: \_\_\_\_\_

The availability of extra beds is important during disaster situations when there is a strong possibility of patient overflow.

Beds should be secured to protect patients during earthquakes. The location of extra beds should be identified to maximize their use during emergency situations.<sup>9</sup>

10. Has the health facility experienced any form of disaster during the last 10 years?

- Yes
- No

If you answered yes, please proceed to questions 10a-10c; otherwise go to question 11.

10a. What is the nature of the disaster? (Please check all applicable answers.)

- Earthquake
- Landslide
- Tsunami
- Typhoon
- Fire
- Volcanic Eruption
- Flood
- Explosion (caused by bombs, fuel tanks, etc.)
- Armed conflict
- Industrial/Technological
- Infectious Disease Outbreak
- Radiologic/Chemical
- Others, specify: \_\_\_\_\_

10b. Was evaluation of the structural integrity of the building done after the disaster?

Yes

No

10c. Has the facility suffered any structural damage due to the said disaster?

Yes

No

*If you answered yes, please fill in the table below; otherwise go to question 11.*

Nature of disaster	Date of Occurrence	Structural Damage	Repairs Done	Cost of Repairs

11. Has the facility responded to an external disaster situation in the past?

Yes

No

*If you answered yes, please fill in the table below; otherwise proceed to the box after the table.*

Nature of Disaster	Date of Occurrence	Total Number of Casualties	Number of Casualties Treated by the Hospital

In most developing countries funding for hospitals is limited, making it difficult to divert funds to prepare for all potential disasters. Because of this, it may be efficacious to review the hospital's past experience and response to disasters.<sup>10</sup>

Capable engineers must perform an evaluation of the structural integrity of the hospital building/s after a disaster. Some defects may not be obvious

<sup>10</sup> WHO, *District Health Facilities*, p. 101.

so referral must not be made only if glaring structural damage was found. Previous structural damage would indicate which part/s of the hospital design was/were vulnerable and thus serve as a guide for future construction. A review of damage repair costs resulting from a disaster may prove that disaster preparedness activities are more cost-effective in the long run.

## II. Assessment of Structural Vulnerability

Various requirements and regulations are imposed on the construction of health care facilities in different countries, especially regarding fire and earthquake resistance. In some cases, however, there is lack of compliance owing to certain limitations, such as use of substandard materials due to financial constraints or selection of an inappropriate site for the hospital due to unavailability of land. If disaster strikes this can lead to a tragic outcome.


12. Where is the health facility located? *(Please check the appropriate answer/s.)*

- On a slope
- On a valley
- On top/close to active faults
- On a plain/flat land
- On a flood plain
- In a tsunami prone area
- On a highly elevated area
- Others, specify: \_\_\_\_\_

The terrain where the health facility is located provides valuable clues as to:

1. The nature of the disaster that may be expected (e.g. flood in an area which is located in a valley); and/or
2. Other potential dangers from disasters (e.g. landslides in slopes during typhoons).

A plain or flat terrain is the best site for a health facility<sup>11</sup>



**Figure 1.** Building located on flat terrain

11 WHO, *District Health Facilities*, p. 20.



**Figure 2.** Building located on sloping terrain<sup>12</sup>

Identification of the location and any relevant hazards should prompt a professional referral (e.g. to engineers) to ensure proper measures are taken to minimize damage to structures. Examples of the measures that may be taken are:

1. Provision of storm-water drains in areas prone to flooding;
2. Substitution of a heavy tile roof, which is more susceptible to movement during an earthquake, by a lighter and safer roof; and
3. Reinforcement and strengthening of walls by covering their surfaces with wire mesh and filling with cement.<sup>13</sup>

13. How many buildings does the institution have?

- 1  
 2  
 3  
 >3, specify: \_\_\_\_\_

14. Is/Are the shape/s of the building/s symmetrical<sup>14</sup>?

Building	Symmetry	
	Yes	No

15. Is/Are the shape/s of the building/s simple or complex<sup>15</sup>?

Building	Shape	
	Simple	Complex

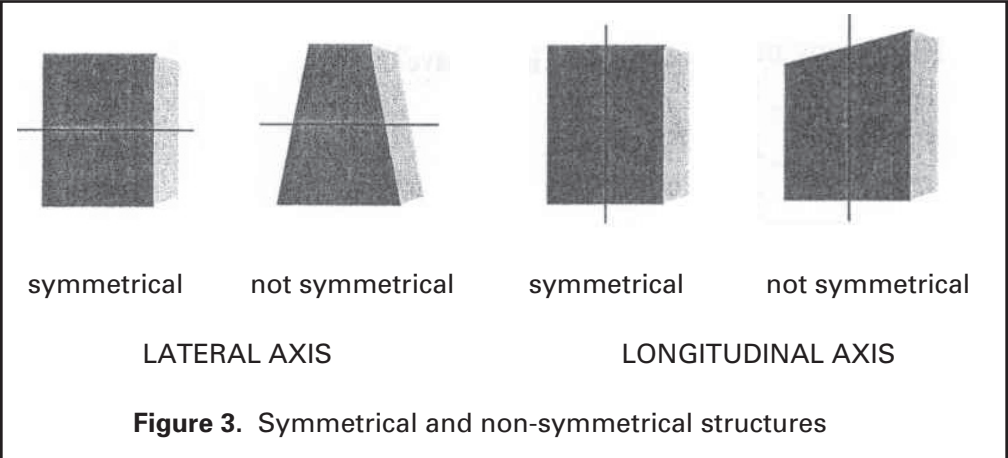
12 Figure 1 and Figure 2 were adapted from WHO, *District Health Facilities: Guidelines for Development and Operations*, 1998, p. 20.

13 PAHO, *Mitigation of Disasters*, Volume 3, pp. 54-55.

14 Please see Figure 3.

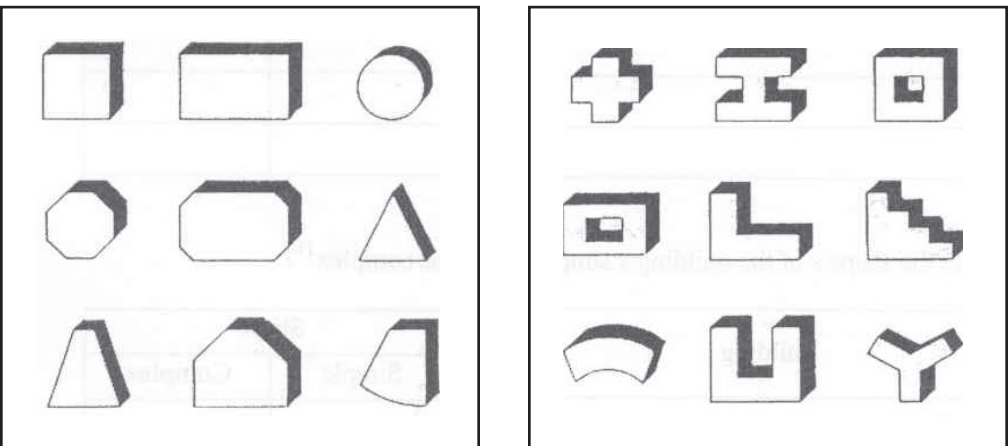
15 Please see Figure 4.

The symmetry and shape of a building may play important roles in its behavior when subjected to stress such as that produced by an earthquake. **Symmetry** is defined as the 'correspondence in size, shape, and relative position of parts that are on opposite sides of a dividing line'<sup>16</sup>. Examples of symmetry in structures are illustrated below.



**Figure 3.** Symmetrical and non-symmetrical structures

The shape of a building may be simple or complex as shown in Figure 4. The most stable structures are those with simple shapes that are symmetrical in both the lateral and longitudinal axes, such as a square or rectangular structure.



**SIMPLE SHAPES**

**COMPLEX SHAPES**

**FIGURE 4.** Examples of simple and complex building shapes

16 Webster's Third New International Dictionary, (Merriam-Webster Inc., 1986).

16. How many stories do the buildings of the institution have? (Please fill in the table below.)

Building	No. of stories

During the 1988 earthquake in Armenia, people inside buildings with five or more floors were 3.65 times more likely to be injured compared to those inside buildings with less than five floors. During the 1990 Philippine earthquake, people inside buildings with seven or more floors were 34.7 times more likely to be injured.<sup>17</sup> This is because during an earthquake, multi-story buildings become unstable due to the magnification of seismic forces on higher floors, leading to a greater probability of structural collapse.<sup>18</sup> Another factor is the longer time needed by occupants of high-rise buildings to evacuate, which increases their chances of being trapped if the building collapses.

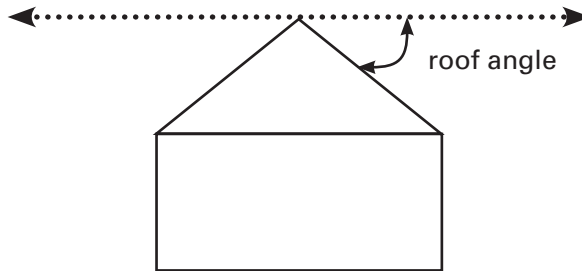
17. What is/are the angle/s of the roof/s on the health facility building/s? (Please fill up the table below.)

Building	Roof Angle						
	1° - <10°	10° - <20°	20° - <30°	30° - <40°	>40°	Flat, no angle	Do not know

17 Eric K. Noji, Earthquakes in Eric K. Noji (ed), *The Public Health Consequences of Disaster*, (Oxford Press, NY), 1997, p. 152.

18 PAHO, *Mitigation of Disasters*, Volume3, p. 41.

The roof angle is the angle made by one side of a roof against the horizontal.



For buildings located in an area which is prone to cyclones and/or may be affected by ashfall from a volcanic eruption (up to about 80 km or 50 miles, as observed in the eruption of Mt. St. Helens in Washington State), consideration must be given to the angle of roofs. During the Mt. Pinatubo eruption in 1991, at least 300 people died in buildings whose roofs collapsed under the weight of ash. It was also found that buildings that are wider than they are tall (such as churches and halls) are 5 times more likely to collapse than residential buildings. Ash build-up approaches a dangerous level at a depth of approximately 25 cm. However, in the case of Mt. Pinatubo, whose eruption was accompanied by rainfall, even roofs which accumulated only 10 cm collapsed under the weight of ash compacted and made heavier by rainwater.<sup>19</sup>

In particularly large eruptions, 25 cm deep ashfall may easily accumulate in one hour, allowing insufficient time to sweep it away.<sup>20</sup> In this case, more acutely-angled roofs would be beneficial as most of the ash will slide off.

For buildings located in cyclone-prone area, studies show that a roof angle of 30°-40° is optimum for withstanding wind forces.<sup>21</sup>

18. Are ramps present in appropriate areas of the health facility for moving bed patients and for use by people with disabilities?

- Yes
- No

Proper structures to provide access to persons with limited mobility must be in place. Ramps must be located in proper places for transporting patients on beds and wheelchairs. Failure to do so may compromise the safety of these people especially if the health facility must be evacuated.

19 Peter J. Baxter, Volcanoes, In: Noji (ed), *The Public Health Consequences of Disaster*, pp. 185, 189.

20 Baxter, p. 189.

21 Ian Davis and Satyedra P. Gupta, Technical Background Paper. In: *Disaster Mitigation in Asia and the Pacific*, (Asian Development Bank, Manila), 1991, p. 55.

## 19. What is the main material used in the construction of the buildings?

- Reinforced concrete  
 Brick masonry  
 Wood  
 Others, specify: \_\_\_\_\_

Construction materials have varying **yield points**. This is the point at which a material breaks apart in response to the force/s applied to it. Wood is considered to have a low yield point compared to the other usual building materials, since it is easily deformed and broken apart by smaller forces.<sup>22</sup> However, wood-frame buildings have been proven to be among the safest structures during an earthquake because even if they do collapse, their potential to cause injury is considerably less than stone buildings. Unreinforced masonry buildings, such as structures made from adobe, have heavy walls and heavy roofs that are prone to collapse. Greater injury can be expected from accidents involving these structures. Concrete-frame structures are less likely to collapse, but when they do, they are considerably more lethal due to the weight of the materials used.<sup>23</sup>

Reinforced concrete and steel are the recommended building materials, but they require sophisticated construction techniques. In the absence of adequate technical competence or proper building inspection and control, the use of these materials can result in catastrophic failures.<sup>24</sup>

## 20. Were there any major alterations done in any of the buildings of the health facility?

- Yes  
 No

If you answered yes, please fill in the table below; otherwise proceed to the box after the table.

Building	Alteration done	Year

22 PAHO, *Mitigation of Disasters*, Volume 3, p. 40.

23 Noji, *Earthquakes*, pp. 150-151.

24 Noji, *Earthquakes*, p. 152.



Alteration and/or remodeling done within the hospital in an attempt to create new spaces or install new structures or equipment without considering the effect these alterations could have on the general strength of the structure may become a liability rather than an improvement. There have been cases in which the structural walls that were part of the original seismic-resistant design of a building were broken in order to install air-conditioning units. These alterations might have been done afterwards when the original design engineers were no longer associated with the construction. Even small openings for window-type air conditioners made through an important load-bearing wall may spell disaster. The results of such breaches is a weakening of structural walls that may result in failure or partial collapse during an earthquake, even if the initial design were seismic-resistant.<sup>25</sup>

Building alterations require proper consultation with engineers and a review of the original plan of the building.

### III. Assessment of Non-Structural Vulnerability

**Non-structural elements of a building include ceilings, windows, doors, as well as mechanical, electrical, and plumbing equipment and installations. For health facilities, attention needs to be paid to these non-structural elements, particularly medical equipment, since these are necessary to its operations. Too much damage to a health facility's non-structural elements can cause its functional collapse and even lead to structural damage of buildings and physical injury to patients and personnel.<sup>26</sup>**

21. Which of the following are available in your institution? (Please fill in the table below.)

Equipment	Present in the hospital ?		No. of units
	Yes	No	
Central air conditioning unit			
Electric generators			
X-ray equipment			
Boiler			
CT-Scan machine			
Hydrotherapy pool			
MRI Machine			
Respirators			
Anesthesia machine			

25 PAHO, *Mitigation of Disasters*, Volume 3, p. 49.

26 PAHO, *Mitigation of Disasters*, Volume 3, p. 46.

22. Where are the following located? (Please put the number of units in the appropriate spaces.)

Equipment	Building location	Basement	Ground Floor	Second Floor	Third Floor	Above 3 <sup>rd</sup> Floor
Central Air-Con Unit						
X-ray Equipment						
CT Scan Machine						
MRI Machine						
Electric Generator						
Boiler						
Hydrotherapy Pool						
Respirator						
Anesthesia Machine						

23. How are the following anchored? (Please check all appropriate spaces.)

Equipment	Anchorage		Material			Location of Anchorage		
	<i>Attached to wall</i>	<i>Not anchored</i>	<i>Use of metal</i>	<i>Use of wood</i>	<i>Use of rope</i>	<i>At the base</i>	<i>On top</i>	<i>At the sides</i>
Central Air Conditioning Unit								
X-ray Equipment								
CT Scan Machine								
MRI Machine								
Electric Generators								
Boilers								
Hydrotherapy Pools								
Respirators								
Suction Machines								
Substations								
Refrigerator/Freezer								
Television Sets								

The presence of heavy equipment on a particular floor of a building alters its response to movements (e.g., earthquakes). Placement of heavy machinery on upper floors concentrates more of the total mass of the building at that point. This is worsened by the fact that the higher the floor is, the greater the increase in seismic response accelerations, thus creating a higher possibility of collapse.<sup>27</sup> Moreover, if the presence of this heavy equipment were not taken into account by the original building design, the structural response of the building to ground movement may be altered. The additional load may produce stress on ceilings and floors which can then result in catastrophic failures.<sup>28</sup>

27 PAHO, *Mitigation of Disasters*, Volume 3, p. 41.

28 PAHO, *Mitigation of Disasters*, Volume 3, p. 48.

A piece of heavy equipment should be firmly anchored to a structural element of a building or its foundation. If not, it may slide, overturn, or move in such a way that it can cause structural damage or physical injury to hospital personnel/patients. The heavier an object is, the more likely it is to move due to the force of inertia. Some furniture, if not properly anchored, may cause similar damage. Especially worthy of mention are the television sets which are sometimes placed on high brackets near the patients' beds and in waiting rooms.<sup>29</sup>

The simplest and most effective solution is to fasten the lower and upper parts of the equipment against a firm wall or some other support using metal strips.

24. Where do you store chemicals? *(Please check all applicable answers.)*

- Storage with shelves
- Storage without shelves
- On top of cabinets
- On the floor
- Others, specify: \_\_\_\_\_

25. Where do you store other potentially hazardous substances? *(Please check all applicable answers.)*

- Storage with shelves
- Storage without shelves
- On top of cabinets
- On the floor
- Others, specify: \_\_\_\_\_

26. Are these storage containers anchored?

- Yes
- No

*If you answered yes, please proceed to question 26a; otherwise go to question 27.*

26a. How are these storage containers anchored?

- At the base
- At the sides
- On top
- All of the above

27. Who is/are responsible for storage and safekeeping of these chemicals and substances?

- Laboratory technician
- Utility personnel
- Others, specify: \_\_\_\_\_

29 PAHO, *Mitigation of Disasters*, Volume 3, p. 54.

28. Did the personnel in charge handling and storing chemicals and potentially hazardous substances receive proper training regarding his/her tasks?

Yes

No

29. Are guidelines set by Material Safety Data Sheets (MSDS) being followed with regard the storage, handling, and disposal of these chemicals and substances?

Yes

No

Chemicals and other potentially hazardous substances may cause injury by virtue of their inherent toxicity or by the possible subsequent reactions that may arise (e.g. fire). This may result from improper storage, handling, and/or disposal of these substances. Thus, it is recommended that personnel in charge of these substances be properly trained and that safety guidelines specific to each substance be followed.

In storing chemicals and other substances, proper arrangement and grouping must be followed. The type of chemical determines how, and with what, other chemicals it should be stored.

The storage containers of these chemicals and substances should be put directly on the floor with proper labels, manufacturer's warning, and appropriate instructions on what to do in case of accidental contact with these substances.

If placement in storage shelves cannot be avoided due to space constraints, it may be wise to do either one of the following:

1. Put railings in front of each shelf to avoid overturning the individual containers on the shelf; or,
2. Fasten each individual container against the storage shelf wall using Velcro.<sup>30</sup>

30 WHO, "Health Sector Emergency Preparedness," *WHO Community Emergency Preparedness Manual*, 1996, p. 74.

Material Safety Data Sheets (MSDS) are official documents that are used to disseminate important chemical safety information to involved workers, emergency responders, and the general public. The use of MSDS has gained widespread support among most countries. However, the varying cultural, historical, and political processes in each country preclude the formulation of a truly international form of MSDS. Moreover, the role of MSDS in the local regulatory scheme differs in each country.

Typically, MSDS contain the following information about chemicals:

- Chemical and physical properties
- Spill and disposal procedures
- Health hazards
- Emergency care and first aid
- Storage and handling
- Personal protection
- Reactivity
- Environmental and registration data<sup>31</sup>

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31 Albert J. Ignatowski and Ernest Weiler, "A Multinational MSDS System," *Chemical Health & Safety*, Vol. 1 No. 2, Aug/Sept 1994, pp 26-30.

## IV. Assessment of Functional Vulnerability

After assessing the structural and non-structural soundness of the institution, the next step is to ensure that health services will keep running to meet the demands of the community at a time when these are most needed. This section deals with assessment of the functional vulnerability of the health facility and encompasses several aspects. The first deals with the general physical layout of the facility including its location, accessibility, and the distribution of areas within the facility. Secondly, there is the consideration of the individual services, both medical (equipment and supplies) and non-medical (utilities, transportation and communication), that are vital to the continuous operation of the facility. The third aspect examines the public services and safety measures available inside the facility.

### A. Site and Accessibility

30. Is the health facility located in the town/city proper?

- Yes  
 No

*If you answered no, please proceed to questions 30a-30b; otherwise go to the box after question 30b.*

30a. How far is the facility from the main town/city? \_\_\_\_\_

30b. Is the facility separated from the main town/city by a bridge?

- Yes  
 No

To ensure accessibility for patients the health facility should be near good roads and adequate means of transportation. It should also be close to other institutional facilities such as educational, religious and commercial centres.<sup>32</sup>

A bridge separating the health facility from a main town/city is a disadvantage, especially if that route is the only one that leads to and from the main town/city. If the bridge were affected by flood, earthquake or man-made catastrophe, the facility would be isolated from people seeking help.

31. Is the health facility located along the main street/highway?

- Yes  
 No

*If you answered no, please proceed to question number 31a; otherwise go to question 32.*

<sup>32</sup> WHO, *District Health Facilities*, p. 19.

31a. How far is the facility from the main street/highway? \_\_\_\_\_

32. How many roads lead to the health facility?

- \_\_\_\_\_ 1
- \_\_\_\_\_ 2
- \_\_\_\_\_ 3
- \_\_\_\_\_ >3, specify: \_\_\_\_\_

33. What are the conditions of roads leading to the health facility? (Please fill in the table below.)

Road	No. of lanes	Road Condition		
		Well paved, no potholes	Paved but with potholes	Unpaved
1				
2				
3				
4				

Standards specify that a health facility be located near a major roadway that connects developing areas of the city/town and, in some cases, some other municipalities.<sup>33</sup>

In case one route is blocked, it is important that there be a functional alternative route leading to the facility. In the event of disaster, these routes may be used to the facility's advantage by establishing clear access and evacuation routes, facilitating fluid traffic movement.

Well-paved roads, wide enough to accommodate at least two ambulances at the same time, provide better flow of traffic.

## B. Areas in the Health Facility

34. What are the major areas of your institution? (Please check all applicable answers.)

- \_\_\_\_\_ Administration
- \_\_\_\_\_ Ambulatory Care Units (Outpatient)
- \_\_\_\_\_ General Services
- \_\_\_\_\_ Emergency Services
- \_\_\_\_\_ In-patient Care Units
- \_\_\_\_\_ Laboratory
- \_\_\_\_\_ Pharmacy
- \_\_\_\_\_ Radiology
- \_\_\_\_\_ Operating Rooms
- \_\_\_\_\_ Others, specify: \_\_\_\_\_

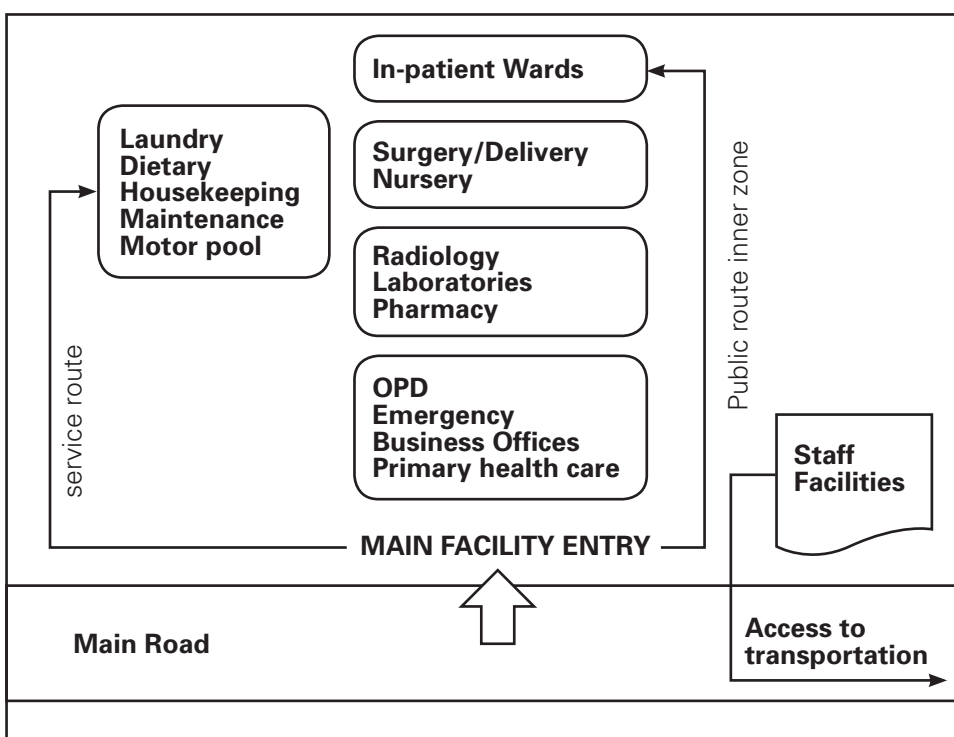
33 PAHO, *Mitigation of Disasters*, Volume 3, p. 24.

