Student Guide

Reducing Earthquake Risk in Hospitals

from Equipment, Contents, Architectural Elements and Building Utility Systems

A Training Course for Nurses

GeoHazards International
A Nonprofit Working Toward Global Earthquake Safety

GeoHazards Society
INDIA

Swiss Re

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from Equipment, Contents, Architectural Elements and Building Utility Systems

A Training Course for Nurses

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Purpose

Hospitals provide life-saving medical care on a daily basis to the communities that they serve. Communities expect the hospital staff to save lives in an emergency and to care for community members that have been severely injured or have become seriously ill. Earthquakes threaten your hospital's ability to carry out its responsibilities to care for the ill and injured. Past earthquakes around the world have destroyed hospitals or damaged them so that they could not function. These hospitals failed their communities in their hour of greatest need.

Reasonable measures can reduce the risk of earthquake damage and losses, and to keep hospitals functioning after an earthquake. This half-day training course will help you reduce one of the major sources of earthquake-related damage and losses: a hospital's medical equipment and supplies, contents, architectural elements, and building utility systems. Damage to these items has caused deaths, injuries, building functional loss, and economic loss in past earthquakes, even in cases in which the building structure itself was essentially undamaged. The course also provides a brief introduction to the other components necessary for keeping a hospital functional and safe: structural safety of hospital buildings, hospital emergency preparedness, and personal preparedness for the staff.

These training materials are based on GeoHazards International's manual entitled *Reducing Earthquake Risk in Hospitals from Equipment, Contents, Architectural Elements and Building Utility Systems*. An electronic copy of the manual is freely downloadable from the GeoHazards International website: http://www.geohaz.org/hospitalsafetymanual.

Learning Objectives

Our objective is that you should be able to do the following after completing the course:

1. Understand why earthquake safety is important:

   (a) Understand why hospitals need to function and continue to care for patients after an earthquake, and not just avoid collapse of the hospital's buildings;
   (b) Understand what might happen to the hospital and its equipment, systems, architectural elements and contents if a strong earthquake occurred; and
   (c) Understand the basics of earthquake hazard in the region (i.e., that earthquakes can affect their location, historical earthquakes that occurred in the area, etc.).

2. Understand how to reduce the damage and consequences caused by an earthquake:

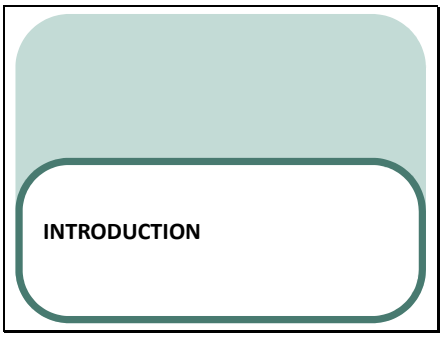
   (a) Know the basic elements of a hospital earthquake risk management program: risk assessment, building safety, securing objects and systems, preparedness planning and training/ practice;

(b) Recognize and understand how to anchor or relocate items than can fall, slide, or topple and break, interrupt life support, cause injury or block exits;
(c) Recognize the need to work with facilities personnel to develop earthquake safety solutions that do not compromise functionality;
(d) Know the basics of the hospital emergency planning process; and
(e) Know what to do before, during, and after an earthquake.

3. Understand how you can participate in earthquake safety efforts:

(a) Know the options for your involvement: join safety committee, identify and anchor hazards, develop solutions, etc.
(b) Think about your potential role in the hospital's emergency preparedness plan; and
(c) Develop a family preparedness plan.

Presentation Notes



Hospitals are Particularly at Risk

Photo credit: Kanchan Sabnis, GeoHazards Society

Photo credit: Manisha Dharan, THOT Designs

Preventing Collapse is Critical

Photo credit: Mehmet Celebi, U.S. Geological Survey

Building collapses usually kill the most people

Most causes of collapse are well known to engineers

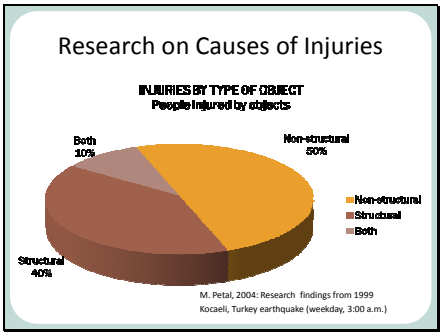
Preventing Collapse Is Not Enough

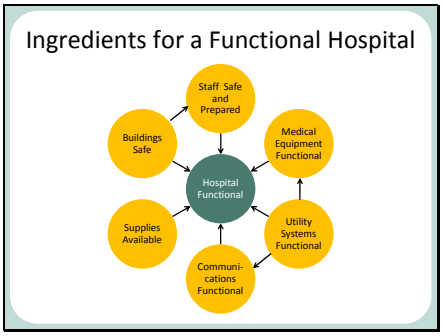
1971 M6.6 Sylmar, California, USA Earthquake

Photo credit: K. Steinbrugge, Natl . Inform. Service for Earthquake Engineering (NISEE) at the University of California, Berkeley (EERI)

Photo credit: Penco Engineering, Inc.