Proper zoning of various areas of the health facility, with regard to the inter-relationships between them, helps maintain an adequate level of operation during normal conditions as well as with an influx of a large number of patients.<sup>34</sup>

The facility's design should be kept simple to allow users to find their way around without difficulty. Some principles for the designation of different units are as follows:

1. Departments most closely linked to the community are best located nearest to the entrance. These include the outpatient service, emergency room, administration, and primary health care support (PHC).
2. Departments that receive their workload from above should be next closest to the entrance: radiology, laboratories.
3. In-patient departments should be in the interior zones or wards.<sup>35</sup>

**Figure 5.** Diagram showing an example of proper zoning of health facilities.<sup>36</sup>



34 WHO, *District Health Facilities*, p. 46.

35 WHO, *District Health Facilities*, p. 47.

36 Adapted from WHO, *District Health Facilities: Guidelines for Development and Operations*, 1998, p. 47.



35. Where are the points of entry of the health facility? *(Please check all the applicable answers.)*
- ER area
  - Administration area
  - OPD area
  - Others, specify: \_\_\_\_\_

During disaster situations, some points of entry may have to be closed off to limit and control the number of people entering the facility. This avoids unnecessary overcrowding, prevents the curious from wandering in and out, and protects personnel from external hostile forces.

36. What is within the General Services area? *(Please check all applicable answers.)*
- Boilers
  - Kitchen area
  - Laundry area
  - Communications
  - Machinery area
  - Storeroom
  - Others, specify: \_\_\_\_\_

37. Is the General Services area located in a separate building?
- Yes
  - No

The General Services area includes services vital for the continuous operation of the health facility. In the past, mistakes made in planning this sector, such as failing to take into consideration the explosive and flammable nature of boilers, fuels and gases, have proven costly.<sup>37</sup>

It is recommended that the General Services area be located in a separate structure to house its various components including: power plant, boilers, water storage facilities, kitchen, laundry area, and communications centre.

38. What specific areas of the health facility can be converted into spaces for patients during disaster situations? *(Please check all the applicable answers.)*
- Waiting areas/lobby
  - Physician’s offices
  - Parking lots
  - Physiotherapy room
  - Park/ free area
  - Outpatient consultation

37 PAHO, *Mitigation of Disasters*, Volume 3, p. 26.

\_\_\_\_\_ Diagnostic and treatment room  
 \_\_\_\_\_ Others, specify: \_\_\_\_\_

39. What provisions are located in these areas? *(Please check all applicable answers.)*

- \_\_\_\_\_ Adequate lighting
- \_\_\_\_\_ Electrical outlets
- \_\_\_\_\_ Water supply
- \_\_\_\_\_ Bathroom
- \_\_\_\_\_ Telephone outlets
- \_\_\_\_\_ None

The health facility should identify areas that can be converted into spaces for patients in the event of an influx of patients beyond the bed capacity of the facility or in case of evacuation of a floor or building. These areas must have basic utilities to remain functional. As much as possible, the use of hallways this purpose must be avoided since this impedes the flow of patients, personnel, and services.

**C. Equipment and Supplies**

40. Are the following equipment/supplies available in your institution? *(Please fill in the table below.)*

Equipment/Supply	No. of units available	Functional	Properly labeled	
			YES	NO
a. Stethoscope, adult				
b. Stethoscope, pediatric				
c. Sphygmomanometer				
d. Thermometer				
e. Tongue depressors				
f. Light source (flashlight)				
g. Tape measure				
h. Vision testing chart (Snellen)				
i. Reflex hammer				
j. Head mirror				
k. Mirror, laryngeal set				
l. Otoscope set				
m. Pelvimeter (Collyer, external)				
n. Speculum, nasal				
o. Scale, spring/infant				
p. Scale, adult				
q. Ambu-bags (infant, child, adult with masks)				
r. Laryngoscope				
s. Suction Machine				

t. Oropharyngeal airway				
u. Endotracheal tubes with cuffs				
v. Intubating forceps				
w. Endotracheal tube connectors				
x. Examination table				

The materials included in the table above are adapted from a list of basic equipment that is recommended by the World Health Organization for a Rural Health Unit in the Western Pacific Region.<sup>38</sup>

This list should only be used as a guide for the development of a health facility's set of emergency equipment according to local health needs. Ideally, at least **one set** should be available **per ward or treatment area**.

It is recommended that a system be set up for regular inventory of these items to ensure that management of patients will not be delayed by the absence of diagnostic and therapeutic tools. It is also imperative that they be periodically checked as to function to be sure that they are ready for use during emergency situations. The importance of these preparations is crucial during disaster situations when a large number of victims may have to be treated.

Proper labeling of equipment is particularly important if the facility depends on volunteers, who are unfamiliar with medical equipment.

41. Are there stocks of the necessary supplies and equipment in the health facility?  
 Yes  
 No

42. Is inventory of resources done by the institution?  
 Yes  
 No

*If you answered yes, please proceed to questions 42a-42b; otherwise go to question 43.*

- 42a. How often is the inventory conducted?  
 Every month  
 Quarterly  
 Annually  
 Others, specify: \_\_\_\_\_

- 42b. What benefits have been realized from this practice? (*Please check all applicable answers.*)

38 WHO, *District Health Facilities*, pp. 192-193.

- Identification of resources needed for effective emergency management
- Identification of resources currently available within the community
- Identification of variation (shortfall/surplus)

43. Is there a detailed list showing the destination (intended use) of these supplies?

- Yes
- No

In any health facility, systems should be in place for estimating drug requirements, maintaining an inventory, storing and stocking drugs, and issuing and controlling the use of drugs. If this is not done, an inadvertent shortage of essential supplies may occur due to poor procurement procedures, and/or wastage of valuable supplies that exceed their expiration dates. Inventory control is a vital part of managing and using available resources.<sup>39</sup>

Necessary supplies should be stockpiled in advance. Detailed lists showing the destination of these supplies should be drawn up in the preparation phase of the disaster plan.<sup>40</sup>

44. How many months of supplies (medical and surgical items, essential medicines and other supplies) are stocked for use by the health facility?

- 1 month
- 2 months
- 3 months
- >3 months, specify: \_\_\_\_\_

45. Is there an arrangement with vendors regarding procurement of supplies and equipment during a disaster?

- Yes
- No

46. Does the health facility have a system in place for emergency procurement of supplies?

- Yes
- No

*If you answered yes, please proceed to question 46a; otherwise go to question 47.*

46a. How long does the procurement of supplies take under emergency conditions?

- 1 week

39 WHO, *District Health Facilities*, pp. 167-168.

40 WHO, *Community Emergency Preparedness Manual*, p. 73.

- 2 weeks
- 3 weeks
- Others, specify: \_\_\_\_\_

47. Is there an arrangement for sharing of resources with other health facilities and / or potential emergency suppliers of resources?

- Yes
- No

The recommended amount of supplies on stock depends on the assessed needs of the health facility and the purchasing interval, i.e. the time between ordering and delivery of supplies, which is commonly about three to six months.<sup>41</sup> However, during a disaster, the facility’s regular purchasing cycle can no longer be expected to fulfill the increased demand for supplies. Special arrangements should be made with vendors in anticipation of disasters.

It is important to devise a system for emergency procurement of supplies, otherwise, proper treatment of patients might be compromised. This may be done by setting aside a particular percentage of the budget for emergency procurements, bypassing the usual bureaucratic procedures. If this is not possible, it may be necessary to coordinate with nearby health facilities to arrange for sharing of resources during disaster situations. An organized community-wide disaster response, as a result of close coordination, would ensure that all available community resources would be utilized with maximum efficiency.

48. Is rotation of items with expiry dates done?

- Yes
- No

To avoid needlessly wasting supplies, it is essential to ensure rotation of items with expiry dates by using items that will expire first while placing in stock those with later expiration dates.

49. Who coordinates resource allocation? (*Please check all the applicable answers.*)

- Staff of emergency controller<sup>42</sup>
- Administrative staff
- Volunteers
- Others, specify: \_\_\_\_\_

41 WHO, *District Health Facilities*, p. 168.

42 An **emergency controller** is a member of the emergency planning group who is assigned the responsibility of controlling and coordinating the entire emergency response.

During emergency situations, a member of the staff of the emergency controller should coordinate allocation of resources. Unusual resource purchases and allocations should be recorded for later analysis and reconciliation.<sup>43</sup>

50. Does your health facility have an emergency kit?

Yes

No

If you answered *yes*, please proceed to questions 50a-50b; otherwise proceed to the box after 50b.

50a. Are the contents of your emergency kit consistent with the WHO's prescribed *New Emergency Health Kit*?

Yes

No

50b. Are the following medicines included in your emergency kit?

MEDICINE		Yes	No	No. of units available
<b>Anesthetics</b>				
Ketamine, 50mg/ml in 10-ml vial (as hydrochloride), for injection				
Thiopental, 1 g (sodium salt), powder for injection				
Lidocaine	1% (as hydrochloride), for injection			
	5% with 7.5% glucose solution for spinal in 2-ml ampoule anesthesia			
Bupivacaine, 0.5% (as hydrochloride), for injection				
<b>Pre-operative medication</b>				
Atropine, 1 mg/ml (as sulfate), for injection				
Diazepam, 5 mg/ml in 2-ml ampoule, for injection				
<b>Analgesics, Antipyretics, NSAIDS</b>				
Acetylsalicylic Acid	300 mg tablet			
	500 mg tablet			
Ibuprofen	200 mg tablet			
	400 mg tablet			
Paracetamol	100 mg tablet			
	500 mg tablet			
Morphine, 10mg/ml (as sulfate or hydrochloride), for injection				
Pethidine, 50 mg/ml (as hydrochloride), for injection				
<b>Anti-allergics</b>				
Epinephrine, 1 mg/ml (as hydrochloride or hydrogen tartrate), for injection				
Hydrocortisone, 100 mg in vial (as sodium succinate), powder for injection				

43 WHO, *Community Emergency Preparedness Manual*, p. 73.

Prednisolone, 5 mg tablet			
<b>Antidote</b>			
Naloxone, 0.4mg/ml (as hydrochloride), for injection			
<b>Anti-convulsants</b>			
Phenobarbital, 50 mg tablet			
Phenytoin, 50 mg (as sodium salt) capsule or tablet			
<b>Anti-infectives</b>			
<i>Intestinal antihelminthics</i>			
Mebendazole, 100 mg tablet			
<i>Antibacterials</i>			
Amoxicillin, 250 mg capsule or tablet			
Ampicillin, 500 mg (as sodium salt), powder for injection			
Benzylpenicillin, 3 g (5 million IU), (as sodium or potassium salt), for injection			

MEDICINE		Yes	No	No. of units available
Cloxacillin	500 mg (as sodium salt), powder for injection			
	500 mg tablet			
Phenoxymethyl penicillin, 250 mg tablet				
Procaine benzylpenicillin	1 g (1 million IU)			
	3 g (3 million IU), powder for injection			
Chloramphenicol	250 mg capsule			
	1 g (as sodium succinate), powder for injection			
Doxycycline, 100 mg (as hyclate or monohydrate) capsule or tablet				
Erythromycin, 250 mg (as stearate or ethyl succinate) Capsule or tablet				
Gentamycin, 40 mg/ml (as sulfate), for injection				
Metronidazole,	200 mg tablet			
	250 mg tablet			
	500 mg/100 ml, injection			
Sulfamethoxazole + Trimethoprim	100 mg + 20 mg tablet			
	400 mg + 80 mg tablet			
<i>Anti-fungals</i>				
Nystatin, 100,000 IU non-coated tablet				
<i>Anti-malarials<sup>a</sup></i>				
Chloroquine	100 mg tablet (as sulfate or phosphate)			
	150 mg tablet (as sulfate or phosphate)			
Quinine	200 mg (as sulfate) tablet			
	300 mg (as bisulfate) tablet			
	300mg/ml, for injection			
Sulfadoxine + Pyrimethamine, 500mg+25 mg tablet				

Mefloquine, 250 mg tablet <sup>b</sup>			
<b>Anti-anemia Medications</b>			
Ferrous sulfate + folic acid, 200 mg + 0.25 mg tablet			
Folic acid, 5 mg tablet			
<b>Plasma substitutes <sup>c</sup></b>			
Polygeline, 3.5% injectable solution			
<b>Cardiovascular Medications</b>			
Glyceryl trinitrate, 0.5 mg sublingual tablet			
Hydralazine, 20 mg (as hydrochloride), powder for injection			
Atenolol, 50 mg tablet			
Methyldopa, 250 mg tablet			

<b>Dermatological Medications</b>	Yes	No	No. of units available
<i>Anti-fungals</i>			
Benzoic Acid + Salicylic Acid, 6% +3 % ointment or cream			
<i>Anti-infectives</i>			
Methylrosanilinium chloride (gentian violet), 0.5% aqueous solution or crystals			
Silver sulfadiazine 1% cream			
<i>Scabicide and pediculicide</i>			
Benzyl benzoate, 25% lotion			
Soap			
<i>Ultraviolet-blocking agent</i>			
Zinc oxide, 15% ointment			
<b>Disinfectants and antiseptics</b>			
Chlorhexidine <sup>d</sup> , 5%(digluconate) solution, for dilution			
Polyvidone iodine, 10% solution			
Calcium hypochlorite, 70% available chlorine, powder for solution			
<b>Diuretics</b>			
Furosemide, 10mg/ml, for injection			
Hydrochlorothiazide, 25 mg tablet			
<b>Gastrointestinal medications</b>			
<i>Antacid</i>			
Aluminum hydroxide, 500 mg tablet			
Magnesium trisilicate compound, 500 mg tablet			
<i>Anti-emetic</i>			
Promethazine,	25 mg tablet		
	25 mg/ml, injection		
<i>Oral rehydration</i>			
Oral rehydration salts, powder for solution			
<b>Contraceptives</b>			
<i>Hormonal</i>			
Ethinylestradiol + levonorgestrel, 30 ug + 150 ug tablet			
<i>Barrier</i>			



Condoms, with or without spermicide				
<b>Muscle relaxants</b>				
Alcurinium, 5mg/ml (as chloride), for injection				
Neostigmine	0.5mg/ml			
	2.5mg/ml, for injection			
Suxamethonium, 50 mg/ml (as chloride), powder for Injection				
Vecuronium, 10 mg (as bromide), powder for injection				
<b>Ophthalmological preparations</b>				
Tetracycline, 1% (as hydrochloride), eye ointment				
Gentamycin, 0.3% eye drops				

<b>Oxytocics</b>				
Ergometrine	0.2 mg tablet, (as hydrogen maleate)			
	0.2 mg/ml, for injection			
Oxytocin, 10 IU/ml, for injection				
<b>Psychotherapeutic medications</b>				
Chlorpromazine	25 mg/100mg tablet (as hydrochloride)			
	25 mg/ml, for injection			
<b>Anti-asthma</b>				
Aminophylline, 25 mg/ml, for injection				
Salbutamol	4 mg/tablet (as sulfate)			
	0.1 mg per dose aerosol			
<b>Parenteral solutions</b>				
Glucose	5% isotonic, injectable solution			
	50% hypertonic injectable solution			
Sodium chloride, 0.9 % isotonic injectable solution				
Compound solution of sodium lactate				
Water for injection, 10 ml ampoule				
<b>Vitamins and minerals</b>				
Ascorbic acid, 50 mg tablet				
Retinol	200,000 IU (110 mg) (as palmitate)			
	100,000 IU (5.5 mg) for pregnant women			

<sup>a</sup> Only antimalarials which conform to national malaria treatment guidelines should be used. Failure to do so will have a negative impact on national malaria treatment programmes.

<sup>b</sup> This medicine should be reserved for therapy of confirmed *Plasmodium falciparum* malaria either known or suspected to be resistant to chloroquine or sulfa/pyrimethamine.

<sup>c</sup> Intravenous solutions must always be supplied in plastic containers with an infusion set and needle/s. Glass containers are not acceptable.

<sup>d</sup> Chlorhexidine 20% should be avoided as it needs distilled water for dilution otherwise precipitation will occur. 5% solution is the WHO standard. Alternatives include the combination of chlorhexidine 1.5% + Cetrimide 15%.

The medicines listed in the table above are essential medicines recommended by the World Health Organization for the early phase of emergency.<sup>44</sup> This is intended only as a reference list. A health facility may formulate its own emergency kit based on the emergency/disaster situations which are being anticipated.<sup>45</sup>

51. Does your health facility have the capacity to store blood products?

- Yes  
 No

*If you answered no, please proceed to question 51a; otherwise, proceed to the box after question 51a.*

51a. Where do you get blood and other blood products? *(Please check all applicable answers.)*

- Commercial blood banks  
 Other hospitals  
 Blood donors  
 Others, please specify: \_\_\_\_\_

It is recommended that every health facility at the first referral level maintain adequate blood-bank facilities, with particular attention paid to correct storage and handling of blood and blood products.

If a blood bank is not feasible, possible sources of blood products should be identified and a system arranged for quick procurement in times of emergency.

## D. Utilities

52. How is water supplied to the health facility? *(Please check all applicable answers.)*

- From a water company  
 Deep Well  
 Others, specify: \_\_\_\_\_

53. Does the health facility have suitable means of storing water?

- Yes  
 No

54. Is there an alternative source/s for water in case the main supply gets cut off?

- Yes  
 No

44 UNDP/IAPSO, *Emergency Relief Items: Compendium of Basic Specifications*, Volume 2, (United Nations Development of Programme, NY), 1996, pp. 175-186.

45 See Appendix 1 for a list of WHO's New Emergency Health Kit.

If you answered yes, please proceed to questions 54a-54c; otherwise proceed to the box after question 54c.

54a. What is the alternative source of water? \_\_\_\_\_

54b. How is the water from the alternative source treated? (Please check all the applicable answers.)

- \_\_\_\_\_ Filtration
- \_\_\_\_\_ Chlorination
- \_\_\_\_\_ Sedimentation
- \_\_\_\_\_ Boiling
- \_\_\_\_\_ Water tablets
- \_\_\_\_\_ Not treated

54c. How long would the health facility continue to function using the alternative source of water? \_\_\_\_\_

Water in a health facility should be safe and potable and contribute to the well being of patients by reducing the risk of infection and propagation of food and water-borne diseases.<sup>46</sup>

The average water consumption per person is 15 liters per day, distributed as follows:

- o *Drink and food* – 2.5-3 L (dependent on climate and individual physiology)
- o *Basic hygiene practices* – 2-6 L (dependent on social and cultural norms)
- o *Basic cooking needs* – 3-6 L (dependent on food type and norms)

For health facilities, the daily water consumption is estimated to be 5 liters per out-patient, and 40-60 liters per in-patient. Additional liters are needed for laundry, flushing toilets, and other utilities.<sup>47</sup>

It is thus important for the facilities to have an alternate source of water in case the main supply is cut off. Possible external sources of water supply should be identified, such as a rural water system or the local fire station. If there is a storage tank for water, its capacity should be known so that it may be properly allocated like any other resource.

Regular sanitary surveys should be performed with the aim of assessing conditions and practices that increase public health risks, such as possible sources of contamination in the procurement, transport, and storage of water.<sup>48</sup>

46 WHO, *District Health Facilities*, p. 107.

47 McConnan (Ed.), *Humanitarian Charter & Minimum Standards in Disaster Response (SPHERE Project) 2004 Edition*, 2004, pp. 63-64, 93.

48 McConnan, p. 67.

55. How is electricity supplied?

Voltage :  110 V  
 220 V

Amperage: \_\_\_\_\_

Cyclage: \_\_\_\_\_

56. Where are the control panels and electric power distribution lines located?  
 \_\_\_\_\_

The emergency plan should at least indicate how electric power is supplied to the institution together with other characteristics of the hospital's electric supply such as amperage or cyclage. This may prove important when outside help is required in storing electrical service.

The location of control panels and power distribution lines should be marked in the floor plan for rapid identification during any emergency situation.

57. Is there an alternative source of electrical supply (emergency power generator)?

Yes

No

*If you answered yes, please proceed to questions 57a-57c; otherwise proceed to the box after question number 57c.*

57a. What is the capacity of the emergency power generator? \_\_\_\_\_

57b. What fuel is utilized by the emergency power generator? \_\_\_\_\_

57c. What proportion (in %) of the facility's energy requirement can it supply? \_\_\_\_\_

For the safety of its occupants, the health facility should have a reliable alternative source of power for emergency lighting and operation of essential equipment. If this is unavailable, immediate impact will be felt at the critical patient areas where increased staffing would be required to provide manual ventilation of intubated patients.<sup>49</sup> Other services that may suffer include the operating room/s, delivery room/s, and nursery. Accidents can occur if hallways and stairwells are not properly lit.

If available, the generating set should be located on the premises but not adjacent to the operating and ward areas. It should be capable of supplying at least 50-60% of the facility's normal electrical load to maintain the minimum level of services. The recommended circuits to which power should be provided are:

#### Lighting

- ⊙ all exits, including exit signs, stairways and corridors
- ⊙ surgical, obstetrical and emergency room operating lights
- ⊙ nursery, laboratory, recovery room, intensive care unit, nursing station, labor room, and pharmacy
- ⊙ generator set location, electrical switch-gear location, and boiler room
- ⊙ one or two lifts, if needed for emergency
- ⊙ telephone operator's room
- ⊙ computer room when available

#### Equipment

- ⊙ nurses' call system
- ⊙ alarm system, including fire alarm
- ⊙ fire pump and pump for central suction system
- ⊙ blood bank refrigerator
- ⊙ sewerage or pump lift system, if installed
- ⊙ equipment necessary for maintaining telephone service
- ⊙ equipment in operating, recovery, intensive care and delivery rooms
- ⊙ one electrical sterilizer if installed

#### Heating, cooling, and ventilation system

- ⊙ operating, delivery, labor, recovery, intensive care unit, nurseries, and patient rooms

Ideally, after normal power has been interrupted, the generator set should be able to bring full voltage and frequency within 10 minutes to the areas listed above.<sup>50</sup>

49 Richard Aghababian, et al, "Disasters Within Hospitals," *Annals of Emergency Medicine*, April 1994, 23:4, pp. 771-777.

50 WHO, *District Health Facilities*, p. 125.

58. Does the health facility have emergency lights (for use between the period of power interruption and restoration of electrical supply with generator set)?

Yes

No

*If you answered yes, please proceed to questions 58a-58b; otherwise proceed to the box after question 58b.*

58a. How are the emergency lights activated?

Manual

Automatic

58b. Where are they located?

Nurses' stations

Emergency room

Wards

Operating Room

Individual patients' rooms

Laboratory

Hallways

Lobby

Stairwells

Others, specify: \_\_\_\_\_

Emergency lights should be available for use during the period of transfer switching (the period between the interruption of power supply and the connection to a generator set) to light important areas inside the health facility such as stairs and hallways, operating room, emergency room, nurses' stations and cashier area. They should not be used as substitutes for the generator set.

59. How are medical gases supplied?

Main pipeline

Individual tanks

Others, specify: \_\_\_\_\_

60. Are there safety measures to ascertain prevention of gas spills/leaks?

Yes

No

The medical gas supply is vital to the survival of some patients in the health facility but it is also a source of danger if not properly maintained.<sup>51</sup>

The tanks and/or medical gas pipes must be inspected regularly to ascertain if they are still in good condition. In cases of piped-in gases, there should be safety valves installed to prevent leaks.