You Can Help Reduce Risk
Photo credit: Hari Kumar, GHI
Photo credit: SEEDS


Research on Causes of Injuries
INJURIES BY TYPE OF OBJECT
People injured by objects
Both 10%
Non-structural 50%
Structural 40%
Non-structural
Structural
Both
M. Petal, 2004: Research findings from 1999
Kocaeli, Turkey earthquake (weekday, 3:00 a.m.)


Ingredients for a Functional Hospital
Staff Safe and Prepared
Buildings Safe
Medical Equipment Functional
Hospital Functional
Supplies Available
Utility Systems Functional
Communi-cations Functional

Topics

- Earthquake basics
- Earthquake damage and consequences
- Identifying and mitigating risk
- Hospital emergency preparedness basics
- Personal and family preparedness

Today's Schedule

9:00-9:20	Introduction and Earthquake basics
9:30-9:50	Earthquake damage and consequences
9:50-11:00	Identifying and mitigating risk
11:00-11:30	Tea Break
11:30-12:00	Implementing risk reduction measures
12:00-12:40	Hospital emergency preparedness basics
12:40-13:00	Personal and family preparedness

Questions?

EARTHQUAKE BASICS

Earthquakes Have Affected Delhi

Earthquakes that caused damage in the Delhi region:

- 1505 Lo Mustang (Nepal border) earthquake
- 1720 Gharwal Himalayas earthquake
- 1803 Mathura earthquake

Many other earthquakes felt in Delhi that luckily caused little or no damage

What Causes Earthquakes Affecting Delhi

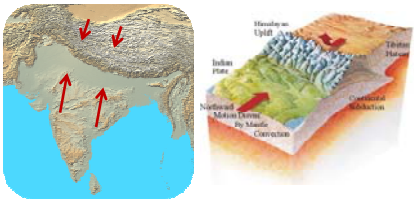


Image credits: Roger Bilham, Univ. of Colorado

Earthquakes Happen on Faults

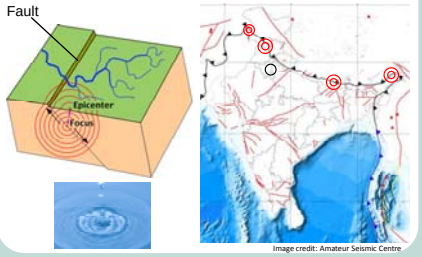


Image credit: Amateur Seismic Centre

Future Earthquakes Will Affect Delhi

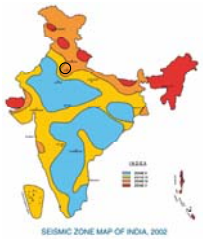
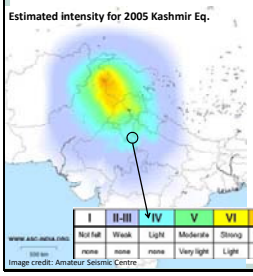


Image credit: IS 1893 (BIS), reproduced by IIT Kanpur

How strong will the shaking feel?

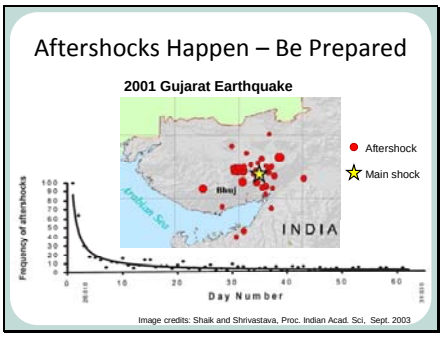
Estimated intensity for 2005 Kashmir Eq.