**E. Warning System and Safety Equipment**

61. Is there a system of signs instituted in response to a disaster situation?

- Yes
- No

*If you answered yes, please proceed to question 61a; otherwise go to the box right after the question.*

61a. What signs are included? (Please check all applicable answers.)

- escape route indicators
- fire-fighting equipment indicators
- building layout diagram

Signs inside the health facility should indicate the location of escape routes and fire-fighting equipment.<sup>52</sup> A building layout diagram should be provided so that even a stranger unfamiliar with the hospital’s surroundings can easily identify where he/she is and where he/she should go in case there is a need for evacuation.

Absence of these signs may lead to confusion and panic during an emergency. This may subsequently give rise to occurrence of stampedes and/or trapping of individuals in enclosed spaces.

62. Does the institution have fire detection equipment (e.g. smoke alarms)?

- Yes
- No

*If you answered yes, please proceed to question 62a; otherwise go to question 63.*

62a. Is the fire detection equipment strategically located?

- Yes
- No

51 PAHO, *Mitigation of Disasters*, Volume 2, p. 60.

52 PAHO, *Health Services Organization*, p. 29.

**63. Does the institution have fire extinguishers?**

- Yes  
 No

*If you answered yes, please proceed to questions 63a-63c; otherwise go to the box after question 63c.*

**63a. How many fire extinguishers does the institution have?** \_\_\_\_\_

**63b. Are fire extinguishers strategically located?**

- Yes  
 No

**63c. How often are the fire extinguishers replenished/serviced?**

- Once a year  
 Once in two years  
 As needed  
 Never  
 Others, specify: \_\_\_\_\_

Swift reaction in fighting fires depends on early fire detection. This can be achieved by installing smoke detectors at proper intervals to cover the entire building. Regular checks must be done to ensure detectors are functioning and that they have adequate power supply. Equipment for local fire control includes fire hoses and fire extinguishers which should be placed strategically, in corridors, exit routes, and at the entrances to high-risk rooms such as laboratories. They must be visible and accessible. Regular maintenance of fire-fighting equipment is mandatory. This is especially true for fire extinguishers, the contents of which expire over time and therefore must be regularly replaced.

Coordinate with the local fire protection bureau for guidelines regarding proper placement of fire detectors and fire-fighting equipment.

**F. Security**

**64. Does the health facility have a security unit?**

- Yes  
 No

*If you answered yes, please proceed to questions 64a-64b; otherwise go to the box after question 64b.*

**64a. Who provides the personnel for the security unit?**

- Health facility  
 Private security agency



64b. What areas in the health facility are given top priority in terms of security especially during disasters? *(Please check all that apply.)*

- Entrance / Exit points
- Main thoroughfares
- Storage area for controlled substances
- Storage area for high-value medical equipment
- Others, specify: \_\_\_\_\_

The security of a health facility may be seriously breached during a disaster. The level of risk is magnified if structural damage was incurred. A facility must have either its own security unit, or alternatively, utilize the services of a private security company.

During disasters, security should be tightened in certain high-risk areas of the facility such as the main entrance and exit points, storage areas for controlled substances and volatile chemicals, and areas containing high-value medical equipment.

**G. Transportation and Communication**

65. What forms of internal communication are being used by the institution? *(Please check all applicable answers.)*

- Regular telephone
- Cellular telephone
- Pager
- Public address system
- Short-wave radio
- Intercoms
- Runners
- Others, specify: \_\_\_\_\_

66. What forms of external communication are being used by the institution? *(Please check all applicable answers.)*

- Telephone with landline
- Cellular telephone
- Pager
- Facsimile machine
- Short-wave radio
- Runners
- Others, specify: \_\_\_\_\_

66a. If the hospital is using telephones (whether landline or cellular), what are alternative forms of communication in case the phone system breaks down? *(Please check all the applicable answers.)*

- Short-wave radio
- Runners
- Others, specify: \_\_\_\_\_

Communication is vital to the success of all coordination efforts. Unfortunately, communication difficulties arising from both equipment failure and human error are the most common problems experienced during disaster situations.<sup>53</sup>

During California's Loma Prieta Earthquake in 1989, the most difficult problem during the response phase was information management. Telephone facilities became non-functional early in the response and hospitals later complained that they had little idea of the amount of damage in their communities and the number of patients that they should anticipate. In Watsonville Community Hospital which was close to the epicentre, hand-held radios meant for in-house coordination likewise failed.<sup>54</sup> Similarly, in the 1990 earthquake in Baguio City, Philippines, the disaster area became virtually isolated due to the lack of communication facilities. A telecommunications company had to deploy satellite dishes to facilitate microwave communication.

67. What means of patient transport are used by the institution? (*Please check all applicable answers.*)

- Buses, minibuses and vans  
 Ambulance  
 Trucks  
 Private vehicles  
 Boats (if applicable)  
 Aircraft (both fixed-wing and helicopters)  
 Motorcycles  
 Others, specify: \_\_\_\_\_

*If your facility has at least one ambulance, please answer question 67a; otherwise, please proceed to the box after question 67a.*

67a. What are the capabilities of your ambulance/s? (*Please fill in the table below.*)

Ambulance capabilities	No. of ambulance in the facility	Personnel assigned to the ambulance			
		Driver	Paramedic	Nurse	Doctor
Purely for transport, No special equipment					
With supplies for Basic Life Support					
With supplies for both Basic Life Support and Advance Cardiac Life Support					
Others, specify:					

53 Joseph F. Waeckerle, "Disaster planning and Response," *New England Journal of Medicine*, Vol. 234, No. 12, p. 817.

54 Bruce Haynes, et al, "Medical Response to Catastrophic Events: California's Planning and the Loma Prieta Earthquake," *Annals of Emergency Medicine*, 1992, 21:4, pp. 370-372.

Planning for disaster situations should also entail pooling available resources for patient transport, aside from those already in existence. These may be needed for moving casualties from the field to the health facility, for moving patients to other facilities in cases of referral or overload, or for evacuating and relocating a hospital service.<sup>55</sup>

Identifying the availability and capabilities of ambulances is important in maximizing their use during emergencies.

## H. Public Information

68. Is there a public information centre in the institution?

Yes

No

*If you answered yes, please proceed to questions 68a-68e; otherwise go to the box after 68e.*

68a. Who coordinates the public information centre? *(Please check all the applicable answers.)*

Social worker

Administrative staff

Volunteer

Others, specify: \_\_\_\_\_

68b. Who are tasked to man the public information centre? *(Please check all the applicable answers.)*

Social workers

Administrative staff members

Volunteers

Others, specify: \_\_\_\_\_

68c. What services are provided at the information centre? *(Please check all the applicable answers.)*

Providing information about patients admitted and discharged

Finding addresses and whereabouts of family members of patients admitted to the hospital

Assisting in the identification of victims

Assisting of family members to locate relatives

Others, specify: \_\_\_\_\_

68d. Will the Public Information Centre continue to provide the above-mentioned services during disaster situations?

Yes

No

Not sure

68e. Does the Public Information Centre have the capacity to coordinate with the following external entities in the event of a disaster? *(Please check all that apply.)*

- National emergency preparedness agency
- Red Cross and other emergency management agencies
- Other specialized health facilities in the hospital's vicinity
- Fire department
- Police department
- Local utility companies
- Transport companies (for external means of transporting patients)
- Local funeral homes (for temporary morgue facilities)
- Medical supply vendors

A public information centre should be established where the public can go to request information concerning family members. Its functions include:

1. providing information to family members about patients admitted and discharged
2. finding out the address and whereabouts of the family members of patients admitted to the health facility
3. assisting in the identification of victims
4. helping family members locate victims
5. coordinating with other organizations / entities outside the facility

It is recommended that the public information centre be coordinated by a social worker and staffed by personnel or volunteers. The health facility's disaster plan should provide for the continued functioning of the public information centre during disaster situations.<sup>56</sup>

69. Are there means to create public awareness of the disaster preparedness plan of the institution?

- Yes
- No

*If you answered yes, please proceed to question 69a; otherwise go to the box after question 69a.*

69a. What are these measures? *(Please check all applicable answers.)*

- Posters
- Hanging signs
- Signboards
- Public Meetings
- Labels on necessary equipment
- Labels on exit doors

<sup>56</sup> WHO, *Community Emergency Preparedness Manual*, p. 72.

- General evacuation route
- Others, specify: \_\_\_\_\_

In any occurrence of a sudden-onset disaster, the first hours are the most critical because of the strong emotional impact on the population. The resulting disorientation, confusion, and panic are gradually replaced by a more organized reaction. A public awareness campaign which familiarizes people with the disaster preparedness activities of the health facility would not prevent these initial reactions but would hasten a more organized way of reacting.<sup>57</sup>

70. How is the public informed of a disaster situation in your catchment area?  
*(Please check all the applicable answers.)*

- Mass media
- Audible and visual signs
- Community network
- Loud speakers
- Door-to-door announcements
- Others, specify: \_\_\_\_\_

71. What methods are used to disseminate emergency plans to the public?  
*(Please check all applicable answers.)*

- Local press
- Radio
- Television
- Public meetings
- Visits to schools, offices, etc.
- Brochures
- Others, specify: \_\_\_\_\_

Public education is best integrated into the health facility's disaster plan. The public must be informed of the characteristics of possible disasters and told how they should behave during those times. This would provide additional help to the institution in attenuating the effects of the disaster.<sup>58</sup>

The intention of informing the public of a disaster situation is to prompt an appropriate response, to reduce public exposure to a minimum. Warning messages should:

- a. contain precise information on the hazard,
- b. state what action should be taken to protect life and property,
- c. describe the consequences to the public of not heeding the warning,
- d. provide feedback to the operational decision-makers,
- e. cite a credible and respected authority,
- f. be short, simple and precise,
- g. have a personal context,
- h. contain active verbs,
- i. repeat important information regularly.

These messages can be put out in various ways depending on the availability of resources in the community.<sup>59</sup>

During infectious disease outbreaks, information presented to the public should be limited to specific data and results. Speculation, over-interpretation of data, and overly confident assessments of investigations should be avoided. Rumors should be addressed as quickly as possible in order to avoid stigmatization of population groups. Such steps will contribute significantly to the maintenance of order and avoidance of public panic and fear.<sup>60</sup>

58 WHO, *Community Emergency Preparedness Manual*, p. 14.

59 Samir Ben Yahmed, "Introduction to Intersectoral Planning for Emergencies", *Emergency Preparedness Planning*, (Division of Emergency Relief Operations, WHO), 1993, p. 13.

60 Centers for Disease Control and Prevention, *Public Health Guidance for Community-level Preparedness and Response to SARS, [Supplement G: Communication]*, 2003, pp. 1-3.

Here are examples of public messages:

*“During and after a disaster, there may be a high level of water contamination because of broken water mains. Also, there may be a loss of electricity which would affect the pumping of water to homes. The Ministry of Health will inform you about the situation immediately after the disaster. Do not drink tap water until informed by officials.” [Delivered prior to onset of disaster, concerning water security]<sup>61</sup>*

*“At this time, there is no evidence of ongoing transmission of SARS anywhere in the world. In the absence of SARS transmission, there is no need for concern about travel or other activities. Up-to-date information on SARS is available on the website....” [Delivered shortly after a disease outbreak]<sup>62</sup>*

## V. Assessment of Human Resources

**Among all of the health facility’s available resources, personnel remain the most important. This is a fact regardless of the health facility’s bed capacity, degree of technical advancement or whether the hospital is responding to its usual cases or to disaster situations. Thus, it is essential that their level of preparedness be assessed.**

**The topics covered in this section can be grouped into two aspects. One deals with the organization of the health facility personnel such as the emergency planning group, subcommittees, and inventory and mobilization of personnel; the other covers the preparedness activities for the personnel such as: hazard and vulnerability analysis, drills and training, community involvement, and evacuation.**

### A. Emergency Planning Group

72. Is there an existing emergency planning group in your institution?

- Yes  
 No

*If you answered yes, please proceed to questions 72a-72e; otherwise go to box after question 72e.*

72a. When was this group formed? \_\_\_\_\_

72b. Who are the members of this planning group? *(Please check all applicable answers.)*

Health facility chief executive officer

61 PAHO, *Communicating with the Public in Times of Disaster: Guidelines for Disaster Managers on Preparing and Disseminating Effective Health Messages*, (PAHO/WHO), 1994, p. 20.

62 CDC, *Supplement G*, p. 3.

- Chief of medical personnel
- Head of administration
- Director of nursing services
- Public Information Centre head
- Security services supervisor
- Maintenance Chief
- Staff representative
- A health department representative
- Engineer
- Architect
- Other organizations with which the health facility may interact in emergency management
- Others, specify: \_\_\_\_\_

72c. Are all members of sufficient seniority to commit the organization to planning group decisions?

- Yes
- No

72d. Are they capable of contributing to the planning group's work?

- Yes
- No

72e. What activities are done by the emergency planning group? *(Please check all applicable answers.)*

- Hazard/potential problem analysis
- Structural vulnerability assessment
- Non-structural vulnerability assessment
- Functional vulnerability assessment
- Determine hospital operating capacity during disaster situations
- Plan for mobilization of resources
- Define roles and responsibilities of each member/group
- Ensure training and education of personnel as required
- Provide for a monitoring and evaluation system for the emergency preparedness program
- Provide pre-disaster photographic documentation of facility buildings and equipment for insurance purposes
- Others, specify: \_\_\_\_\_



An emergency planning group for the health facility should be formed. The group could consist of:

- ⊙ the health facility chief executive officer;
- ⊙ chief of medical personnel;
- ⊙ head of administration;
- ⊙ head of field medical service;
- ⊙ director of nursing services;
- ⊙ public information centre head;
- ⊙ security services supervisor
- ⊙ maintenance chief;
- ⊙ engineers (structural, electrical, sanitary);
- ⊙ architect;
- ⊙ a staff representative;
- ⊙ a representative of the health department;
- ⊙ representatives from other organizations with which the hospital may interact in emergency management.<sup>63</sup>

Each member of the planning group should have a deputy and the group should appoint:

1. **emergency controller** – responsible for coordinating emergency response; and an
2. **emergency officer** – acts as project manager for the preparedness program.

The planning process conducted by the emergency planning group gives rise to all the programmes for emergency management and to the necessary strategies and arrangements. It also establishes convention and arrangements among those concerned. The planning group must first conduct hazard assessment which aims to identify:

1. the nature, severity and frequency of the hazard;
2. the area likely to be affected; and
3. the time and duration of impact.

The second step is to conduct **vulnerability analysis** which is the process used to identify vulnerable conditions which are exposed to natural hazards. Vulnerability analysis results in an understanding of the level of exposure to various hazards identified.<sup>64</sup> This strategy will provide information concerning the causes of potential emergencies, suggest prevention strategies, and suggest contingent strategies and trigger events.

**Resource analysis** for a health facility should also be conducted including:

1. an assessment of the hospital's capacity for emergency medical response;
2. an analysis of the hospital's capacity to continue providing medical services with damaged or failed services and supplies;
3. an analysis of emergency equipment for the protection of the hospital.<sup>65</sup>

63 WHO, *Community Emergency Preparedness Manual*, pp. 66-67.

64 W. Nick Carter, *Disaster Management: a Disaster Manager's Handbook*, (ADB, Manila), 1991, pp. 346-348.

65 WHO, *Community Emergency Preparedness Manual*, pp. 66-67.

73. What type/s of disaster does the health facility prepare for?

- External disasters only  
 Internal disasters only  
 Both internal and external disasters

The health facility should always be prepared to respond to external disasters to provide assistance to victims. However, like any physical structure, the facility is also vulnerable to disasters directly occurring within its walls. Thus, preparation must be made for response to internal disasters, the most common of which is fire.

74. Does the hospital have an emergency preparedness plan?

- Yes  
 No

*If you answered yes, please proceed to questions 74a-74e; otherwise go to the box after question 74e*

74a. Is the hospital emergency plan documented in writing?

- Yes  
 No

74b. How often do you evaluate your disaster preparedness plan?

- Semi-annually  
 Annually  
 Biannually  
 Others, specify: \_\_\_\_\_

74c. How do you evaluate your disaster preparedness plan?

- By discussion  
 By performing drills  
 By performing simulation exercises  
 Others, specify: \_\_\_\_\_

74d. When was the plan last updated? \_\_\_\_\_

74e. What is your evaluation of your most recent emergency plan?

- Effective  
 Needs changes/improvement

The emergency plan should be documented in writing so that all those who are involved will get an overview of the plan itself and the relationship between some parts and the various agencies involved. It will also enable them to quickly and easily find the part of the plan for which they are responsible. A good plan is simple, brief and can easily be revised.<sup>66</sup>

Review of the emergency plan should be done at least once a year, then be evaluated according to its effectiveness.<sup>67</sup> Adjustments must be made in response to changes in the health facility structure, acquisition of new equipment, expansion of health facility services, prevailing social conditions, and acquisition of better knowledge in disaster mitigation.

75. Is there an existing/updated organizational chart for disaster situations?

- Yes
- No

*If you answered yes, please proceed to question 75a; otherwise proceed to the box after 75a.*

75a. Does the organizational chart follow the structure recommended by the Hospital Emergency Incident Command System (HEICS)?

- Yes
- No

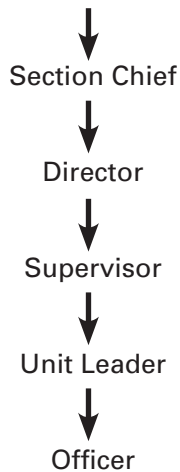
66 Yahmed, pp. 16-17

67 WHO, *Community Emergency Preparedness Manual*, pp. 69.

The Hospital Emergency Incident Command System (HEICS)<sup>68</sup> is an emergency management system that utilizes a logical management structure, defined responsibility for every staff member, clear reporting channels, and a unifying nomenclature for health facilities and their emergency responders. HEICS was developed in order to assist the operation of a health facility during crisis situations.

The HEICS organizational chart gives a chain of command which incorporates four sections (Logistics, Planning, Finance, Operations) under the leadership of an Emergency Incident Commander. The following illustrates the general layout of organization:

EMERGENCY INCIDENT COMMANDER



Each position has a written *Job Action Sheet* that specifies the important roles and duties of every team member.<sup>69</sup>

76. How are the members of the emergency planning group made aware of these management roles? *(Please check all the applicable answers.)*

- Distribution of copies  
 Regular meetings  
 Others, specify: \_\_\_\_\_

77. How are the members encouraged to actively be involved in preparedness, response or recovery? *(Please check all applicable answers.)*

- Meetings  
 Drills/ exercises  
 Others, specify: \_\_\_\_\_

68 See Appendix 2 for a more detailed overview on HEICS.

69 State of California Emergency Medical Services, *Hospital Emergency Incident Command System 3<sup>rd</sup> Edition*, 1998.

Once the emergency management structure is identified by the planning committee, the roles and responsibilities of each member/group must be clearly described, verbally and in writing. This aims to ensure that all required control, coordination and support functions are taken into account, and that there is no overlap between members.<sup>70</sup>

**B. Subcommittees**

78. Is the emergency preparedness committee divided into subcommittees or subgroups?

- Yes
- No

*If you answered yes, please proceed to questions 78a-78d; otherwise go to the box after question 78d.*

78a. What are these subcommittees/subgroups? *(Please check all applicable answers.)*

- Health
- Rescue
- Transport
- Communication
- Mutual assistance and welfare
- Engineering
- Others, specify: \_\_\_\_\_

78b. Are the roles and responsibilities of these subcommittees/subgroups clearly defined by the planning committee?

- Yes
- No

78c. How are these responsibilities assigned to them?

- According to existing function
- According to assessed capability of a group
- By random selection
- By volunteerism
- Others, specify: \_\_\_\_\_

78d. What subcommittee/subgroup is directly involved among the following: *(Please identify.)*

70 Yahmed, p. 10.

TASKS/DUTIES	Name of Subcommittee or Subgroup
1 servicing and testing of emergency equipment regularly in accordance with relevant standards and manufacturers' recommendations	
2 providing advice to management regarding new equipment or existing safety equipment	
3 implementing a yearly plan of hazard audits of hospital to determine that good housekeeping is being maintained and to identify remedial action	
4 planning and coordinating emergency planning group meetings	
5 disseminating emergency plans	
6 reviewing emergency planning at least once a year	
7 exercising emergency plans at least once a year	
8 providing all new, temporary, and casual personnel with a summary of emergency plans at the time of appointment	

Functional subcommittees or subgroups are established in order to arrange specific and essential functions for emergency operation. The sectors that may be represented are health, communications, rescue, mutual assistance and welfare, transport, and engineering. Aside from these, there are specific tasks that must not be overlooked. These tasks are as follows:

1. servicing and testing of emergency equipment regularly in accordance with relevant standards and manufacturers' recommendations;
2. providing advice to management regarding new equipment or existing safety equipment;
3. implementing a yearly plan of hazard audits of health facility to determine that good housekeeping is being maintained and to identify remedial action;
4. planning and coordinating emergency planning group meetings;
5. disseminating emergency plans;
6. reviewing emergency planning at least once a year;
7. exercising emergency plans at least once a year through drills;
8. providing all new, temporary, and casual personnel with a summary of emergency plans at the time of appointment.<sup>71</sup>

Subcommittees/subgroups must be formed according to existing functions in the day-to-day operation of the health facility. For every element of the plan, it must also be established whether a subcommittee has an essential (primary) role in terms of responsibility for initiative and continuity action, a secondary role, with responsibility for supporting another group which has a primary role to play, or no role at all.<sup>72</sup>

71 WHO, *Community Emergency Preparedness Manual*, pp. 68-69.

72 Yahmed, p. 10.

### C. Inventory of Personnel

79. How many doctors does your health facility have? *(Please fill in the table below.)*

Areas of Specialty	No. of consultants	No. of Residents	No. of Interns
Family Medicine			
Internal Medicine			
Obstetrics and Gynecology			
Pediatrics			
Surgery			
Anesthesiology			
ENT			
Ophthalmology			
Orthopedics			
<i>Others, please specify:</i>			

80. How many staff members does the health facility have per ward/area? *(Please fill in the table below.)*

Ward/Area	Bed capacity of ward/area	No. of Staff Nurses/Shift	No. of Nursing Aides/Shift	No. of Orderlies/Shift

81. How many laboratory/radiology technicians does your health facility have?

Laboratory/Radiology Area	No. of Technicians/Shift	No. of Shifts

Like other resources, there should be knowledge of the number of human resources available in the health facility in the event of disaster. The number of personnel that could be called into service should also be known so that equitable distribution of personnel may be done. These personnel should be assigned to perform tasks similar to their day-to-day activities for them to function maximally.

Rest, food, and water breaks should be enforced since the medical personnel are generally reluctant to ask for these while victims are in need.<sup>73</sup>

#### D. Mobilization of Personnel

82. How are alarms raised during disaster situation? *(Please check all applicable answers.)*

- Alarm  
 Bell  
 Megaphone  
 Verbal  
 Siren  
 Others, specify: \_\_\_\_\_

83. Who may activate the alarm? *(Please check all applicable answers.)*

- Special committee  
 Administrator  
 Director of health facility  
 Others, specify: \_\_\_\_\_

The emergency planning committee should clearly define situations that would warrant the activation of the plan. A responsible person and a number of alternates should then be clearly designated for the decision to put the plan into effect. A mechanism should be arranged for raising the alarm to inform personnel on duty that the disaster plan has been activated.<sup>74</sup>

84. Does the administration have an updated list of addresses and telephone numbers of all staff involved in the emergency preparedness plan?

- Yes  
 No

*If you answered yes, please proceed to question 84a; otherwise, proceed to question 85.*

<sup>73</sup> Waeclerle, p. 818.

<sup>74</sup> Lilia M. Reyes, "Hospital disaster-preparedness plan," In: *Community Disaster Management*, (UP College of Public Health), p. 144.



84a. Is the list of addresses and telephone numbers of hospital staff always located in an accessible area?

- Yes
- No

85. Does the health facility have a diagram of the communication network?

- Yes
- No

Aside from an organizational chart, the health facility disaster-preparedness plan should include a diagram of the health facility’s communication and transmission network. This is to ensure prompt and efficient information dissemination among the personnel. If an organized network is not present, some personnel may be inadvertently skipped or duplication of effort may occur.

86. Is there a pre-assigned emergency operations center (EOC) in the institution?

- Yes
- No

*If you answered yes, please proceed to questions 86a-86b; otherwise go to the box after question 86b.*

86a. Where is it located? \_\_\_\_\_

86b. Who is/are assigned to run the operation centre?

- Administrative personnel
- Physician
- Nurse
- All of the above
- Others, specify: \_\_\_\_\_

A pre-determined site must be chosen for the Emergency Operations Centre (EOC) so that all personnel know where to report important information and/or get instructions. This is important in maintaining a unified intra-hospital command. The functions of the EOC include:

- ⊙ activation of the plan by the designated person;
- ⊙ control and coordination of hospital activities;
- ⊙ provision of additional resources
- ⊙ liaison with the overall emergency control centre;
- ⊙ control of field medical services.

It is recommended that the command personnel should include at least one physician, nurse, and administrator.<sup>75</sup>

75 WHO, *Community Emergency Preparedness Manual*, p. 70.

## 87. Does the health facility have an on-site disaster response team?

 Yes No

*If you answered yes, please proceed to questions 87a-87b; otherwise go to the box after question 87b.*

87a. Who are the members of the on-site disaster response team? *(Please check all applicable answers.)* ER Physician-on-duty Family Medicine Resident-on-duty Surgery Resident-on-duty ER Nurse-on-duty Emergency Medical Technicians (EMTs) Volunteers Others, specify: \_\_\_\_\_

## 87b. Which of the following are team members trained to do?

*(Please check all applicable answers.)* Analyze the magnitude of disaster Coordinate efforts of various hospitals/support groups Basic Life Support Advanced Cardiac Life Support Perform limited surgery when necessary*(e.g. doing amputation to free trapped victims)* Relieve pain and anxiety of the injured Indicate the order of how casualties must be rescued according to medical condition (Initial triage)

The health facility could create an on-site disaster response team depending on the availability of physical and human resources. The basic pre-requisite for the personnel in this team is that they be properly trained in first aid and that they have the necessary means to move immediately to the scene of disaster.<sup>76</sup> It is, however, more desirable for members of the team to be properly trained in disaster medical care so that they may be better prepared for working under austere field conditions. They should not come from the ER personnel on-duty unless back-up personnel can take over. This is to ensure that the ER has the necessary personnel to accommodate incoming victims.

The physicians in this team should try to determine the magnitude of the disaster with the help of whoever is in-charge at the disaster area and make the proper coordination with the health facilities that can receive victims. Initial triage may be established at the disaster site so that priorities for treatment and evacuation may be designated. At the initial triage site, assessment is usually just based on respiration, pulse, and mental status. Vigilant monitoring is necessary since a patient's triage status can be re-prioritized during transport to a health facility.

76 PAHO, *Health Services Organization*, p. 13.

**88. Do you have a pre-assigned area for reception of victims at the health facility?**

- Yes
- No

*If you answered yes, please proceed to question 88a; otherwise go to question 89.*

**88a. Where is the pre-assigned area for reception located?**

- Inside the emergency room
- Outside the emergency room but inside the health facility
- Outside the health facility
- Others, specify: \_\_\_\_\_

**89. Do you have a pre-assigned area for triage in the health facility?**

- Yes
- No

*If you answered yes, please proceed to questions 89a-89c; otherwise go to the box after question 89c.*

**89a. Where is the pre-assigned area for triage located?**

- Inside the emergency room
- Outside the emergency room but inside the health facility
- Outside the health facility
- Others, specify: \_\_\_\_\_

**89b. Who is/are tasked to man the triage area? (Please check all applicable answers.)**

- General Practitioners
- Surgeons
- Internists
- Physicians trained in traumatology
- Nurses
- Volunteers
- Paramedical personnel
- Others, specify: \_\_\_\_\_

**89c. What functions are assigned to the triage team? (Please check all applicable answers.)**

- Classification of patients according to priority of treatment
- Referral of the patient/s to the right place within the health facility
- Referral of the patient/s to other treatment centers following stabilization
- Updating the Health Facility Emergency Committee of the situation

During disaster situations where there is an expected increase in patient consultations, a reception and triage area should be established. Reception includes receiving patients and directing them to specific areas where they can receive initial treatment. On the other hand, triage is the process of setting priorities to ensure that the largest possible number of patients is treated. Functions of the triage team include the following:

1. classification of patients according to priority
2. referral of the patient/s to the right place within the health facility;
3. referral of the patient/s to other treatment centres following stabilization;
4. updating the hospital's emergency committee of the situation.

A successful triage will make possible the rationalization of existing resources in the hospital and therefore will determine the success of all relief activities.<sup>77</sup>

The emergency plan should specify an area for triage and reception, which may be located inside or outside the health facility, but should be as close as possible to, but outside of, the emergency room or the established primary treatment areas. Entry for all patients should be restricted to one point leading to the triage area.

Personnel with experience in the field of emergencies, surgery or traumatology should be part of the triage team, which is ideally composed of a doctor, a nurse and an auxiliary in charge of keeping statistics. As many triage teams as are needed and is feasible should be formed. However, once the triage team completes its task, members should be incorporated into other teams as needed.

90. Do you have an established system for proper categorization and tagging of patients/casualties (e.g. color-coding)?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

Proper categorization and tagging of patients are functions of the triage team. The parameters are based on severity of injuries, prognosis, and the chances that the action taken may contribute to the recovery of the patient. This would hasten the initial diagnostic and therapeutic management and maximize efforts of health personnel.

The degrees of priority can be represented through the utilization of colors. A sample guideline for tagging of patients suggested by the Pan America Health Organization (PAHO) is presented here.<sup>78</sup>

77 PAHO, *Mitigation of Disasters*, Volume 2, p. 54.

78 PAHO, *Health Services Organization*, pp. 15-17.

**⊙ Red Tag**

This signifies that the patient is a first priority for evacuation or treatment. These patients fall into one of the following categories:

1. Breathing problems that cannot be treated at the site
2. Cardiac arrest (witnessed)
3. Appreciable loss of blood (more than 1 liter)
4. Loss of consciousness
5. Thoracic perforations or deep abdominal injuries
6. Certain serious fractures:
  - a. pelvis
  - b. thorax
  - c. fractures of cervical vertebrae;
  - d. fractures or dislocations in which no pulse can be detected below the site of the fracture or dislocation;
  - e. severe concussion;
  - f. burns (complicated by injury to air passages).

**⊙ Yellow Tag**

Identifies patients that receive second priority for evacuation or treatment since their injuries are not life-threatening.

1. Second-degree burns covering more than 30 % of the body;
2. Third-degree burns covering 10 % of the body;
3. Burns complicated by major lesions to soft tissue or minor fractures;
4. Third-degree burns involving such critical areas as hands, feet, or face but with no breathing problems present;
5. Moderate loss of blood (500-1000 cc);
6. Dorsal lesions, with or without injury to the spinal column;
7. Conscious patients with significant craniocerebral damage (serious enough to cause subdural hematoma or mental confusion). Such patients will show one of the following signs:
  - a. secretion of spinal fluid through ear or nose;
  - b. rapid increase in systolic pressure;
  - c. projectile vomiting;
  - d. changes in respiratory frequency;
  - e. pulse below 60 per minute;
  - f. swelling or bruising beneath the eyes;
  - g. anisocoric pupils;
  - h. collapse;
  - i. weak or no motor response;
  - j. weak reaction to sensory stimulation (profound stupor).

**⊙ Green Tag**

Patients who are given third priority for evacuation and treatment and who fall into the following categories:

**Minor Lesions**

1. Minor fractures (fingers, teeth, etc.).
2. Other minor lesions, abrasions, contusions.
3. Minor burns:
  - a. 2nd degree burns covering less than 15% of the body;
  - b. 3rd degree burns covering less than 25% of the body;
  - c. 1st degree burns covering less than 20% of the body, excluding hands, feet and face.

**Fatal Injuries**

1. 2<sup>nd</sup> and 3<sup>rd</sup> degree burns over more than 40% of the body with death seeming reasonable certain.
2. 2<sup>nd</sup> and 3<sup>rd</sup> degree burns over more than 40% of the body, with other major lesions, major fractures, major craniocerebral lesions, thoracic lesions, etc.
3. Cranial lesions with brain tissue exposed and the patient unconscious.
4. Craniocerebral lesions where the patient is unconscious and has major fractures.
5. Lesions of the spinal column with absence of sensitivity to movement.
6. Patient over 60 years old with major lesions.

It should be noted that the line separating the yellow-tag patients with fatal injuries from red-tag patients is very narrow. If there are patients belonging to the red-tag category mentioned above, this system will have to be followed. If there are none, the yellow-tag patients with apparently fatal injuries become red-tag patients. This is because if there are many red-tag patients with a chance to survive and there are yellow-tag patients that cannot be saved because of their injuries, the time spent on the dying wounded could be better spent on the patients with a chance to survive.

⊙ **Black Tag**

These are placed on the dead, i.e. casualties without a pulse or respiration who have remained in that condition for over 20 minutes or whose injuries render resuscitation procedures impossible.

91. Are there specific people assigned for security and crowd-control?

- Yes  
 No

*If you answered yes, please proceed to question 91a; otherwise go to the box after question 91a.*

91a. What are these people tasked to do?

- Close off other points of entry that are not vital to the emergency operations of the health facility
- Control the flow of people entering the health facility
- Direct people to appropriate areas inside the health facility
- Act as marshals in case evacuation is necessary
- Others, specify: \_\_\_\_\_

Security and crowd-control are important tasks that must be assigned to specific people in times of emergency. Crowd-control minimizes the number of people inside treatment areas. This also means directing people to wherever they can be attended to or determining whether they need medical attention or just information about relatives. Done efficiently, this helps reduce the chances of violence in a highly emotional atmosphere. This allows other health facility personnel to direct their efforts to important tasks at hand.

Marshals are vital to evacuation efforts. They may be of help in directing the flow of the evacuees and in physically assisting them. This is especially true for health facilities where many of the evacuees are with limited physical capabilities.

**E. Hazard and Vulnerability Analysis**

92. Has the emergency preparedness group conducted hazard and vulnerability analysis?
- Yes
  - No

*If you answered yes, please proceed to question 92a-92c; otherwise go to the box after question 92c.*

92a. What techniques were involved? *(Please check all applicable answers.)*

- Identification of hazard
- Listing of possible effects
- Listing of potential problems
- Determining causes
- Develop preventive strategies
- Develop response and recovery strategies and trigger events for these strategies

92b. What benefits have been realized from this tool? *(Please check all applicable answers.)*

- Obtained a list of possible hazards
- Identified the most likely and damaging hazards
- Identified the effects of those hazards in the health facility infrastructure and community

\_\_\_\_\_ Obtained a firm basis for health facility emergency management planning

92c. What types of hazard does the health facility prepare for? *(Please check all applicable answers.)*

\_\_\_\_\_ Earthquake

\_\_\_\_\_ Flood

\_\_\_\_\_ Fire

\_\_\_\_\_ Tsunami

\_\_\_\_\_ Hurricane

\_\_\_\_\_ Volcanic eruption

\_\_\_\_\_ War/Armed conflict

\_\_\_\_\_ Epidemic

\_\_\_\_\_ Infectious Disease Outbreak

\_\_\_\_\_ Chemical/Radiologic Emergency

\_\_\_\_\_ Industrial/Technological

\_\_\_\_\_ Others, specify: \_\_\_\_\_

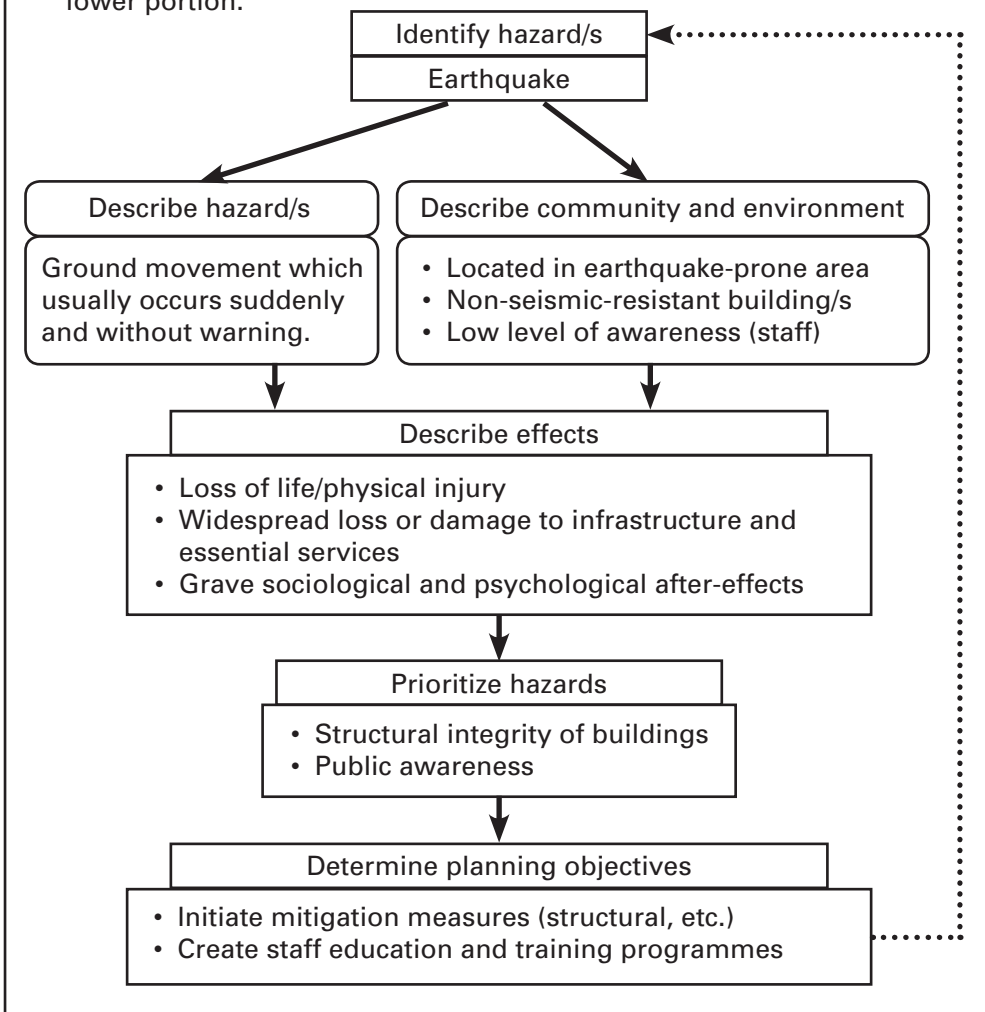


Hazard analysis is a process of analyzing potential risks and their effects on the health facility’s infrastructure and the community. It is in general, a qualitative process although it may be necessary to consult quantitative risk analysts for some particular hazards (e.g. engineers for seismic vulnerability of infrastructure).

The expected benefits in conducting a hazard analysis are:

1. obtaining a list of possible hazards;
2. identifying the most likely and possible hazards;
3. identifying the effects of those hazards in the health facility infrastructure and the community;
4. obtaining a firm basis for health facility emergency planning.<sup>79</sup>

The hazard analysis process<sup>80</sup> can be charted as shown on the flowchart below. Examples are provided inside the boxes on the lower portion.



79 Yahmed, pp. 7-8.

80 Yahmed, pp. 8.

## F. Training and Drills

93. Is the institution supporting training and education of staff members for emergency preparedness?

Yes

No

*If you answered yes, please proceed to question 93a-93d; otherwise go to question 93.*

93a. What strategies have been tried? *(Please check all applicable answers.)*

Workshops, seminars, conferences

Self-directed learning

Individual tuition

Exercises

Pamphlets, videos, media

Informal/formal presentations

Public displays, meetings

Others, specify: \_\_\_\_\_

93b. What stages are involved in training? *(Please check all applicable answers.)*

Analyze training need

Design training

Develop instruction

Conduct instruction

Validate training

93c. How often does the institution conduct training?

Biannually

Annually

As necessary

Others, specify: \_\_\_\_\_

93d. How many attended the most recent training conducted by the institution?

\_\_\_\_\_ *(actual number)*

\_\_\_\_\_ % *(proportion of those who attended among those who need to be trained)*

94. Is there a regular drill/exercise being conducted in preparation for any disaster occurrence?

Yes

No

*If you answered yes, please proceed to question 94a-94b; otherwise go to the box after question 94b.*

94a. How regular are these drills done?

- Quarterly
- Semi-annually
- Annually
- Others, specify: \_\_\_\_\_

94b. Who heads the drills?

- Special committee
- Administrator
- Director of health facility
- Others, specify: \_\_\_\_\_

95. Is there financial support for the training and drills mentioned above?

- Yes
- No

*If you answered yes, please proceed to question 95a-95b; otherwise go to the box after question 95b.*

95a. What are the sources of financial support? *(Please check all applicable answers.)*

- Donation
- Insurance
- Allotment from the health facility’s budget
- Others, specify: \_\_\_\_\_

95b. How much is the budget for these preventive measures? \_\_\_\_\_/year

Ideally, a sufficient amount from the institution’s budget should be reserved for disaster mitigation activities, which include drills and training. If this cannot be done, coordination with local government units and some non-governmental organizations may yield positive results.

**G. Evacuation**

96. Is there a system for evacuation of the institution?

- Yes
- No

*If you answered yes, please proceed to question 96a-96c; otherwise go to the box after question 96c.*

96a. Which among the following stages of evacuation are being conducted in the institution? *(Please check all applicable answers.)*

- Warning
- Withdrawal
- Return

## 96b. In general, what activities are done in connection with the evacuation?

*(Please check all applicable answers.)*

- Identifying options of vertical or horizontal evacuation<sup>81</sup> within the health facility
- Identifying the type of signal or alarm that will signify that an evacuation is required
- Outlining the evacuation routes
- Identifying the assembly areas
- Establishing the means of accounting for evacuees
- Anticipating types of support or assistance likely to be required by patients
- Establishing the type of “all clear” signal<sup>82</sup> that will be given

## 96c. Is there an evacuation warden assigned for each part of the health facility?

- Yes
- No

Total or partial evacuation of health facility patients, personnel and visitors could be required by internal or external emergencies. Careful planning before an emergency/disaster occurs is needed to come up with evacuation procedures since evacuation is a hazard in its own right. It exposes staff, patients and visitors to danger.

Assigning an evacuation warden for each part of the health facility to ensure that all people leave when required may minimize the dangers associated with evacuation. It will also be helpful if the alarm message for the evacuation specifies the following:

- ⊙ the part of the health facility to be evacuated;
- ⊙ any particular area to avoid while evacuating due to current hazards;
- ⊙ any other deviations from the pre-planned evacuation procedure.

The evacuation procedures should specifically identify the following items:

1. options of vertical or horizontal evacuation within the health facility;
2. type of signal or alarm that will signify that an evacuation is required;
3. evacuation routes;
4. assembly areas;
5. means of accounting for evacuees;
6. types of support or assistance likely to be required by patients;
7. type of “all clear” signal.<sup>83</sup>

81 **Vertical evacuation** within a building involves movement to another floor/storey of a building, while **horizontal evacuation** entails movement to another part of the building within the same floor.

82 An “all clear” signal is an example of a signal given to signify that no imminent danger is present.

83 WHO, *Community Emergency Preparedness Manual*, p. 73.

## H. Health Facility Networking

97. Is your disaster plan coordinated with those of other health facilities in your area?

- Yes  
 No

*If you answered yes, please proceed to question 97a-97b; otherwise go to the box after question 97b.*

97a. Is your coordination part of a formal agreement?

- Yes  
 No

97b. Do you perform drills together?

- Yes  
 No

Health facilities should maximize their existing network in times of disaster. The pooling of resources starts with the coordination of disaster plans. Areas of collaboration may include the establishment of proper patient referral system, sharing of resources, and conducting joint drills and personnel training programs. For example, one facility may absorb the existing patient load of another that is identified as the main receiving center for disaster victims. This practice expands all available resources of the involved health facilities, making them more capable of responding to disaster situations.

## I. Community Involvement

98. Does the institution take into consideration the characteristics of its community in responding to emergency situations?

- Yes  
 No

*If you answered yes, please proceed to question 98a; otherwise go to the box after question 98a.*

98a. What characteristics of the community are taken into account? *(Please check all applicable answers.)*

- Demography  
 Environment (plants, animals, waters, air and soil)  
 Infrastructure  
 Culture  
 Economy  
 Disease pattern  
 Others, specify: \_\_\_\_\_

Ideally, the health facility takes into consideration some characteristics of the community in responding to emergency situations. These are important in preparing supplies for the most probable diseases that may occur during emergency situations, in anticipating additional problems that may arise, and in identifying possible sources of human and material support.

99. Does the local community have its own disaster preparedness plan?

Yes  
 No

*If you answered yes, please proceed to question 99a; otherwise go to the box after question 99a.*

99a. Is the health facility disaster preparedness plan coordinated with the community disaster preparedness plan?

Yes  
 No

Helping the local community develop its own disaster plan may prove to be vital especially in some areas in developing countries that remain isolated by poor communication and transportation facilities. Access to health facilities by patients from these areas is meagre even under normal conditions. Obviously, during a disaster, the difficulty is accentuated and these areas may remain isolated for some time. It is thus necessary to train these people to initially deal with the disaster situation themselves in the best possible way.<sup>84</sup>

<sup>84</sup> PAHO, *Health Services Organization*, p. 21.

## Part III - Assessment of Preparedness for Specific Emergencies

### I. Assessment of Industrial Emergency Preparedness

Technological advances and rapid industrialization is giving rise to a new kind of disaster involving the release of hazardous substances or their by-products into the environment. This kind of disaster is termed industrial or human-made.<sup>85</sup>

Almost everyone is at risk from this kind of disaster as developed countries increase their reliance on high-level industrialization for vital services such as electric power and telecommunications. In developing countries, on the other hand, the vulnerability results from importation of technology that is often not accompanied by training on how to utilize it properly. This is worsened by the fact that sometimes the required safety measures are lacking or done poorly due to cost-saving efforts, thus, preparing a perfect breeding ground for the occurrence of a disaster.

Planning for mitigation of industrial disasters should involve a multi-disciplinary body (e.g., law enforcement officials, public health authorities, and safety engineers). For health facilities within the vicinity of industrial firms and transportation routes used by vehicles conveying potentially hazardous materials, special responses are needed to ensure they can continue their task of protecting and saving lives. This section is designed to help these health facilities assess their capacity to respond to industrial disasters.<sup>86</sup>

Health facilities should consider the possibility of having to respond to an industrial disaster if they are located near industrial firms and/or near major transportation routes used by vehicles conveying potentially hazardous substances. Inadvertent accidents such as chemical spillage or transportation accidents resulting in chemical spillage might result in contaminated patients who would seek help from the health facility. The occurrence of an industrial accident might also have a direct effect on the health facility structure and its occupants. These situations involve a specific kind of preparedness.

1. Is there an industrial firm within your health facility's catchment area?  
 Yes  
 No

*If you answered yes, please proceed to question 1a; otherwise, go to question 2.*

- 1a. What is the distance of the industrial firm from the health facility?  
 \_\_\_\_\_

2. Is the health facility near a roadway frequently used by vehicles conveying

85 Scott R. Lillibridge, Industrial disasters, In: Eric K. Noji (ed), *The Public Health Consequences of Disasters*, p. 354.

86 Lillibridge, pp. 354-355.

potentially hazardous substances in or out of an industrial firm/s?

Yes

No

3. What kind of substances are used or produced by the industrial firms and/or transported by the vehicles? *(Please check all applicable answers.)*

Acids

Ammonias

Bases

Chlorines

Cyanides

Herbicides

Insecticides

Polychlorinated biphenyls

Radioactive substances

Volatile organic compounds

Do not know

Others, specify: \_\_\_\_\_

For health facilities located near industrial firms and their main transportation routes, part of the hazard and vulnerability analysis should be identifying potentially hazardous substances that can cause life-threatening situations.<sup>87</sup>

These substances may be used as raw material, produced as the main product or by-product, or transported in quantities to and from the manufacturing firms. Adequate information regarding the properties of substances, their clinical effects, procedures for proper neutralization, and appropriate antidotes should be gathered and made available to concerned medical personnel. This knowledge will be useful if inadvertent chemical spills or substance contamination occurs or if accidents involving the transporting vehicles take place near the health facility. In the deadliest industrial disaster which occurred in 1984 in Bhopal, India, ethyl isocyanate vapor was accidentally vented into the atmosphere. Methyl isocyanate is an intermediate product in the production of carbamate pesticides and is capable of causing chemical pneumonitis after inhalation. This substance spread throughout the residential neighborhood; killing more than 2,500 people and affecting about 200,000 more. The victims swamped local health facilities while authorities tried to understand the nature and toxicity of the offending agent, the proper treatment, and the length of decontamination needed.<sup>88</sup>

Failure to consider emergency situations of this kind could lead to inappropriate patient management and risk of secondary contamination of unsuspecting medical personnel and patients.

87 See Appendix 4 for a list of establishments likely to hold hazardous materials.

88 Lillibridge, pp. 354-355.



4. Are antidotes for the substances identified in question number 3 present in your health facility?  
 Yes  
 No  
 Not applicable

If you answered yes, please fill in the table below; otherwise, proceed to question no. 5.

Substance	Antidote	Indication	# of units in stock

5. Are there nearby sources of antidotes?  
 Yes  
 No

If you answered yes, please fill in the table; otherwise, proceed to question number 6.

Source	Antidote	Time to reach source	How to reach source

6. Is the health facility capable of contacting any poison control or assistance centre?  
 Yes  
 No

If you answered yes, please proceed to question 6a-6d; otherwise, go to question number 7.

- 6a. Which poison control/assistance centre can you easily get in touch with? \_\_\_\_\_
- 6b. Is this center accessible 24 hours a day, everyday of the week?  
 Yes  
 No

6c. What means exist for contacting the centre? *(Please check all applicable answers.)*

- Telephone  
 Short-wave radio  
 Internet  
 Electronic mail  
 Others, specify: \_\_\_\_\_

6d. Do all relevant personnel know how to contact the poison control/assistance centre?

- Yes  
 No

7. Does the health facility have local experts who may offer assistance in the management of these patients?

- Yes  
 No

*If you answered yes, please proceed to question 7a; otherwise, go to the box after question 7a.*

7a. What are their areas of expertise?

- Toxicology  
 Pharmacology  
 Industrial hygiene  
 Occupational medicine  
 Chemistry  
 Others, specify: \_\_\_\_\_

The availability of up-to-date antidotes and other pharmaceutical substances necessary for the treatment of patients injured by hazardous substances should be ensured. Even prior to an emergency, it is prudent to develop active antidotes for substances that have no or insufficient antidotes.<sup>89</sup>

Links with poison control centre/s for assistance must also be established. The means of contacting these centres must be identified and made accessible to emergency personnel for immediate retrieval in case of need. If there are resource persons within the community, they should also be contacted. Professionals in the field of toxicology, pharmacology, industrial hygiene, occupational medicine or chemistry might be able to offer immediate assistance in the management of disaster.<sup>90</sup>

89 Organization for Economic Co-operation and Development, *OECD Guiding Principles for Chemical Accident Prevention, Preparedness, and Response 2nd Edition*, 2003, pp. 99.

90 Jiri Pokorny, Vladimir Dolezal and Eric Noji, "Planning for the emergency medical service response to chemical disaster," In: Philippe Bordeau and Gareth Green (eds), *Methods for Assessing and Reducing Injury from Chemical Accidents*, (John Wiley and Sons Ltd), 1989, p. 206.

**8. Does the health facility coordinate regularly with the nearby industrial firms and local authorities ?**

- Yes
- No

*If you answered yes, please proceed to questions 8a-8d; otherwise, go to the box after question 8d.*

**8a. What are the areas of coordination that exist?**

- Drafting of disaster plans
- Conducting joint hazardous materials disaster drills
- Conducting training seminars regarding industrial disasters
- Conducting periodic medical evaluation of the industrial firm’s employees
- Conducting public information campaign regarding industrial disasters
- Others, please specify: \_\_\_\_\_

**8b. Is the health facility constantly updated with regard possible hazards present in nearby industrial firms?**

- Yes
- No

**8c. What are the health facility’s responsibilities in the event of an industrial disaster?**

- Send a team for search and rescue operations
- Act as the primary receiving hospital for victims
- Assist in conducting victims to other health facilities
- Others, please specify: \_\_\_\_\_

**8d. Who are the identified key players during an industrial emergency?**

*(Please check all that apply.)*

- Health facility liaison officer
- Police services
- Fire protection service
- Civil defense agencies
- Public works and utilities
- Industrial firm management
- Public information outlets
- Public health agencies
- Environmental agencies
- Others, please specify: \_\_\_\_\_

Coordination with public authorities and industrial firms will allow the health facility to obtain relevant information regarding possible hazards within the installation and surrounding areas. All parties expected to participate in an emergency response, along with each party's roles and responsibilities, should be delineated in the emergency plan. Ideally, close coordination should be maintained between the following entities: Health facility liaison officer (or its equivalent), police services, fire protection services, civil defense agencies, public works and utilities, management of the industrial firm, public information outlets, and public health & environmental agencies.<sup>91</sup>

9. Does the health facility have adequate amenities for decontamination?

- Yes  
 No

10. Does the health facility have the capacity to evacuate its patients and personnel if the facility itself becomes contaminated?

- Yes  
 No

*If you answered yes, proceed to questions 10a-10d; otherwise proceed to the box after 10d.*

10a. Where do you refer contaminated patients?

Referral health facility	Distance from your health facility

10b. Are there transportation procedures for these patients?

- Yes  
 No

10c. Are medical personnel required to accompany the patient/s to the other health facility/ies?

- Yes  
 No

10d. Is there a provision for decontamination of the vehicle/s that conducted the contaminated patient/s?

- Yes  
 No

<sup>91</sup> OECD, pp. 95-96.

In responding to industrial emergencies the adequacy of medical facilities, including transportation facilities, should be ensured. Some aspects of preparedness include decontamination equipment, protective equipment for personnel, and evacuation protocols.<sup>92, 93</sup>

11. After a significant industrial emergency, does the health facility have the means to follow-up all persons exposed to the hazardous substances?

Yes

No

*If you answered yes, proceed to questions 11a-11b; otherwise, proceed to question 12.*

11a. Are all exposed persons, regardless of presence or absence of symptoms, registered for short- and long-term follow-up?

Yes

No

11b. Are biological samples taken from those who were exposed as soon as possible after an incident?

Yes

No

12. After an incident, are procedures in place for sharing of information regarding the short -and long-term effects of acute exposure to hazardous substances between the health facilities, industrial firms, local government, and other involved parties?

Yes

No

After an industrial emergency, there must be appropriate follow-up procedures in place for the monitoring and observation of persons exposed to hazardous substances. Even those who may appear asymptomatic have to be followed-up because the onset of symptoms can be delayed for hours or days after exposure. To facilitate follow-up, all persons with significant exposure should be registered. Ideally, biological samples should be taken as soon as possible after exposure and at regular intervals.

In order to apply lessons learned from a crisis situation to future events, further efforts should be made to promote the sharing of information concerning appropriate treatment, epidemiological data, and follow-up data involving hazardous substances.<sup>94</sup>

92 OECD, p. 99.

93 Refer to Part III-II & III for a more detailed discussion on protective equipment and decontamination.

94 JOECD, p. 129.

## II. Assessment of Infectious Disease Outbreak Preparedness

Infectious disease outbreaks pose a distinct challenge for health care facilities. The number of affected patients who need emergent medical care can rise exponentially, affecting a wide area within a particularly short period of time. Moreover, health care personnel, because of their constant interaction with the afflicted, are themselves highly susceptible to disease and may in fact hasten the spread of the causative organism in the community. Indeed, well documented epidemics in the past have illustrated how disease outbreaks can stretch a health facility's resources to its limits. Thus, every facility must have a high level of preparedness prior to an infectious disease outbreak, for the most effective systems are those that were devised and tested prior to crisis situations. This subsection aims to assist health care managers in assessing whether present infrastructure, functional, and human resources can keep the impact of an epidemic in a health facility to an acceptable minimum.

### A. Infrastructure Assessment

During epidemics, delays in immediate diagnosis and isolation of suspect cases contribute significantly to the spread of disease. Aside from the universal standard precautions, health facilities should always observe transmission-based precautions. These are designed for patients who are either suspected or proven cases of a highly infectious or epidemiologically important pathogen.

Isolation aims to disrupt the interconnections between the elements of disease transmission: source of microorganism, susceptible host, mode of transmission. Precautions should consider the possibility of *contact*, *droplet*, or *airborne* transmission.<sup>95</sup>

13 Does the health facility have an existing evaluation or triage area/s for all incoming patients?

- Yes  
 No

If you answered yes, proceed to questions 13a-13b; otherwise, go to question 14.

13a. Where is/are the evaluation area/s located? (Please check all applicable answers.)

- Outside the emergency department  
 Inside the emergency department  
 Outside the outpatient department  
 Inside the outpatient department

<sup>95</sup> JS Garner, Hospital Infection Control Practices Advisory Committee, "Guidelines for Isolation Precautions in Hospitals," *Infect Control Hospital Epidemiol*, 1996, p.8.

13b. In the event of an epidemic, can this area be adequately isolated from the rest of the facility?

- Yes
- No

14. Are there specially designed infectious disease isolation units in the hospital?

- Yes
- No

*If you answered yes, proceed to questions 14a-14b; otherwise, go to question 15.*

14a. What provisions are found in these units? *(Please check all applicable answers.)*

- Individual rooms
- Partitioned beds in one big ward
- Negative air pressure
- Separate air control / ventilation system
- Individual handwashing facilities
- Shared handwashing facilities
- Individual toilets
- Shared toilets
- Sealed windows
- Self-closing doors
- Anterooms with gloving / gown-donning facilities
- Separate waste disposal units

14b. What is the total bed capacity of all the isolation units? \_\_\_\_\_

15. What other areas in the facility can be temporarily converted into an isolation unit in the event of an epidemic?

Area	Bed Capacity	With Negative Pressure? (Y/N)	Individual rooms? (Y/N)	Separate exhaust? (Y/N)

During the recent SARS epidemic, transmission was controlled by assigning suspect cases to a separate evaluation unit. This may be a temporary or existing structure.<sup>96</sup>

If confinement is necessary, patients should be assigned to a separate unit. Ideally, each patient should be placed in a room with air pressure that is negative in relation to the corridor. Doors should remain closed as much as possible. Each room should have its own handwashing and toilet facilities. If above setting is not possible, cohorting of similar cases to a single floor/area may be done. If possible, such an area should have independent air supply and exhaust systems.<sup>97</sup>

The assignment of a separate SARS unit in health facilities during the recent SARS epidemic proved to be an effective strategy in Toronto and Canada.<sup>98</sup>

16. Is there a heating, ventilation, air conditioning (HVAC) system installed in your facility?

Yes

No

*If you answered yes, proceed to questions 16a-16c; otherwise, go to the box after 16c.*

16a. How long has the HVAC system been installed? \_\_\_\_\_

16b. What is the ambient temperature in the facility? \_\_\_\_\_ ; ambient humidity? \_\_\_\_\_

16c. How much Air Changes per Hour (ACH )are provided for by the HVAC system? \_\_\_\_\_

96 Centers for Disease Control and Prevention, *Public Health Guidance for Community-level Preparedness and Response to SARS [Supplement C: Preparedness and Response in Healthcare Facilities]*, 2003, p. 2.

97 [www.who.int/csr/surveillance/infectioncontrol/en](http://www.who.int/csr/surveillance/infectioncontrol/en), 2003

98 [www.cdc.gov/ncidod/sars](http://www.cdc.gov/ncidod/sars), 2003



Heating, Ventilation, Air Conditioning (HVAC) systems maintain indoor air temperature and humidity at comfortable levels. Air temperature is usually maintained at 24°C, while humidity is kept at 30-60%. Moreover, HVAC systems control odors, remove contaminated air, and facilitate air-handling requirements to protect from airborne pathogens, thereby minimizing risks of microbial transmission from infected patients.<sup>99</sup>

Areas housing patients infected with microorganisms that are spread via airborne transmission require special ventilation control systems.<sup>100</sup> Although the most effective way of maintaining clean air would be to control pollutants at their source, ventilation control is the second most effective method. Ventilation is defined in terms of *air volume per minute per occupant*. This is based on the assumption that most of the contaminants in a given area come from the occupants. It is expressed as room *Air Changes per Hour (ACH)*. Peak ventilation efficiency is achieved at 12-15 ACH. For existing facilities, >6 ACH is considered acceptable. For newly constructed or renovated facilities, >12 ACH should be targeted.<sup>101</sup>

**17. Does the facility’s HVAC systems utilize filtration devices?**

- Yes
- No

*If you answered yes, proceed to questions 17a-17b; otherwise, go to question 18.*

**17a. What kind of filtration devices are currently installed in the hospital?**

- Fixed High Efficiency Particulate Air (HEPA) filters
- Portable HEPA filters
- Others, specify: \_\_\_\_\_

**17b. What type of frame, if any, was used for the filters?**

- None
- Metal
- Wood
- Plastic
- Fiberglass
- Others, specify: \_\_\_\_\_

**18. Are Ultraviolet Germicidal Irradiation (UVGI) devices installed in the health facility?**

- Yes
- No

99 LM Sehulster, et al, *Guidelines for Environmental Infection Control in Health-care Facilities. Recommendations from CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC)*, (Chicago IL, American Society for Healthcare Engineering/American Hospital Association), 2003, p.13.

100 See Appendix 4 for a list of common organisms associated with airborne transmission.

101 Sehulster et al, p. 36.

## 19. Do isolation units contain pressure-controlled rooms?

- Yes  
 No

If you answered yes, proceed to questions 19a; otherwise, go to the box after 19a.

## 19a. Please specify the specific type of pressurization method used.

- Negative room / Airborne Infection Isolation Room (AIIR)  
 Variable pressure room  
 Others, specify: \_\_\_\_\_

Ventilation control can be achieved by the following methods:<sup>102</sup>

- a. **Filtration.** High Efficiency Particulate Air (HEPA) Filters provide at least 99.97% efficiency in removing particles > 0.3 microns. These are usually fixed into HVAC systems. Portable HEPA units (filter air at 300-800 ft<sup>3</sup>/min) may be used to augment systems, but do not fulfill fresh air requirements on their own. In securing the filters, metal frames are preferred over wooden frames as the latter can facilitate the growth of fungi and bacteria.
- b. **Ultraviolet Germicidal Irradiation (UVGI).** This method prevents or limits growth of vegetative bacteria and fungi. However, it is recommended as a supplemental measure only. It is not a substitute for HEPA filters, local exhaust, or negative pressure.
- c. **Pressurization.** Airborne Infection Isolation Rooms (AIIR's) are set at a negative pressure in relation to the corridor.<sup>103</sup> Hence, air circulates from the cleanest area (i.e. nurses' station) to the least clean (i.e. patient's room). Variable pressure rooms, where pressure can be manually shifted from positive to negative, are no longer recommended due to inherent difficulties in assuring a consistently proper pressure differential.

## 20. When was the present ventilation system installed? \_\_\_\_\_

## 21. Does the ventilation system undergo regular inspection?

- Yes  
 No

If you answered yes, proceed to questions 21a-21d; otherwise, go to question 22.

## 21a. When was the last formal inspection / maintenance check? \_\_\_\_\_

## 21b. How long has it been since the time of installation or last formal inspection? \_\_\_\_\_

<sup>102</sup> Schulster et al, pp. 15-18.

<sup>103</sup> See Appendix 5 for Engineered Specifications for Negative Pressure Rooms.

21c. According to manufacturer’s specifications, how often should maintenance be done? \_\_\_\_\_

21d. Who carries out the regular inspection of the ventilation system?

- \_\_\_\_\_ Manufacturer
- \_\_\_\_\_ Facility Administrator (Please specify) \_\_\_\_\_
- \_\_\_\_\_ Government contractor
- \_\_\_\_\_ Private contractor
- \_\_\_\_\_ Others, specify: \_\_\_\_\_

*If the facility has pressure-controlled rooms, answer the next question. Otherwise, proceed to the box after 22a.*

22. Are pressure differentials constantly monitored for accuracy?

- \_\_\_\_\_ Yes
- \_\_\_\_\_ No

*If you answered yes, go to question 22a; otherwise, go to the box after the question.*

22a. What indicators are used to determine the direction of air stream?

*(Please check all applicable answers.)*

- \_\_\_\_\_ Qualitative
- \_\_\_\_\_ Flutter strips
- \_\_\_\_\_ Ping-pong balls
- \_\_\_\_\_ Others, specify: \_\_\_\_\_
- \_\_\_\_\_ Quantitative
- \_\_\_\_\_ Manometer tests
- \_\_\_\_\_ Others, specify: \_\_\_\_\_

Ventilation systems require regular monitoring and replacement in accordance with manufacturers’ recommendations. The following are areas that need regular maintenance:<sup>104</sup>

- a. Determination of pressure differentials. Qualitative indicators include placing flutter strips / ping-pong balls at the room’s entry point to determine direction of air stream. Manometer tests for positive and negative pressure areas can also be used.
- b. Inspection of system filters and ducts. Insulation can trap contaminants. Ducts should always be free from bird droppings. Excess humidity and moisture should be limited.

23. Are alternative generators available in order to avoid disruption of ventilation control during a power outage?

Yes

No

*If you answered yes, go to question 23a-23b otherwise, go to the box after 23b.*

23a. How long does it take before the alternative power source engages?  
\_\_\_\_\_

23b. How long does the back-up power last? \_\_\_\_\_

Ideally, alternative generators that will engage within **10 seconds** of loss of main power should be available in order to minimize disruption of ventilation control.<sup>105</sup>

24. In your facility, the following procedures would entail movement / transport of infected patients out of the isolation areas: *(Please check all applicable answers.)*

Radiologic procedures

X-ray

Ultrasound

CT / MRI

Minor procedures

Thoracentesis

Paracentesis

Central line insertion

Venous cutdowns

Intubation

Suctioning

Major procedures

Chest tube insertions

Major operations (e.g. thoracotomies, laparatomies, etc.)

25. How many of the following are available for the sole use of infected patients in your health facility?

Provision	No. of Units
Trolleys	
Wheelchairs	
Disposable linen	

26. In the event that infected patients have to be transported,

<sup>105</sup> Schulster et al, p. 13.

26a. Are there elevator/lifts reserved for these patients?

Yes

No

26b. Are there dedicated corridors that will allow these patients to access services as necessary?

Yes

No

26c. Are the receiving staff given ample notice prior to any transport / movement?

Yes

No

Movement and transport of infected patients should be kept to a minimum. Trolleys / wheelchairs with disposable linen should be used. Corridors and elevators solely for the use of these patients should be designated.<sup>106</sup>

## B. Functional Assessment

Standard precautions are designed to decrease the risk of transmission of microorganisms from both recognized and unrecognized sources of infection. These apply to blood, all body fluids except sweat, non-intact skin, and mucous membranes.<sup>107</sup>

During the recent SARS epidemic, unprotected exposure to unrecognized cases resulted in significant transmission in health care facilities.<sup>108</sup>

27. Are the following Personal Protective Equipment (PPE) available in your health facility? (Please fill up the table below.)

PPE	No. of units	Supplier
Disposable particulate respirators (N95 or higher)		
Personal air-purifying respiratory hoods		
Eye protection devices		
Face shields		
Disposable gloves		
Disposable long-sleeved gowns		

106 [www.who.int/csr/surveillance/infectioncontrol/en](http://www.who.int/csr/surveillance/infectioncontrol/en), 2003.

107 Garner et al, p. 9.

108 [www.cdc.gov/ncidod/sars](http://www.cdc.gov/ncidod/sars), 2003.

28. Are the following materials used for cleaning possibly infected surfaces readily available in your health facility? *(Please fill in the table below.)*

Equipment	No. of units	Supplier
Alcohol-impregnated wipes		
Antiseptic hand cleansers		
Antiseptic surface cleansers		

29. Does the health facility have an adequate supply of surgical masks for all incoming patients with respiratory symptoms?

Yes

No

30. In the event of an increased demand for supplies, is there a contingency plan in place for both government and private sourcing?

Yes

No

*If you answered yes, go to question 30a; otherwise, proceed to the box after the question.*

- 30a. Who oversees the adequacy of PPE for the entire facility? \_\_\_\_\_

Health care facilities must have an adequate supply of Personal Protective Equipment (PPE) which include, but are not limited to, hand hygiene supplies, disposable particulate respirators (N95 or higher), disposable gloves, personal air-purifying respiratory (PAPR) hoods and power packs (if applicable), eye protection devices, face shields, surgical masks, and disposable long-sleeved gowns.<sup>109</sup>

For reusable equipment like stethoscopes, alcohol impregnated wipes should be readily available. Potentially contaminated surfaces need to be cleaned with phenol or its equivalent.<sup>110</sup>

Contingency plans for replenishing supplies must be developed and implemented in the event of an outbreak. Efficient coordination between government and private sourcing is necessary.

31. Which component(s) of the universal respiratory etiquette strategy is/are strictly enforced in the facility during an epidemic? *(Please check all applicable answers.)*

All patients with respiratory illness are provided with surgical masks and given instructions regarding proper use.

Hand hygiene materials are present in the evaluation areas, and all

<sup>109</sup> CDC, *Public Health Guidance*, p. 17.

<sup>110</sup> MOH Singapore, 2003, pp. 16-17.

- patients and staff are encouraged to practice hand hygiene.
- Patients with respiratory symptoms are segregated from other patients.
- Health-care personnel use proper protective equipment when evaluating infected patients.
- In the absence of barriers, health-care personnel maintain a distance of at least one metre from possibly infected patients.
- Droplet precautions are consistently observed until it is determined with certainty that the patient’s respiratory illness does not require any safety measures above the standard precautions.

The initiation of a universal respiratory etiquette strategy for the facility is recommended.<sup>111</sup>

Handwashing before and after each patient contact is the single most important preventive measure. Gloves may decrease the risk of exposure to blood-borne pathogens, the likelihood that organisms on health-care personnel’s hands are transferred to the patient, and the likelihood of transferring organisms from patient to patient. However, gloving is not a replacement for handwashing due to unapparent defects and possible contamination during removal.<sup>112</sup>

**32. Is there an established system for handling soiled linen, patient laundry, and used utensils in the facility?**

- Yes
- No

Soiled linen and patient laundry can be adequately managed using hygienic and common sense storage and processing. Hot water and detergents are sufficient in cleaning used utensils

**33. How are possible cross-infections between health care personnel, visitors, and infected contacts monitored? (Please check all applicable answers.)**

- Vigilant recording of vital signs and telltale symptoms before and after each work shift by all health-care personnel with high-risk exposure.
- Updated personal diary of contacts for all health-care personnel throughout the duration of the epidemic.
- Regular medical evaluation for all health-care personnel.
- Quarantine of all symptomatic health-care personnel.
- Availability of a venue where health-care personnel with questionable health status can direct their queries and concerns.
- Registration of all visitors, with full contact details.
- Others, specify: \_\_\_\_\_

111 CDC, Public Health Guidance, p. 10.

112 Garner et al, p. 9.

A comprehensive yet realistic exposure reporting process should be developed. Vigilance in health-care personnel with regard reporting any alarming physical symptoms acquired after a high risk exposure is encouraged. Each worker must keep and update a personal diary of contacts during an outbreak. All visitors should be registered, with full contact details.<sup>113</sup>

### C. Human Resources Assessment

34. Does the health facility have an Infectious Disease Central Committee that addresses all technical concerns with regard infection control in the facility during an outbreak?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

*If you answered yes, go to question 34a-34c; otherwise, proceed to the box after question 34c.*

34a. Who are the members of the committee, and what is the specific role of each member? (Please fill up the table below)

Member	Department	Specific Role

34b. How often do the committee members meet?

Prior to an outbreak \_\_\_\_\_

During an outbreak \_\_\_\_\_

34c. Does the committee enlist the help of outside institutions and experts for technical concerns when necessary?

\_\_\_\_\_ Yes

\_\_\_\_\_ No



All health care facilities must have a designated infection control team available that will formulate and enforce infection control procedures. The roles and responsibilities of each member of the team, including all hospital officials, should be clearly defined.<sup>114</sup>

It is highly recommended that representatives from the following groups be included in the committee: administration/senior management, section of infectious disease, hospital disaster coordinator, engineering/physical plant, nursing administration, medical staff including out-patient areas, intensive care unit, emergency department, laboratory services, housekeeping department, public relations, security, materials management, diagnostic imaging department, staff education/development department.<sup>115</sup>

In the recent SARS epidemic, a disproportionate rate of transmission was noted in health care settings among health-care personnel. This phenomenon can be attributed to the personnel’s frequent exposure to patients, their secretions, and the contaminated environment.<sup>116</sup>

Because of this risk, appropriate measures should be instituted in order to guarantee that all health-care personnel will be sufficiently protected.

35. Does the health facility conduct training on disease outbreak preparedness for its personnel?  
 Yes  
 No

*If you answered yes, go to question 35a-35d; otherwise, proceed to the box after question 35d.*

- 35a. Who is/are the intended audience of the training program? *(Please check the most appropriate option.)*  
 Medical personnel  
 Non-medical personnel  
 All personnel who are possibly exposed to infected patients  
 Others, specify: \_\_\_\_\_

- 35b. Is the training program a prerequisite prior to a health worker’s assignment to his/her area of responsibility?  
 Yes  
 No

- 35c. How often is the training program given? \_\_\_\_\_

114 MOH Singapore, p. 14.

115 [www.cdc.gov/ncidod/sars](http://www.cdc.gov/ncidod/sars), 2003.

116 [www.cdc.gov/ncidod/sars](http://www.cdc.gov/ncidod/sars), 2003.

35d. What knowledge items are covered by the training program on disease outbreak preparedness? *(Please check all applicable answers.)*

- Basic and essential knowledge on the infectious disease in question
- Major components of the health facility's formal written plan of action on epidemics
- Standard precautions
- Airborne precautions (including universal respiratory etiquette strategy)
- Others, specify: \_\_\_\_\_

Adequate training regarding standard operating procedures during an epidemic is compulsory for all health-care personnel (refers to all workers, medical and non-medical, in a health care facility who work with affected patients). Core components of the training program include knowledge of the particular disease in question, the facility's formal plan of action, and basic health care infection control principles.<sup>117</sup>

36. What kind of medical evaluations, if any, are given to health-care personnel in your health facility? *(Please check all applicable answers)*

- Pre-employment
- Periodic *(Please state frequency)* \_\_\_\_\_
- Post-exposure
- As-needed basis
- None

37. Are vaccines made available for health-care personnel with possible high-risk exposures?

- Yes
- No

*If you answered yes, go to question 37a-37b; otherwise, proceed question 38.*

37a. Which vaccines are made available for health workers in your health facility? *(Please place a check mark in the appropriate space)*

Vaccine	Available, without fee	Available, with fee	Not available
MMR			
Measles			
Varicella			
Influenza			
Polyvalent Pneumococcus			
Tetanus Toxoid			

<sup>117</sup> MOH Singapore, p. 15.

Hepatitis A			
Hepatitis B			

37b. Are health workers constantly followed-up for appropriate booster doses?

- Yes
- No

38 Does the health facility maintain an updated database of medical records of its health-care personnel?

- Yes
- No

*If you answered yes, go to question 38a-38b; otherwise, proceed to the box after question 38b.*

38a. What information regarding personnel is/are contained within the database? *(Please check all applicable answers.)*

- Past Medical History
- Immunization Status
- High Risk Exposures
- Post-exposure Prophylaxis
- Work-related injuries
- Others, specify: \_\_\_\_\_

38b. Who has access to personnel health records? *(Please check all that apply)*

- Health worker in question
- Hospital Director
- Direct Supervisor
- Human Resources Department Official
- Health Facility Infectious Disease Central Committee
- Others, specify: \_\_\_\_\_

Medical evaluations should be made available for all health-care personnel.

Individual risk factors for each worker are determined prior to placement, including immunization status and medical histories. Periodic evaluations and updating of records are necessary. Individualized health counseling should supplement medical evaluations.

Immunization of health-care personnel with constant high risk exposures is an essential component of preventive services. The choice of vaccines depends on: a) likelihood of personnel exposure, b) nature of employment, c) characteristics of the present patient population.

Efficient monitoring of personnel health status is of utmost importance. These records include an updated database of medical evaluations, immunizations, exposures, and post-exposure prophylaxis (if applicable). Information contained in the medical records of health-care personnel should be kept confidential.<sup>118</sup>

39. Does the health facility have the capacity to investigate all reports of high risk exposures by health-care personnel?

Yes  
 No

40. Do different departments in the facility coordinate with a central committee in order to facilitate exposure surveillance and post-exposure treatment?

Yes  
 No

Health care facilities are responsible for managing job-related illnesses and exposures. Decisions on work-related disease transmission are based on the mode of transmission and epidemiology of the disease, and will thus ultimately determine the work restrictions that will be imposed. Coordination between all involved departments will ensure efficient surveillance and provision of preventive services.<sup>119</sup>

41. In the event of an epidemic, are health-care personnel divided into multiple task-independent yet coordinating teams?

Yes  
 No

*If you answered yes, go to question 41a-41c; otherwise, proceed to question 42.*

**41a. Are high-risk tasks distributed to different teams in order to minimize**

118 Bolyard et al, *Guideline for Infection Control in Health Care Personnel*, (Centers for Disease Control and Prevention Public Health Service, US Department of Health and Human Services), 1998, p. 293.

119 Bolyard et al, p. 295.

high-risk exposures for individual personnel?

Yes

No

41b. Does your setup prevent any unnecessary interactions between personnel of various departments with different responsibilities?

Yes

No

41c. Please outline the organization of health-care personnel in your facility during an infectious disease outbreak.

	<b>Personnel</b>	<b>Assigned Area</b>	<b>Specific Task(s)</b>
Team 1	1. 2. 3. 4. 5.		
Team	1. 2. 3. 4. 5.		
Team	1. 2. 3. 4. 5.		

42. Are health-care personnel discouraged from interacting with workers from other health facilities throughout the duration of an epidemic?

Yes

No

43. Does the facility temporarily close all shared common areas for personnel (e.g. coffee lounges) during an epidemic as a precautionary measure?

Yes

No

In order to minimize the disruption of services, breach of infection control procedures, and cross-infectivity between personnel, a modular system of service provision and staff deployment is recommended. Services are divided into self-contained units with minimal contact between other units. The number of staff-staff and staff-patient contacts should be minimized. Moreover, the number of procedures and encounters by different team members for one patient should be as low as possible. There should be minimal contact between health-care personnel of different facilities during an outbreak.

Special precautions should be observed regarding areas with common usage. Temporary closure of all common staff facilities is prudent.<sup>120</sup>

44. Which of the following groups can your health facility utilize in the event of a staffing shortage during an infectious disease outbreak? *(Please check all applicable answers.)*

- Retired health-care personnel previously affiliated with the facility
- Other personnel in the facility, previously with non-health-related responsibilities
- Health-care Trainees
- Volunteers
- Others \_\_\_\_\_

45. What is the average length of each health-care worker's work day? \_\_\_\_\_

45a. On the average, how many hours during a shift does each worker spend using PPE's? \_\_\_\_\_

As an outbreak progresses, staffing shortage may escalate. The existing personnel can be augmented by competent retired health-care personnel, non-health-care personnel within the facility, and volunteers. During an outbreak, increasing the size of the staff may be considered in order to facilitate PPE-free time for each worker.<sup>121</sup>

46. Does the health facility have the means of communicating with concerned government agencies and public information systems during an epidemic?

- Yes
- No

47. Is there a Liaison Officer in your health facility who monitors the status of infectious disease outbreaks in both the facility and the community?

- Yes
- No

<sup>120</sup> MOH Singapore, p. 21

<sup>121</sup> [www.cdc.gov/ncidod/sars](http://www.cdc.gov/ncidod/sars), 2003.

48. Does the health facility ensure that, prior to discharge, every infected patient with resolved symptoms can be adequately followed-up?  
 Yes  
 No

An epidemic entails a rapid analysis of the status of patients and possible transmission among personnel in a health care facility. This information should be made known to the government and the general public. A working network with the health department facilitates regular updates on the status of the epidemic in the community and the health care facility.

Appropriate follow-up and management in the community of patients who were discharged after clinical improvement, can be facilitated by a working agreement between the health care facility administration and community officials.<sup>122</sup>

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122 Ibid.

### III. Assessment of Biological, Chemical, and Radiologic Emergency Preparedness

Standards of armed conflict parallel advances in science and technology. Unfortunately, increasingly efficient weapons of mass destruction translate into an increased number of casualties during a single attack. Recent events, like the 1995 sarin nerve gas attack in a Tokyo subway station, have demonstrated that the threat from the intentional use of biological, chemical, and/or radiologic agents extend into supposed times of peace. As information becomes readily accessible globally, the capacity of intentionally utilizing these agents is already within the reach of common citizens with sufficient malicious intent. Unforeseen accidents in institutions utilizing chemical and radiologic technologies, moreover, add to the prevailing threat faced by the global community. The uncertainties involved in mass casualties due to both the intentional and unintentional agents of mass destruction impose a formidable challenge for both the community and its health facilities. In such incidents, health facilities have to be prepared for the difficult task of responding to a sustained and increased demand for health services.

This section discusses salient general points regarding a health facility's response to mass casualties secondary to biological, chemical, and radiologic emergencies. Several details on isolation procedures for biological agents have been clarified in the previous section. The document will not delve into specific aspects of every agent, as there are other manuals designed for this purpose.

#### A. Infrastructure Assessment

As increasing numbers of casualties rush to the health facility, the risk of contaminating equipment, staff, and other patients also increase. Because of this, there is a need for health facilities to establish a reception area that is separate from the main treatment facility. A contamination-free facility ensures that maximal medical care can be given to the critically injured and ill.

49. During a mass casualty incident, does the health facility have the capacity to establish a temporary reception area for incoming patients?

- Yes  
 No

*If you answered yes, go to questions 49a-49h; otherwise, proceed to the box after question 49h.*

49a. Where will the temporary reception area be located? *(Please check the most appropriate response.)*

- Within the existing emergency room  
 Within the hospital compound, but outside the emergency room



- Outside the hospital compound
- Others, specify: \_\_\_\_\_

49b. How large is the space available for the reception area? *(Please state in square meters.)* \_\_\_\_\_

49c. Which of the following are present in the reception area? *(Please check all applicable answers.)*

- Arrival point
- Triage area
- Emergency treatment area
- Decontamination area
- "Hot Line"
- Others, specify: \_\_\_\_\_

49d. How far is the temporary reception area from the main treatment facility? *(Please state in meters)* \_\_\_\_\_

49e. Is the reception area: *(Please check one)*

- Upwind?  Downwind?

49f. How many pathways lead into or out of the reception area? *(Please check the most appropriate response)*

- One: for both ingress and egress
- Two: one for ingress, one for egress
- Four: separate points of ingress and egress for patients and staff
- Others, specify: \_\_\_\_\_

49g. Are pathways and perimeters clearly marked?

- Yes
- No

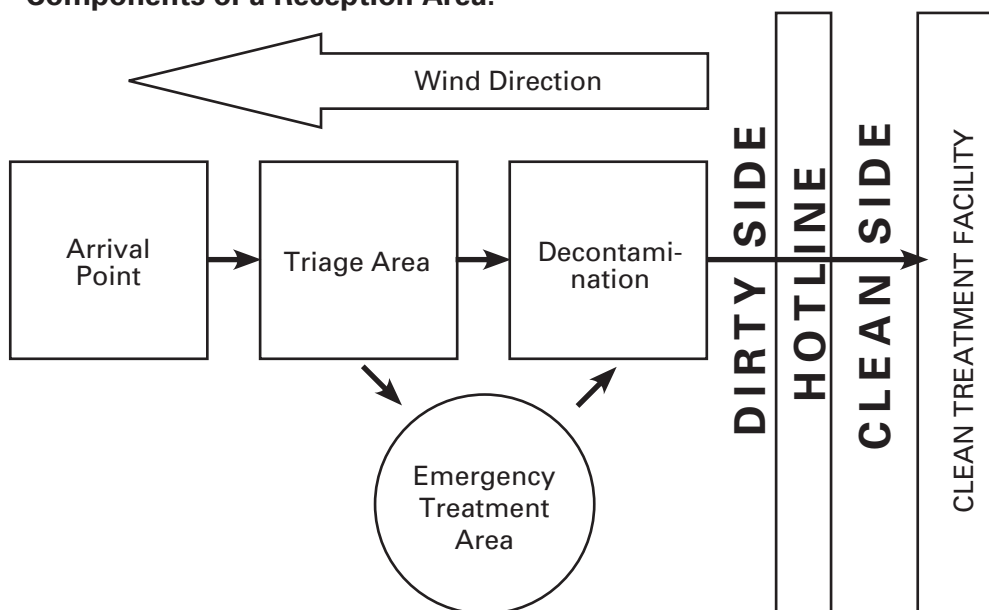
49h. Do vehicles entering and leaving the site have their own point of access?

- Yes
- No

Mass casualty reception areas, managed by a triage officer and augmented personnel, have the following components:<sup>123</sup>

- a. Arrival point – Serves as the entrance to the reception area.
- b. Triage area – Patients are assigned to one of three categories, namely, *Immediate, Minimal, or Delayed Care*.
- c. Emergency treatment area – Immediate, limited medical care is given according to individual need.
- d. Decontamination area – Offending agents are removed according to standard recommendations.
- e. “Hot line” – Separates the contaminated from the non-contaminated areas.

#### Components of a Reception Area:<sup>124</sup>



Ideally, the temporary reception area set up by a health facility should be walking distance and downwind from the main treatment facility. After an incident, the facility “locks down,” with only two entrances available: one for staff and one for incoming patients. Routes for both patient ingress and egress should be designated and clearly marked. Vehicles coming from affected areas are considered contaminated and access the vicinity of the facility through a separate entry/exit point.<sup>125</sup>

123 US Army Medical Research Institute of Chemical Defense, *Medical Management of Chemical Casualties Handbook*, 3rd Edition, 2000, p. 194.

124 Figure adapted from UAMRICD, p. 265.

125 Smith et al, *Interim Guidelines for Hospital Response to Mass Casualties from a Radiologic Incident*, (Division of Environmental Hazards and Health Effects National Center for Environmental Health, CDC), 2003, p. 55.

50. Does the health facility have pre-arranged formal agreements with other facilities in the community that cover transfer procedures in the event that the hospital can no longer accommodate the influx of patients?

Yes (Please fill in table below)

No

Health Facility	Contact Number	Liaison Officer

In reality, health facilities will have little or no advanced notification of incoming patients. During a mass casualty incident, space should be reserved for the most critically ill and injured. If the facility can no longer accommodate incoming patients, transfer to other health facilities should be expedited according to pre-arranged formal agreements. The discharge of non-critical patients who were in the hospital prior to the incident should be facilitated.<sup>126</sup>

51. Do patients going through the reception area get triaged to the proper level of care according to their particular needs?

Yes

No

Patients who are classified as requiring *immediate care* are immediately brought to the emergency treatment area. Those who need *minimal care* are referred to the emergency treatment area or the decontamination site, according to each patient’s particular need. Those identified as *delayed care* cases are sent to the decontamination area, while those deemed stable and labeled as *expectant* may be set aside and re-evaluated at a later time.<sup>127</sup>

52. What procedures are expected to be performed in the emergency treatment area? (Please check all applicable answers.)

Venoclysis

Loading IV therapy

Minor Suturing

Resuscitation

Repair of any defects in protective garments

Initial decontamination

Others, specify: \_\_\_\_\_

126 Smith et al, p. 53.

127 UAMRICD, p. 196. Note: should this read US Army Medical Research Institute of Chemical Defense? (USAMRICD)

In the emergency treatment area, patients in need of immediate care are stabilized to the point that they can survive for around 20-30 minutes without further care, prior to transfer to the decontamination site and the main treatment facility. Time spent by patients in this area is limited, and procedures should be confined to venoclysis, loading IV therapy, and minor suturing. Here, any violations in the protective garments are addressed. Wounds and surrounding skin are flushed with decontaminating solutions.<sup>128</sup>

53. How far is the decontamination area from the main treatment facility? *(Please state in meters.)* \_\_\_\_\_
54. Is the decontamination area downwind in relation to the main treatment facility?  
 Yes  
 No
55. Is the decontamination area upwind from the arrival point and triage area?  
 Yes  
 No
56. Can the location of the decontamination area be easily transferred according to prevailing winds at any given moment?  
 Yes  
 No
57. Is the site of the decontamination area big enough to maintain a distance of 75 meters between the decontamination facilities and any contaminated areas?  
 Yes  
 No
58. Can the perimeter of the reception area be adequately secured against possible external attack?  
 Yes  
 No
59. Is the main treatment facility accessible by any other route that bypasses the temporary reception area?  
 Yes  
 No

128 UAMRICD, p. 197. . Note: should this read US Army Medical Research Institute of Chemical Defense? (USAMRICD)

The decontamination sites should be at least 45 meters downwind from the main treatment facility and upwind from the arrival point and triage area. Separate areas may be designated for ambulatory and stretcher-borne patients. Ideally, sites should be amenable to swift re-deployment, in the event that wind direction shifts more than 45 degrees. In case the sites are moved, a distance of more than 75 meters upwind from any contaminated area is desirable. Provisions for added security from possible attack must be made available since these sites serve as the only entry points to the “hot line” and into the main facility.<sup>129</sup>

The most important decontamination process during a biologic, chemical, or radiologic emergency is done within the first minutes after exposure to the offending agent. In most cases, timely physical removal of the agent is more important than chemical means.<sup>130</sup>

As much as possible, decontamination should not interfere with the medical care of patients with life-threatening conditions.<sup>131</sup>

60. Which of the following decontamination methods can your health facility employ during a mass casualty incident? *(Please check all applicable answers.)*

- Physical decontamination
  - Flushing with water and aqueous solutions
  - Adsorbent materials *(Please specify)* \_\_\_\_\_
  - M291 (Polystyrene Polymeric + ion exchange resins)
  - Others, specify: \_\_\_\_\_
- Chemical decontamination
  - Soap wash
  - Hypochlorite solutions
  - Neutralizing agents *(Please specify)* \_\_\_\_\_
  - Others, specify: \_\_\_\_\_

61. Is there an alternative water source that the hospital can use for decontamination in order to supplement the present water supply during a sudden increase in demand?

- Yes *(Please specify)* \_\_\_\_\_
- No

62. Does the health facility have a contingency plan in place for quickly replenishing its stock of decontamination solutions during a mass casualty incident?

- Yes
- No

129 UAMRICD, p. 246. . Note: should this read US Army Medical Research Institute of Chemical Defense? (USAMRICD)

130 USAMRICD, p. 175. . Note: should this read US Army Medical Research Institute of Chemical Defense? (USAMRICD)

131 Smith et al, p. 56.

**Physical removal** is effective against most chemical contaminating agents regardless of structure.<sup>132</sup> It involves the following processes:

- a. *Flushing with water and aqueous solutions.*
- b. *Use of adsorbent materials – Advocated in some NATO nations. Involves the use of dry powders like soap detergent, followed by wiping with wet tissue paper.*
- c. *M291 (Polystyrene Polymeric + ion exchange resins) - Currently used by American forces on the battlefield. Consists of a wallet-sized carrying pouch with individual packets. Each packet can be used on the skin on the face and around wounds.*

**Chemical decontamination**, on the other hand, consists of the following:

- a. *Soap wash – Works via mechanical force and slow hydrolysis. Both fresh and sea water may be used.*
- b. *Oxidation / Hydrolysis – The ideal skin decontaminant is safe to use, easy to apply, readily available, able to neutralize most agents, stable in long-term storage, affordable, hypoallergenic, and easily disposed. Moreover, it should have a rapid onset of action, and not produce toxic end products nor enhance absorption of the offending agent. Usually, hypochlorite solutions act universally against organophosphorus and mustard agents. A 0.5% sodium or calcium hypochlorite solution is used for the skin, while 5% solution is used for contaminated equipment. The solutions should not be used for the eyes or in open wounds.<sup>133</sup>*

63. Are there skilled technicians in the health facility who can conduct rapid radiologic surveys of incoming patients and the facility itself in order to detect possibly harmful radiologic contamination?

- Yes  
 No

64. In the event of a radiologic incident, does the hospital have the means to handle contaminated casualties and equipment in accordance with accepted guidelines?

- Yes  
 No

65. Does the health facility have adequate stocks of the following supplies that are crucial during a radiologic emergency? (*Please check all that apply and indicate the number of units in the parenthesis after each blank.*)

- (        ) Intravenous therapy kits  
 (        ) Intravenous fluids  
 (        ) Anti-diarrheals  
 (        ) Anti-emetics  
 (        ) Potassium iodide

<sup>132</sup> See Appendix 6 for a list of Common Agents Used in Chemical Warfare.

<sup>133</sup> USAMRICD, p. 175.

Upon arrival at the health facility's reception area, victims of radiologic incidents undergo a radiologic survey conducted by a trained technician using a standard measuring device. Patients are then decontaminated using water and soap. A resurvey is done after the wash, with re-washing done as needed until an acceptable radiation level is attained. Any area that remains contaminated, despite standard measures, should be covered with a plastic bag or wrap. All personal belongings of the patient should be kept in tightly sealed plastic bags, properly labeled and accounted for by the triage officer. Corpses from a radiologic event may be contaminated with radioactive material and must be handled according to existing guidelines.<sup>134</sup>

Health facilities responding to radiologic emergencies should have adequate stocks of the following: IV therapy kits, IV fluids, anti-diarrheals, anti-emetics, and potassium iodide.<sup>135</sup>

66. Are germicidal cleaning agents readily available in your health facility?

- Yes  
 No

67. Does your health facility have an efficient system for sterilizing all reusable equipment?

- Yes  
 No

68. Does the health facility comply with accepted guidelines for disposal of contaminated single-use equipment?

- Yes  
 No

In emergencies involving biological agents<sup>136</sup>, the method of decontamination done depends on the suspected exposure. In contrast to chemical and radiologic agents, containment of possible spread from biological agents is not an emergent issue. Most cases would require little or no decontamination at all. The main goal in treating these patients is to reduce the extent of external contamination and prevent further spread.

Germicidal cleaning agents should be readily available in patient care areas. All reusable equipment should be appropriately cleaned and reprocessed prior to use on succeeding patients. Single-use items must be appropriately discarded in accordance with local regulations.<sup>137</sup>

134 Refer to National Council on Radiation and Measurements *NCRP Report No. 37, "Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides,"* 1970, NCRP, Washington, D.C.

135 Smith et al, p. 54.

136 See Appendix 7 for a list of Common Agents Used in Biological Warfare.

137 APIC Association for Professionals in Infection Control and Epidemiology Bioterrorism Working Group. Interim Bioterrorism Readiness Plan Suggestions, 2002, p. 5.

69. Does your health facility have the necessary instruments to check for possible radiologic contamination in patients, health care workers, and equipment?

Yes

No

*If you answered yes, go to questions 69a-69c; otherwise, proceed to the box after question 69c.*

69a. Which radiation measurement device(s) is/are available in your health facility? (Please check all that apply, and indicate the number of units within the parentheses after each blank)

(            ) Thermoluminescent dosimeters

(            ) Self-reading dosimeters

(            ) Dosimeter cards

(            ) Geiger-Mueller counters

(            ) Pancake probes

(            ) Portable spectrometers

(            ) Area monitors

(            ) Portal monitors

(            ) Air monitors

Others (Please specify) \_\_\_\_\_

69b. Does the health facility have skilled personnel who can operate the instruments?

Yes, How many? \_\_\_\_\_

No

69c. Are the instruments checked and calibrated periodically while not in use?

Yes

No

During a radiologic event, the probability and severity of health effects are dependent on the radiation dose present. Thus, a facility must have instruments that can measure background and contaminant radiation. Examples of these instruments include:<sup>138</sup>

- a. Thermoluminescent dosimeter – Reusable instrument that stores radiation readings which are later read by an electric reader. Can be stockpiled and rapidly issued. However, this cannot be used as an early warning device, and thus should not be used alone by first responders.
- b. Self-reading dosimeter – Easy to use. Gives a reading of total absorbed dose in real time. However, the instrument is fragile and gives erroneous readings when dropped.
- c. Dosimeter card – Compact credit card-sized instrument that can be used only once. Successive dots on the card change color according to the level of radiation, giving an approximate reading. Good for emergency responders, but not for those involved in cleanup.

138 Smith et al, p. 193.



- d. Geiger-Mueller counter – Measures alpha, beta, and gamma radiation. Instrument is directional, and is thus prone to erroneous readings when used in areas with intense radiation. Instrument needs periodic calibration.
- e. Pancake probe – GM counter with a wide flat probe. The added fixture allows for a more rapid scan of an area. However, it is prone to erroneous readings when used in areas with intense radiation.
- f. Portable spectrometer – Determines the specific radioisotopes present. Needed by those involved in formulating treatment for possible internal contamination.
- g. Area monitor – Stationary device designed to continuously detect radiation over a wide area. May be connected to a data-logging device which will enable reconstruction of the extent of contamination and staff exposure.
- h. Portal monitor – Doorway-type device that detects the presence of radiation as people pass through. Allows rapid evaluation of a large number of people.
- i. Air monitor – Omnidirectional probe that is mounted in areas with increased risk of contamination by airborne radiation.

**B. Functional Assessment**

70. Does your health facility have an existing system of monitoring all patient areas for signs of possible disease outbreak or bioterrorist attack?  
 Yes  
 No

*If you answered yes, go to questions 70a-70c; otherwise, proceed to the box after question 70c.*

70a. Who are the key participants in the facility’s infectious disease surveillance system? (Please check all applicable answers)  
 Infectious disease control professional / committee  
 Chief Nurse  
 Attending Physicians  
 Staff Nurses  
 Others, specify: \_\_\_\_\_

70b. Are the medical records of new patients with telltale signs and symptoms of a possible biologic incident immediately put on review?  
 Yes  
 No

70c. Does the facility observe close coordination with the local health department for early detection and / or reporting of possible intentional biologic incidents?

Yes

No

Maintaining a high level of vigilance leads to rapid intervention and prevention. Especially in a bioterrorist attack, early identification of a crisis situation significantly minimizes the number of casualties. A bioterrorist event should be suspected when progressively increasing numbers of otherwise healthy patients seek treatment for similar signs and symptoms. Other telltale signs include: a) patients with unusual clinical presentations coming from the same geographic area; b) increased reports of dead animals from the same area; c) significant increase in the number of patients who die within 72 hours of admission.

Frequent surveillance in the Intensive Care Units, Emergency Room, and other patient care units is vital for the early recognition of a bioterrorism event. Moreover, medical records of new patients with unusual signs and symptoms that go undiagnosed for more than 48 hours should be reviewed.<sup>139</sup>

The key to a health facility's capacity to serve the critically ill is recognizing that it is part of a community. Understanding how the facility fits into the community's emergency plan is paramount. If there is no existing plan for mass casualty incidents, then the hospital should actively participate in the formulation of one.<sup>140</sup>

71. Does the community where your health facility is located have an existing mass casualty emergency preparedness plan?

Yes

No

*If you answered yes to question 71, answer questions 71a-71d.*

71a. When was the plan formulated? \_\_\_\_\_

71b. Was the health facility involved in the formulation of the plan?

Yes

No

71c. When was the plan last updated? \_\_\_\_\_

<sup>139</sup> California Department of Health Services, *California Hospital Bioterrorism Response Planning Guide*, 2001, p. 1.

<sup>140</sup> Smith et al, p. 80.

71d. Does the health facility have a representative in the committee that oversees the periodic review of the emergency plan?

Yes (Please specify the name of the representative.)

\_\_\_\_\_ No

If you answered no to question 71, answer question 71e.

71e. Does the health facility have a representative in the community's health committee who can facilitate the formulation of a mass casualty emergency preparedness plan?

Yes (Please specify the name of the representative.)

\_\_\_\_\_ No

72. Does your facility participate in community-wide emergency drills?

Yes

No

73. In the event of a mass casualty incident secondary to biologic, chemical, or radiologic agents, what subset of patients can your facility accommodate? (Please check the most applicable response.)

Exposed patients only

Unexposed patients only

Both exposed and unexposed patients

The subset of patients has not been determined in the hospital's emergency plan

Preparedness of health facilities for mass casualty incidents should extend into involvement with community-wide initiatives and participation in community drills. Additional protection of the community may be achieved by designating some hospitals for casualties and others for those who are unexposed only.<sup>141</sup>

The usual communication systems used in the health facility and the community can easily be overwhelmed during a mass casualty incident. Back-up systems have to be developed, tested, and drilled.<sup>142</sup>

74. Which communication devices can the health facility utilize during a mass casualty incident? (Please fill in the table below.)

Communication Device	Number of Units
Regular telephones	
Cellular phones	

141 AHA, *Hospital Preparedness for Mass Casualties Final Report*, 2000.

142 AHA, *Hospital Preparedness*, 2000.

Fax machines	
Short wave radios	
Internet consoles	

75. Are there back-up communication systems in place?

Yes (*Please specify*) \_\_\_\_\_  
 No

The community will depend on health facilities for updates about ongoing mass casualty incidents. However, to minimize the provision of medical services, press and media briefings should be regularly scheduled away from the hospitals by a knowledgeable representative of the facility together with leaders of the community.<sup>143</sup>

76. Does the health facility have an assigned representative who coordinates with the press and media during a mass casualty incident?

Yes (*Please specify the name of the representative.*) \_\_\_\_\_  
 No

**C. Human Resources Assessment**

77. In addition to the standard PPE enumerated in the previous section of the manual, are the following items readily available in your health facility? (*Please fill in the table below.*)

Equipment	Number of Units
Disposable shoe coverings	
Standard issue chemical protective masks	
Standard issue MOPP-4 suits	
Rubber gloves	
Rubber aprons	

78. Which of the following materials are readily available for use by the facility's health care workers? (*Please check all applicable answers.*)

Plastic wrap  
 Plastic bags  
 Plain paper for the floors  
 Personal dosimeters for heavily exposed personnel  
 Others, specify: \_\_\_\_\_

<sup>143</sup> AHA, *Hospital Preparedness*, 2000.

Aside from the Personnel Protective Equipment (PPE) enumerated in the previous section, the following items will provide additional protection for health care workers against contamination by offending agents:

- a. Disposable shoe coverings
- b. Standard issue protective masks
- c. Standard issue MOPP-4 suits (chemical protective over-garments)

Moreover, the following should be readily available for personnel use: plastic wrap to cover and protect equipment, butcher paper or its equivalent to cover the floors, and personal dosimeters for personnel who have frequent contact with contaminated patients.<sup>144, 145</sup>

Most of the agents that are likely to be used in a bioterrorist attack are not transmitted from person-to-person. Patients may be managed using Standard Precautions since re-aerosolization is unlikely.<sup>146</sup>

Chemical agents rarely pose a vapor hazard. Thus, chemical protective masks for personnel are not absolutely necessary. However, foreign bodies that have been introduced into wounds may sequester the chemical, leading to retarded release that can be harmful to the patient and personnel. The use of well-fitting rubber gloves is recommended.<sup>147</sup> (USAMRICD, p. 220)

79. Are the health care workers in the facility required to wear photo identification cards while on duty?

Yes

No

80. Can the health facility rapidly issue standard identification cards to reserve staff and volunteers during a mass casualty incident?

Yes

No

During a mass casualty incident, the hospital itself, together with its staff, may be a target for attacks. Thus, security plans should include provision of photo identification cards to all authorized personnel. Public safety personnel (i.e. military and police) must be briefed beforehand regarding the characteristics of authentic ID cards for every health facility in the community. Reserve staff and official volunteers can be issued specially coded ID cards so that officials can readily identify those who are authorized to cross any restricted perimeters.<sup>148</sup>

144 Military Medical Operations, Armed Forces Radiobiology Research Institute, *Medical Management of Radiological Casualties Handbook*, 2nd Edition, 2003, p. 94.

145 Smith et al, p. 61.

146 APIC, p. 7.

147 USAMRICD, p. 220.

148 CDHS, p. 10.

81. During mass casualty incidents, does the health facility allow physicians who are not regular members of its medical staff to admit and attend to victims?

Yes

No

82. Does the health facility have a contingency plan for maximizing and augmenting its work force during a mass casualty incident?

Yes

No

The capacity of a health facility to respond to mass casualty incidents is better measured by the availability of sufficient numbers of trained staff, rather than the facility's total bed capacity. Various health facilities must coordinate with each other in order to ensure that increased demand for medical services can be matched with augmentation of health care staff. During disaster situations, hospitals in the community may follow a policy of recognition of temporary privileges for all physicians. This will allow physicians to attend to patients who are admitted in a facility regardless of whether the former is a member of the facility's medical staff. The community's "first responders" (e.g. firemen, policemen, etc.) are potential sources for additional staff. Each facility must develop contingency plans in case medical professionals and volunteers do not show up.<sup>149</sup>

83. Does the health facility provide regular training regarding biological, chemical, and radiologic incidents for its health care workers?

Yes

No

*If you answered yes, go to question 83a; otherwise, proceed to question 84.*

83a. What components are included in the training program? *(Please check all applicable answers.)*

Universal Precautions

Health Facility Emergency Plan

Decontamination Procedures

Specific roles during a mass casualty incident

Maintenance of physical and psychological well-being during a mass casualty incident

Others, specify: \_\_\_\_\_

84. Does the health facility conduct regular emergency preparedness drills?

Yes

No

*If you answered yes, go to questions 84a-84b; otherwise, proceed to the box after question 84b.*

<sup>149</sup> AHA, *Hospital Preparedness*, 2000.

84a. How frequent does the facility hold the drills? \_\_\_\_\_

84b. Is the health facility's emergency plan modified according to the results of the drills?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

Ideally, health facilities should conduct two emergency preparedness drills per year. The drills provide training exercises as well as underline previously unidentified shortcomings of the existing plan. The specific role of each health care worker during an emergency situation should be elucidated during the drills.<sup>150</sup>

## Summary

There is no such thing as absolute preparedness, only various levels of unpreparedness.<sup>151</sup> It should be kept in mind that occurrences regarded as "disasters" (earthquake, typhoon, volcanic eruption, war, etc.) are really hazards that transform a vulnerable condition into a disaster.<sup>152</sup> Therefore, a reduction in vulnerabilities would result in reduction of the impact of hazards. Identification of vulnerable areas is the first step in this process. Hopefully, this was achieved by patiently going through all the parts of this protocol. Results that were obtained from this endeavor must then be analyzed by the emergency planning group and appropriate actions taken.

The protocol attempted to expose all possible areas of vulnerability in a health facility. Unlike most of the previously published disaster-related materials, a little more emphasis was placed on matters involving the assessment of the structural integrity of the building/s and other significant architectural issues. These are frequently forgotten topics whenever health facilities outline their preparedness plans. Bearing in mind the role of health facilities as 'life-line' buildings, the importance that these health facilities remain structurally and functionally operational when disaster strikes cannot be overemphasized.

In the past, the existence of a written plan was the only measure of disaster preparedness. It is now advocated that pre-disaster planning should include clarification of gray areas of responsibility and the identification of unusual or exceptional tasks, resources and procedures.<sup>153</sup> Preparedness is improved by anticipating and solving potential problems. And it is a never-ending task.

<sup>150</sup> AHA, *Hospital Preparedness*, 2000.

<sup>151</sup> Jean Luc Poncelet and Claude de Ville de Goyet, "Disaster preparedness: institutional capacity building in the Americas," *World Health Statistics Quarterly*, 49(1996), p. 197.

<sup>152</sup> Eric K. Noji, Introduction in Eric K. Noji (ed), *The Public Health Consequences of Disaster*, (Oxford University Press, NY), 1997, p. 11.

<sup>153</sup> Poncelet and Goyet, p. 197.





## Appendices

### APPENDIX 1: The New Emergency Health Kit<sup>154</sup>

The New Emergency Health Kit is designed to meet the needs of the population with disrupted medical facilities in the second phase of a disaster, or of a displaced population without medical facilities. It is not intended for the acute phase response. The kit is composed of two different sets of medicines and medical supplies: a *BASIC UNIT* and a *SUPPLEMENTARY UNIT*.

#### Basic Unit

The basic unit is intended for use by basic health workers and contains estimated provisions for a population of 1,000 persons for 3 months. The contents of the basic unit are as follows:

<i>Medicines</i>	<b>unit</b>	<b>no. of units</b>
Acetylsalicylic acid, tab 300 mg	tab	3000
Aluminum hydroxide, tab 500 mg	tab	1000
Benzyl benzoate, lotion 25%	1 liter bottle	1
Chlorhexidine (5%)	1 liter bottle	1
Chloroquine, tab 150 mg base	tab	2000
Ferrous sulfate + folic acid, tab 200 + 0.25 mg	tab	2000
Gentian violet, powder	25 g	4
Mebendazole, tab 100 mg	tab	500
ORS (oral rehydration salts)	sachet for 1 liter	200
Paracetamol, tab 100 mg	tab	1000
Sulfamethoxazole + trimethoprim, tab 400 + 80 mg	tab	2000
Tetracycline eye ointment 1%	tube 5 g	50
<b>Renewable supplies</b>	<b>unit</b>	<b>no. of units</b>
Absorbent cotton wool	kg	1
Adhesive tape, 2.5 cm x 5 m	roll	30
Bar of soap (100-200g)	bar	10
Elastic bandage (crepe) 7.5 cm x 5 m	unit	20
Gauze bandage with selvedge, 7.5 cm x 5 m	roll	200
Gauze compresses 10 x 10 cm, 12 ply	unit	500
Ball pen blue or black	unit	10
Exercise book., A4, hard cover	unit	4
Health card with plastic cover	unit	500
Small plastic bags for medicines	unit	3000
Notepad A6	unit	10
Thermometer, Celsius, clinical, flat type	unit	6
Glove, examination, latex, pre-powdered non-sterile, disposable	unit	100
Treatment guidelines for basic list	unit	2

154 WHO, *The New Emergency Health Kit*, 1998, pp. 20-29.

Equipment	unit	no. of units
Nail brush, plastic, autoclavable	unit	2
Bucket, plastic, approx. 12 liters	unit	2
Gallipot, stainless steel, 100 ml	unit	1
Kidney dish, stainless steel, approx. 26x14 cm	unit	1
Dressing set (3 instruments + box)	unit	2
Dressing tray, stainless steel approx. 30x15x3 cm	unit	1
Drum for compresses with lateral clips 15cm H, diam. 15cm	unit	2
Foldable jerry can, 20 liters	unit	1
Forceps Kocher, no teeth, 12-14 cm	unit	2
Plastic bottle, 1 liter	unit	3
Syringe Luer, disposable, 10 ml	unit	1
Plastic bottle 125 ml	unit	1
Scissors straight/blunt, 12-14cm	unit	2

### Supplementary Unit

The supplementary unit is designed for use by physicians and senior health workers for a population of 10, 000 persons for 3 months. To be operational, the supplementary unit should be used with 10 basic units.

Medicines	unit	no. of units
<b>Anesthetics</b>		
Ketamine, inj., 50 mg/ml	10 ml/vial	25
Lidocaine, inj. 1%	20 ml/vial	50
<b>Analgesics</b>		
Morphine inj. 10 mg/ml	1 ml/ampule	50
<b>Anti-allergics</b>		
Hydrocortisone powder 100 mg	100mg powder for inj. in vial	50
Prednisolone, tab 5 mg	tab	100
Epinephrine (see respiratory tract)		
<b>Antidotes</b>		
Naloxone inj., 0.4 mg/ml	1 ml/ampule	200
<b>Anti-epileptics</b>		
Diazepam, inj. 5 mg/ml	2 ml/ampoule	200
Phenobarbital, tab 50 mg	tab	1000
<b>Anti-infective medications</b>		
Ampicillin, tab 250 mg	Scored tab	3000
Ampicillin, inj. 500 mg/vial	vial	200
Benzathine benzylpenicillin, inj. 2.4 MIU/vial	vial	50
Benzylpenicillin, inj. 5 MIU/vial	vial	250
Chloramphenicol, caps 250 mg	caps	2000
Chloramphenicol, inj. 1 g/vial	vial	500
Doxycycline, tab 100mg	caps or tab	2000
Metronidazole, tab 250 mg	tab	2000

Nystatin, non-coated 100,000 IU/tab	tab	1000
Nystatin vaginal 100,000 IU/tab	tab	1000
Procaine benzylpenicillin, inj. 3-4 MIU/vial	vial	750
Quinine, inj. 300 mg/ml	2 ml/ampule	100
Quinine, sulfate, tab 300 mg	Tab	3000
Sulfadoxine + Pyrimethamine, tab 500 mg + 25 mg	Tab	300
<b>Medications affecting the blood</b>		
Folic acid, tab 5 mg	tab	1000

<b>Cardiovascular medications</b>		
Methyldopa, 250 mg	tab	500
Hydralazine, inj. 20 mg/ml	ampule	20
<b>Dermatological</b>		
Polyvidone iodine, 10%, sol	200 ml bottle	10
Silver sulfadiazine cream 1%	50g tube	30
Benzoic acid 6% + salicylic acid 3% ointment	40g tube	25
<b>Diuretics</b>		
Furosemide, inj., 10 mg/ml	2 ml/ampule	20
Hydrochlorthiazide, tab 25mg	Tab	200
<b>Emergency contraceptives</b>		
Ethinylestradiol 50 mcg + Levonorgestrel 250mcg	pack of 4	100
<b>Gastro-intestinal medications</b>		
Promethazine, tab 25 mg	tab	500
Promethazine, inj. 25 mg/ml	2 ml/ampule	50
Atropine inj. 1 mg/ml	1 m./ampule	50
<b>Oxytocics</b>		
Oxytocin inj. 10 IU/ml	1 ml/ampule	200
<b>Psychotherapeutic medications</b>		
Chlorpromazine, inj. 25 mg/ml	2 ml/ampule	20
<b>Medications acting on the respiratory tract</b>		
Salbutamol tab 4mg	tab	1000
Aminophylline, inj. 25 mg/ml	10 ml/ampoule	50
Epinephrine, inj. 1 mg/ml	1 ml/ampoule	50
<b>Solutions for correction of water, electrolyte and acid-base disturbances</b>		
Ringer's lactate, with giving set and needle	500 ml/bag	200
Glucose, inj. Sol 5% with giving set and needle	500 ml/bag	100
Glucose, inj, sol. 50%	50 ml/vial	20
Water for injection	10 ml/plastic vial	2000
<b>Vitamins</b>		
Retinol (Vitamin A) caps, 200,000 IU	caps	4000
Ascorbic acid, tab 250 mg	tab	4000

<b>Renewable supplies</b>	<b>unit</b>	<b>No. of units</b>
Scalp vein infusion set, disposable 25 G (diam 0.5 mm)	unit	300

Scalp vein infusion set, disposable 21G (diam 0.8 mm)	unit	100
IV placement canula, disposable 18G (diam 1.3 mm)	unit	15
IV placement canula, disposable, 22G (diam 0.8 mm)	unit	15
IV placement canula, disposable, 24G (diam 0.7 mm)	unit	15
Needle Luer IV, disposable 19G (diam 1.1x38 mm)	unit	1000
Needle Luer IM, disposable 21G (diam 0.8x40 mm)	unit	2000
Needle Luer SC, disposable 25G (diam 0.5x16 mm)	unit	100
Spinal needle, disposable 22G (diam 0.7x40 mm) black	unit	25
Spinal needle, disposable 20G (diam 0.9x90 mm) yellow	unit	25
Syringe Luer resterilisable, nylon, 2 ml (diam 0.9x90mm)	unit	20
Syringe Luer resterilisable, nylon 5 ml	unit	100
Syringe Luer resterilisable, nylon 10 ml	unit	40
Syringe Luer disposable, 2 ml	unit	400
Syringe Luer disposable, 5 ml	unit	500
Syringe Luer disposable, 10 ml	unit	200
Syringe conic connector (for feeding), 60 ml	unit	20
Feeding tube CH 5 or 6 (premature baby), Luer tip, 40 cm disposable	unit	20
Feeding tube CH 8, Luer tip, 40cm disposable	unit	50
Feeding tube CH 16, conical tip, 125cm disposable	unit	10
Urinary catheter (Foley), no 12, disposable	unit	10
Urinary catheter (Foley), no 14, disposable	unit	5
Urinary catheter (Foley), no 18, disposable	unit	5
Surgical gloves sterile and resterilisable no 6.5	Pair	50
Surgical gloves sterile and resterilisable no 7.5	Pair	150
Surgical gloves sterile and resterilisable no 8.5	Pair	50
Safety box for disposal of used syringe & needles	unit	20
Sterilization test tape (for autoclave)	Roll	2
Sodium dichloroisocyanate, tab 1.67g	tab	1200
Thermometer, Celsius, clinical, flat-type	unit	10
Spare bulb for otoscope	unit	4
Batteries R6 alkaline AA size (for otoscope)	unit	12
Urine collecting bag with valve, 2000 ml	unit	10
Glove, examination, latex nonsterile, large	unit	100
Glove, examination, latex nonsterile, medium	unit	100
Glove, examination, latex nonsterile, small	unit	100
Mucus extractor, disposable	unit	5
Suture, synthetic absorbable, braided, 70 cm size DEC 3 (USP 00) with cutting needle 3/8, circle, 30mm	4x36 units	144
Surgical blade (surgical knives) no 22 for handle no 4	unit	50
Tape umbilical, nonsterile, 3mm wide x 100m spool	unit	1
Razor blade	unit	100
Tongue depressor (wooden, disposable)	unit	100
Gauze roll 90 m x 0.90 m	roll	3

Gauze compresses, 10 x 10 cm, 12 ply, sterile	unit	1000
<b>Equipment</b>	<b>unit</b>	<b>No. of units</b>
Apron, utility, plastic reusable	unit	2
Clinical stethoscope, dual cup	unit	4
Obstetrical stethoscope (metal)	unit	1
Sheeting, plastic PVC clear, 90x180 cm	unit	2
Sphygmomanometer (adult)	unit	4
Razor non-disposable	unit	2
Scale for adult	unit	1
Scale hanging 25 kg x 100 g (Salter type) + trousers	unit	3
Tape measure (cm/mm)	unit	5
Tape measure, mid-upper arm circumference	unit	10
Towel HUCK, 430x500 mm	unit	2
Drum for compresses 10x15cm	unit	2
Otoscope + set of pediatric speculums	unit	2
Tourniquet	unit	2
Dressing tray, stainless steel approx 30x20x3 cm	unit	1
Kidney dish, stainless steel approx 26x14 cm	unit	1
Scissors straight/blunt 12/14 cm	unit	2
Forceps Kocher no teeth, 12/14 cm	unit	2
Abscess/suture set (7 instruments + box)	unit	2
Dressing set (3 instruments + box)	unit	5
Delivery set	unit	1
Pressure sterilizer, 15 liters (type: Prestige 7503, double rack)	unit	1
Pressure sterilizer, 21 liters with basket	unit	1
Kerosene stove, single burner, tank capacity 1-2 liters (type: UNICEF 017.000)	unit	2
Water filter with candles, 10/20 liters (type: UNICEF 561.9902)	unit	3
Nail brush, plastic, autoclavable	unit	2
Clinical guidelines (diagnostic and treatment manual)		2

## APPENDIX 2: Hospital Emergency Incident Command System (HEICS) – An Overview<sup>155</sup>

### Background

First implemented in 1993, clear advantages were observed in hospitals (mainly in the United States) that used the Hospital Emergency Incident Command System (HEICS). Among the advantageous features observed were: *predictable* chain of management, *flexible organizational chart* that allows flexible response to specific emergencies, *prioritized response checklists*, *accountability of position function*, *improved documentation* for improved accountability and cost recovery, *common language* to promote communication and facilitate outside assistance, and *cost effective emergency planning* within health care organizations. Moreover, adoption of the system proved to be financially beneficial for the facilities because it allowed them to remain operational after a disaster, with prompt restoration of day-to-day hospital function.

### HEICS Key Concepts

The third edition of HEICS, produced by the County of San Mateo Emergency Medical Services Agency under a grant by the State of California EMS Authority, adheres to the basic attributes formulated/ enumerated in the first edition:

- Responsibility oriented chain of command  
The organizational structure recommended by HEICS allows for the addressing of many aspects of an emergency. It also allows a manageable scope of supervision for all functions.
- Wide acceptance through commonality of mission and language  
The organizational chart utilizes broadly accepted titles, fostering acceptance in both public and private circles.
- Prioritization of duties with the use of Job Action Sheets (JAS)  
JAS are job descriptions containing a prioritized list of emergency response tasks. These also serve as reminders for reporting and promoting the documentation of an emergency incident.
- Applicability to varying types and magnitudes of emergency events  
The system is flexible, allowing changes in programs that would meet specific needs in specific crisis situations.
- Thorough documentation of actions taken in response to the emergency  
The JAS will facilitate documentation of the facility's response to emergencies. This, in turn, will improve recovery of financial expenditures while decreasing liabilities.
- Expedient transfer of resources (mutual aid) within a particular system or from one facility to another  
Because of the use of a common system of management, HEICS will facilitate the exchange of resources during a crisis.
- Minimal disruption to existing hospital departments by virtue of parallel job qualifications/duties  
While the HEICS organization structure is specially designed for use during emergencies, it is apparent that many individuals within the regular day-to-day

<sup>155</sup> Adapted from the *Hospital Emergency Incident Command System 3rd Edition, 1998*, prepared by the State of California Emergency Medical Services Authority.

management structure of the health facility have responsibilities similar to those prescribed by HEICS.

### ***HEICS Organization***

Figure 1 illustrates the entire organization chart as formulated by HEICS. Each position in the chart has a written *Job Action Sheet* that specifies the important roles and duties of every team member during an emergency. An individual may be assigned more than one position, especially during critical situations wherein an individual has to perform multiple tasks until additional support can be obtained. The provision of distinct position checklists makes this possible.

As previously mentioned, the HEICS plan is flexible. During a crisis, only those positions which are needed should be activated. Efficiency and cost effectiveness are promoted because the system allows for the addition of needed positions or conversely, deactivation of positions at any time. While major disasters may require full activation of the system, most emergencies usually require the activation of only a few positions. Figure 2 gives an example of minimal staffing activation (e.g. during an early morning major vehicular accident).

### ***HEICS Implementation***

The length of time needed to implement HEICS in a health facility depends on the size of the facility, the number of people committed to the project, availability of funds, and the amount of support given by the management. The implementation of HEICS in a health facility goes through several phases:

- 1) *HEICS Concept Briefing*  
Interested administrators and emergency planners can be briefed by someone experienced in HEICS. Details regarding the estimated cost of implementation and maintenance on HEICS should be discussed at this point. The result of the briefing would be the facility's decision either to accept or reject a plan to implement HEICS.
- 2) *Commitment to Adapt the HEICS Plan*  
A transition team should be appointed once the decision to implement HEICS has been made. As many upper level managers as possible should be involved. Members of the team are expected to devote five to ten hours a week for one to three months in order to effect the transition.
- 3) *Establishment of the HEICS Implementation Committee*  
The HEICS Implementation Committee is composed of staff members of various management levels and from different department. The committee's role is to construct a comprehensive program that will integrate HEICS into the facility while promoting a positive attitude toward the facility's revised emergency response plan.
- 4) *Management Briefing*  
The briefing, co-sponsored by the HEICS Implementation Team and a Board representative, aims to solidify support for the program in all areas of the health facility. This involves both education and public relations.

- 5) *Revision of the Health Facility's Disaster / Emergency Plan*  
The current disaster plan of the health facility needs to be reconfigured so that the Incident Command System serves as the standard operating procedure.
- 6) *Introductory Lesson for All Employees*  
The staff of the health facility are instructed on the HEICS plan; all levels and areas of service should be in attendance. Participants of the session are made aware of the plan and its effect on their particular disaster response.
- 7) *Staff Table Top Exercise*  
This is a paper drill that aims to demonstrate the working and communication relationships of functions found within the HEICS organizational plan. It is intended for administrators, managers, and personnel who will be placed into an officer's position once the plan is activated.
- 8) *Full Functional Exercise of the HEICS Plan*  
The new HEICS disaster response plan is tested when the health facility conducts a general disaster drill. This involves the activation and simulated activity of all sections of the Incident Command System.
- 8) *Continuing Staff Education*  
Periodic sessions are held in order to keep all hospital responders committed to disaster preparedness and proficient in emergency operating procedures. Educational offerings may be centered on paper or functional exercises, new disaster-related topics, or review of the disaster plan.

### ***Further Reading***

For a more comprehensive discussion on HEICS, the reader is advised to refer to the original manuscript drafted by the State of California EMS Authority.



## APPENDIX 3: Sample Message Based on Standard Themes<sup>156</sup>

<b>SAMPLE MESSAGES FOR PUBLIC IN PERIOD <i>PRIOR TO ONSET</i> OF DISASTER</b>		
<b>Theme</b>	<b>Topic</b>	<b>Sample message</b>
Information	Stay turned to radio	"This was the message from the emergency Operating Committee. For more information, please contact health personnel at the nearest Health Centre. The next message will be broadcast at..."
	Source of Information	Examples of Official Information Centers: National Disaster Committee and Ministry of Health
Water	Potability; contamination	"During and after a disaster, there may be high level of water contamination because of broken water mains. Also, there may be loss of electricity which would effect the pumping of electricity to homes. The ministry of Health will inform you about the situation immediately after the disaster. Do not drink tap water until being informed by officials."
	Quantity; Storage	"Planning ahead is the best way you and your family can prepare for a hurricane. It is wise to store as much water as possible. Water should be placed in clean covered containers. Empty plastic cooking oil, soft drink and bleach bottles can be good water storage containers. However, water should not be stored in empty herbicide, pesticide or motor oil containers. If you have any questions, please contact...."
House	Safety	"If a house is not safe, go to a neighbor or arrange for other shelter. Increase safety of your house by checking condition of roof, shutters, valves and making necessary repairs. Check condition of trees, removing dead limbs."
House	Storage of equipment and tools	"Store basic tools and materials that will be needed for repairs following a disaster in an easily accessible place. Keep on hand equipment that will be needed during a disaster such as flashlight, batteries."
	Evacuation	"If in flood prone area, be prepared to evacuate. Keep tuned to radio to learn of other evacuation plans."
Food	Storage	"Most disasters result in some kind of food shortage. Don't wait until after a hurricane to ask, 'How am I going to feed my family?' It is wise to have an emergency food supply. Keep a small supply of canned goods, dry food items such as rice, cornmeal, flour and sugar. Make sure you have foods that do not need refrigerator or cooking such as canned meat, salted meat and fish, biscuits, condensed milk. If you need further information, please contact..."
	Food preservation	"Without electricity, special precautions must be taken to ensure the safety of refrigerated cooked foods and to avoid food poisoning. Frozen foods which have thawed should be cooked and eaten the same day. Meats and fish can be preserved by salting and pickling."

156 PAHO, *Communicating with the Public in Times of Disaster*, pp. 20-30.

	Provision for cooking food; energy supply	"Keep a supply of charcoal, kerosene, a coal pot and a kerosene stove for cooking. Make sure that the stove is always in working condition"
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### **SAMPLE MESSAGES FOR PUBLIC IN PERIOD *DURING THE DISASTER***

Injuries	Injuries	Stop bleeding Treat minor injuries at home Do not expose yourself to the elements
House	Safety	Stay indoors and close all windows, taps. Be careful When using candles.
Food	Food	Watch what you can eat and buy.

### **SAMPLE MESSAGES FOR PUBLIC IN PERIOD *FOLLOWING THE DISASTER***

Information		Keep listening to the radio
Water	Potability	Contaminated water can help the spread of diseases such as gastroenteritis, dysentery, typhoid, leptospirosis, and cholera. To prevent the spread of disease, use boiled or chlorinated water for drinking and preparation of foods
	Purification	Water collected should be boiled or disinfected before it is used for human consumption. To disinfect five (5) gallons of water, that is, the amount of water in a standard bucket, one teaspoonful of any household bleach should be added to the water. The water should then be stirred thoroughly and allowed to stand for thirty (30) minutes. The water is then ready to be used for the preparation of food and drinking. Continue to disinfect the water until the Ministry of Health declares that the water in your area is safe.
Sanitation	Excreta disposal	If toilet are destroyed or severely damaged after a hurricane or any other disaster, in order to prevent the spread of disease, a pit latrine should installed for the disposal of human excreta. All body waste, including that of all children, should be sanitarly disposed of by placing into a pit. Latrines should always be located on the downhill side of rivers, springs or wells or any other water source.

## APPENDIX 4: Examples of Establishments Likely to Hold Hazardous Materials<sup>157</sup>

LOCATIONS	HAZARDOUS MATERIALS AND OTHER SUBSTANCES
<b>1. Large storage or combustible-processing facilities</b>	
Refinery and storage	Gasoline, naphtha, hydrofluoric acid, propane, butane, ethylene, propylene, mercaptan, liquefied natural gas and other combustibles
Intermediary storage	Gasoline, diesel, propane, butane and other combustibles
Service station	Gasoline, diesel, propane
<b>2. Transport of petroleum or gasoline</b>	
Gas distribution center	Natural gas, propane
Pipelines	Natural gas, propane, butane, ethylene, ethane, methane, kerosene, crude petroleum, chlorine, hydrogen, etc.
<b>3. Large cooling factories</b>	
Food industry	Ammonia
<b>4. Food</b>	
Spices	Ethyl oxide
Sugar industry	Sulfur dioxide
Flour processing	Methyl bromide
Extraction of vegetable or animal oils and fats	Hexane
Cocoa, chocolate and coffee industry	Hexane, ammonia
Yeast	Various solvents, ammonia
Brewery	Ammonia
Distilleries, alcohol bottling	Ethanol
<b>5. Specific basic products</b>	
Leather industry (tannery)	Acrolein, formic acid
Wood distribution industry	Formaldehyde, impregnation agents
Paper industry	Chlorine, chlorine dioxide, sulfur dioxide, ammonia
Rubber industry	Styrene, butadiene
Glass industry	Hydrofluoric acid
<b>6. Metallurgic and electronic industry</b>	
Aluminum smelters	Hydrofluoric acid, oleum, chlorine
Magnesium	Hydrochloric acid, chlorine, hydrogen, sulfur dioxide
Gold	Carbon monoxide, nitric oxide
Smelting furnaces	Lead compounds
Surface preparation (plating)	Acids, plating solutions, arsine, cyanides
Copper refining	Sulfuric acid, arsine, sulfur dioxide
Pigments of titanium dioxide	Sulfuric acid, chlorine, titanium tetrachloride
Electronic	Arsine, trimethylchlorosilane
<b>7. Specific chemical products</b>	
Fertilizer	Ammonia, nitric acid, nitric oxide, ammonium nitrate

157 Adapted from: Conseil pour la Reduction des Accidents Industriels Majeurs (CRAIM), *Risk Management Guide for Major Industrial Accidents*, 2002 Edition.

Synthetic resins	Ethylene oxide, propylene oxide, chlorine, acrylonitrile, phosgene, isocyanates, formaldehyde, styrene
Rubber	Butadiene, styrene
Plastics and other synthetic products	Ethylene, propylene, vinyl chloride, acrylonitrile, chlorine, toxic combustion products
Paints and pigments	Phosphine, various solvents
Perfumes and essences	Acids, solvents, toxic combustion products
Synthetic products	Carbon sulfide, hydrogen sulfide
Medications and other pharmaceutical products	Chlorine, sulfur compounds, solvents, formic acid
Detergents	Acids, bases, ethylene oxide
Cleaning agents	Acids, bases
Linoleum products	Solvents, toxic combustion products
Textiles	Lye, dyes, solvents, formic acid
Printing products	Solvents
Photographic and cinematographic products	Nitrocellulose
Fluorocarbons	Hydrofluoric acid
<b>8. Pesticides</b>	
Production of raw materials	Phosgene, isocyanates, chlorine
Bulk sale and storage	Toxic powders and liquids, toxic combustion products, ammonia
Retail sale and storage	Various substances, methyl bromide
Smelting furnaces	Cyanides, sulfur dioxide
<b>9. Chemical products: non-specific raw materials</b>	
Inorganic products	Chlorine, ammonia, hydrochloric acid, sulfuric acid, oleum, sulfur dioxide, chlorine dioxide
Organic products	Acrylonitrile, phosgene, solvents
Industrial gases	Hydrogen, solvents, phosgene
<b>10. Explosives</b>	
Production and storage of explosives	Explosives, nitric acid, TNT, ANFO
Storage of munitions	Munitions, TNT
Manufacturing and sale of fireworks	Fireworks, pyrotechnic parts
Others	Hydrogen peroxide, organic peroxides, ammonium nitrate, sodium chlorate, etc.
<b>11. Public areas and services</b>	
Drinking water filtration plant	Chlorine
Sewage treatment plant	Chlorine, hydrogen peroxide
Pool	Chlorine
Arena, rink	Ammonia
Hospital	Oxygen, gas and various solvents
<b>12. Pipelines except those used for fixed installations</b>	Chlorine
<b>13. Laundries</b>	Chlorinated solvents
<b>14. Centres for transferring, processing, and eliminating hazardous materials</b>	Solvents, chlorinated solvents, cyanides
<b>15. PVC industries</b>	Hydrogen chloride, chlorine, phosgene, dioxins
<b>16. Storage sites for hazardous waste</b>	Various chemical products
<b>17. Storage for PBC's, tires, various scraps (plastic)</b>	Toxic combustion products

## APPENDIX 5: Microorganisms Associated with Airborne Transmission<sup>158</sup>

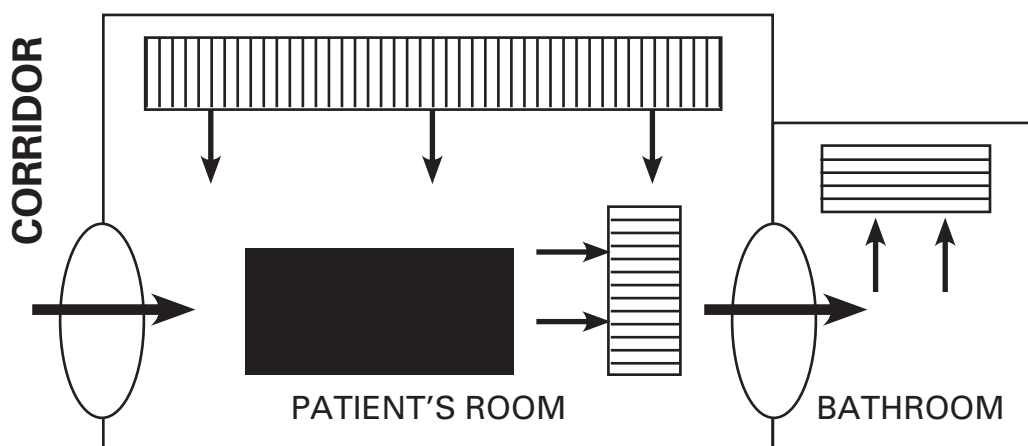
	<b>Fungi</b>	<b>Bacteria</b>	<b>Viruses</b>
<b>Numerous reports in health-care facilities</b>	<i>Aspergillus</i> sp. <i>Mucorales</i> sp.	<i>M. tuberculosis</i>	Rubeola Varicella-zoster
<b>Atypical, occasional reports</b>	<i>Acremonium</i> sp. <i>Fusarium</i> sp. <i>P. boydii</i> <i>Scedosporium</i> sp. <i>S. cyanescens</i>	<i>Acinetobacter</i> sp. <i>Bacillus</i> sp. <i>Brucella</i> sp. <i>S. aureus</i> <b>Group A</b> <i>Streptococcus</i>	Variola Influenza RSV Adenovirus Norwalk-like virus
<b>Airborne in nature; airborne transmission in health care settings not described</b>	<i>C. immitis</i> <i>Cryptococcus</i> sp. <i>H. Capsulatum</i>	<i>C. burnetti</i>	Hantavirus Lassa Marburg Ebola Crimean-Congo
<b>Under investigation</b>	<i>P. Carinii</i>	_____	_____

158 Table adapted from Schulster LM, et al, p. 14.

## APPENDIX 6: Engineered Specifications for Negative Pressure Rooms<sup>159</sup>

	Negative Pressure Areas
Pressure differentials	> -2.5 Pa
Air changes per hour (ACH)	≥ 12
Filtration efficiency	Supply: 90% (dust spot test) Return: 99.97%
Room airflow direction	Into the room
Clean-to-dirty airflow in room	Towards the patient
Ideal pressure differential	> -2.5 Pa

### Example of Airborne Infection Isolation Room<sup>160</sup>



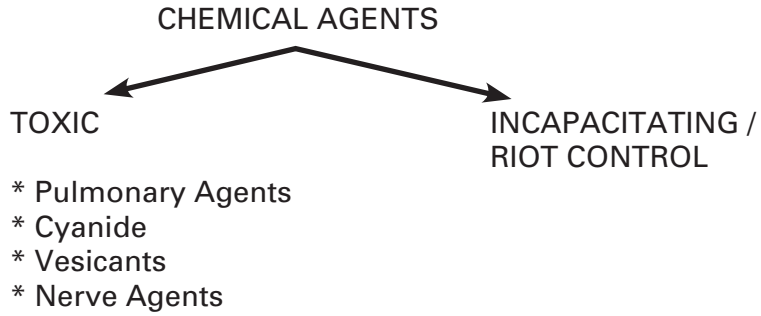
#### LEGEND:

- *Black box* – Patient's bed
- *Oval* – Door
- *Box with vertical stripes*  
– Air supply
- *Box with horizontal stripes*  
– Air exhaust
- *Direction of arrows*  
– Direction of air flow

<sup>159</sup> Table adapted from Schulster et al, p. 19.

<sup>160</sup> Figure adapted from Schulster et al, p. 36.

## APPENDIX 7: Common Agents Used in Chemical Warfare<sup>161</sup>



General Class	Agents	Antidote
<b>Pulmonary Agents</b>	<i>Phosgene</i> <i>Perfluororisobutylene</i> <i>HC Smoke</i> <i>Oxides of Nitrogen</i>	None
<b>Cyanide</b>	<i>Hydrocyanic Acid</i> <i>Cyanogen Chloride</i>	Intravenous sodium nitrite and sodium thiosulfate
<b>Vesicants</b>	<i>Mustard</i> <i>Lewisite</i> <i>Phosgene oxime</i>	BAL (for Lewisite)
<b>Nerve Agents</b>	<i>Tabun</i> <i>Sarin</i> <i>Soman</i>	Atropine Pralidoxime
<b>Incapacitating Agents</b>	<i>BZ</i> <i>Agent 15</i>	Physostigmine
<b>Riot-Control Agents</b>	<i>Corson &amp; Stoughton</i> <i>Mace</i>	None

161 USAMRICD, 2000.

**APPENDIX 8: Common Agents Used in Biological Warfare<sup>162</sup>**

<b>Disease</b>	<b>Chemotherapy</b>	<b>Chemoprophylaxis</b>
<b>Anthrax</b>	Ciprofloxacin 400mg IV q12h or Doxycycline 200mg IV, then 100mg IV q12h	Ciprofloxacin 500mg PO bid x 4wk if unvaccinated, begin initial doses of vaccine
	Penicillin 4 million units IV q4h	Doxycycline 100mg PO bid x 4wk plus vaccination
<b>Cholera</b>	Oral rehydration therapy	NA
	Tetracycline 500mg q6h x 3d	
	Doxycycline 300mg one, or 100mg q12h x 3d	
	Ciprofloxacin 500mg q12h x 3d Norfloxacin 400mg q12h x 3d	
<b>Q Fever</b>	Tetracycline 500mg PO q6h x 5-7d continued at least 2d after afebrile	Tetracycline 500mg PO qid x 5d (start 8-12d post-exposure)
	Doxycycline 100mg PO q12h x 5-7d continued at least 2d after afebrile	Doxycycline 100mg PO bid x 5d (start 8-12d post-exposure)
<b>Plague</b>	Streptomycin 30mg/kg/d IM in 2 divided doses x 10-14d or Gentamycin 5mg/kg or IV once daily x 10-14d or Ciprofloxacin 400mg IV q12h until clinically improved then 750mg PO bid for total of 10- 14d	Doxycycline 100mg PO bid x 7d or duration of exposure  Ciprofloxacin 500mg PO bid x 7d
	Doxycycline 200mg IV then 100 mg IV bid, until clinically improved then 100mg PO bid for total of 10-14d	Tetracycline 500mg PO qid x 7d
<b>Brucellosis</b>	Doxycycline 200mg/d PO plus Rifampin 600mg/d PO x 6wk	Doxycycline 200mg/d PO plus Rifampin 600mg/d PO x 6wk
	Ofloxacin 400 / Rifampin 600mg/d PO x 6wk	

162 US Army Medical Research Institute of Infectious Diseases, *Medical Management of Biological Casualties Handbook*, 4th Edition, 2001.



<b>Disease</b>	<b>Chemotherapy</b>	<b>Chemoprophylaxis</b>
<b>Tularemia</b>	Streptomycin 7.5-10mg/kg IM bid x 10-14d	Doxycycline 100mg PO bid x 14d
	Gentamycin 3-5mg/kg/d IV x 10-14d	Tetracycline 500mg PO qid x 14d Ciprofloxacin 500mg PO q12h x 14d
	Ciprofloxacin 400mg IV q12h until improved, then 500mg PO q12h for total of 10-14d	
	Ciprofloxacin 750mg PO q12h x 10-14d	
<b>Viral Encephalitides</b>	Supportive therapy	NA
<b>Viral Hemorrhagic Fevers</b>	Ribavirin 30mg/kg IV initial dose; then 16mg/kg IV q6h x 4d; then 8mg/kg IV q8h x 6d	NA
	Passive Antibodies	
<b>Smallpox</b>	Supportive therapy	Vaccinia Ig 0.6mL/kg IM (within 3d of exposure, best within 24h)
<b>Botulism</b>	DOD heptavalent equine despeciated antitoxin for serotypes A-G, 10mL IV	NA
	CDC trivalent equine antitoxin for serotypes A, B, E	
<b>Staphylococcus Enterotoxin B</b>	Ventilatory support	NA
<b>Ricin</b>	Supportive therapy	NA
<b>T-2 Mycotoxins</b>	None	Decontamination

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## ***Suggested Readings***

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