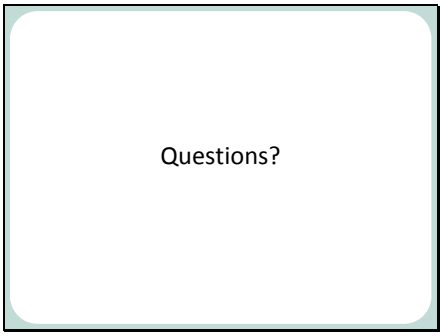


- This is called *intensity*
- Reported on a scale of I to XII
- Based on
  - Human perception of shaking
  - Damage to buildings
  - Effects on nature

I	II-III	IV	V	VI	VII	VIII	IX	X+
Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy

Image credit: Amateur Seismic Centre

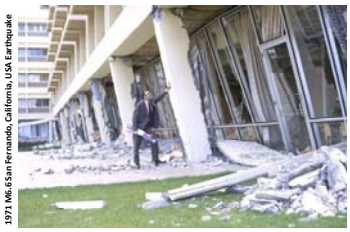

Aftershocks Happen – Be Prepared
2001 Gujarat Earthquake
Aftershock
Main shock
Bhuj
INDIA
Frequency of aftershocks
Day Number
Image credits: Shaik and Shrivastava, Proc. Indian Acad. Sci, Sept. 2003


Questions?


EARTHQUAKE DAMAGE AND
ITS CONSEQUENCES

Building Damage

Would you go in this hospital?



What about this one?

Damage to Everything Else

Could you work in this building?

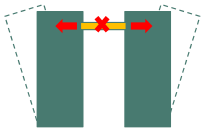
What Happens Inside During Shaking

What causes damage?

Shaking

Causes things to:
- Topple or overturn
- Slide

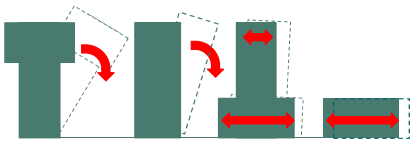
Bending and Stretching



Affects things that span:
- Floor to floor
- Between buildings

Image credits: FEMA

Topple or Slide?



Top-Heavy	Tall, Slim & Uniform	Bottom-Heavy	Short, Stout & Uniform
Topple	Topple	Slide	Slide

Consequences of Earthquake Damage

- Loss of life
- Loss of function
- Loss of property/money
- Loss of community confidence

Loss of Life

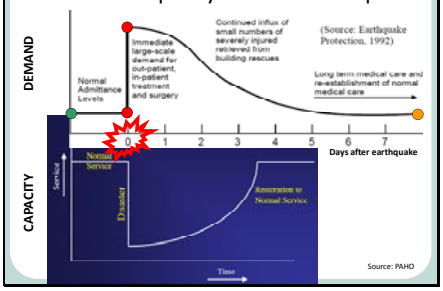
Loss of Function

Loss of property or money

Loss of Community Confidence

Photo credit: Earthquake Engineering Research Institute

Demand & Capacity After an Earthquake



Questions?

IDENTIFYING AND MITIGATING RISK FROM OBJECTS AND SYSTEMS

What can be a hazard?

In each department of the hospital, ask yourself :

- What can happen here?
- Will it hurt someone?
- Interrupt life support?
- Harm patients' health?


Photo credits: Hari Kumar, GHI


Photo credit: Hari Kumar, GHI


Photo credit: Hari Kumar, GHI


Photo credit: Hari Kumar, GHI


2
3

Options for Reducing Risk

- Relocate
- Protect:
  - Anchor, brace or restrain against shaking
    - or -
  - Accommodate movement
- Plan for cleanup or breakage

Relocate

Objects that can:
- Block exits
- Fall on someone

Photo credit: Hari Kumar, GHI

Anchor, Brace or Restrain

Objects that can:
- Fall on someone
- Topple and break
- Block exits (if not able to relocate)

1995 M6.9 Kobe, Japan Earthquake

Photo credit: California OSHPD

Accommodate Movement

Anywhere there is differential motion:
- Pipes, ducts, conduits between buildings or across joints
- Attachments to equipment and tanks
- Partitions

Photo credit: Hari Kumar, GHI

Plan for Cleanup or Breakage

Relocation or restraint may not be practical or possible for items such as:

- Medical records
- Some mobile equipment
- Some items on trolleys
- Pharmacy

1994 M6.7 Northridge, California, USA Earthquake

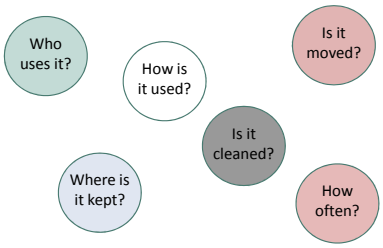
Photo credit: California OSHPD

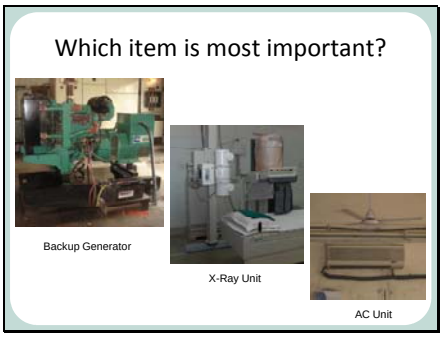
Functionality Requirements

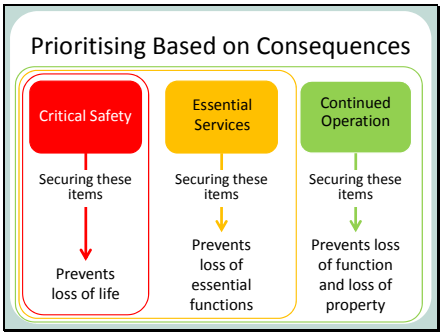
Photo credit: Manisha Dharan, THOT Designs

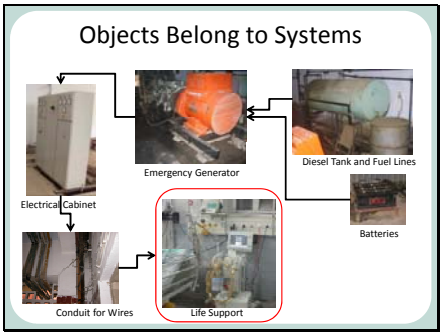
Photo credit: SEEDS

Communication Points




Which item is most important?
Backup Generator
X-Ray Unit
AC Unit


Prioritising Based on Consequences
Critical Safety
Securing these items
Prevents loss of life
Essential Services
Securing these items
Prevents loss of essential functions
Continued Operation
Securing these items
Prevents loss of function and loss of property


Objects Belong to Systems
Electrical Cabinet
Emergency Generator
Diesel Tank and Fuel Lines
Batteries
Conduit for Wires
Life Support

When to Get Help

- When you aren't comfortable doing it yourself
- You will need an engineer for:
  - Objects > 100 kg (too heavy for two people to lift)
  - Sensitive medical equipment; hazardous materials
- You will need a tradesperson for:
  - Any work involving building utility systems

Questions?

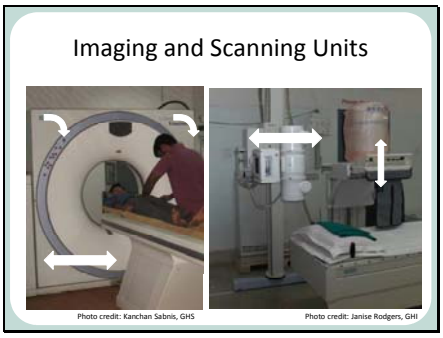
INFORMATION FOR SPECIFIC OBJECTS

Specific Categories of Objects

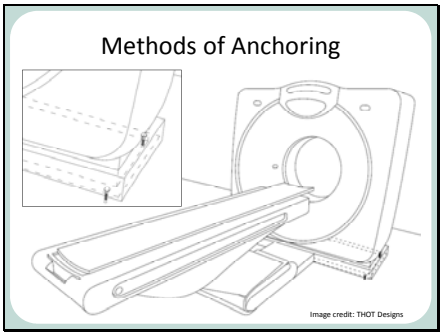
- Medical equipment
- Furnishings and hospital admin systems
- Supplies
- Mechanical and electrical equipment
- Pipes, ducts and conduits
- Tanks and medical gases
- Architectural elements
- Lifts

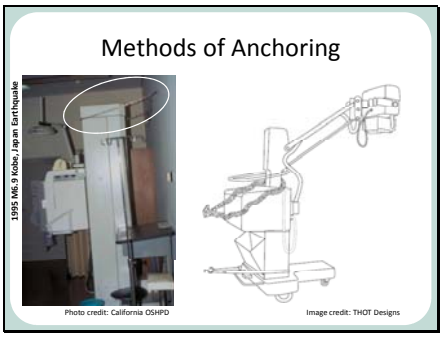
Medical Equipment

- Large floor-mounted equipment: Imaging/scanning, blood bank refrigerators
- Autoclaves and sterilizers
- Operation theatre lights
- Wheeled or trolley-mounted: radiant warmers, anaesthesia machines, ventilators
- Small wall-mounted equipment: monitors
- Laboratory bench-mounted equipment


Imaging and Scanning Units
Photo credit: Kanchan Sabnis, GHS
Photo credit: Janise Rodgers, GHI


Earthquake Damage
1995 M6.9 Kobe, Japan Earthquake
1971 M6.6 San Fernando, California, USA Earthquake
Photo credit: FEMA
Photo credit: California OSHPD


Methods of Anchoring
Image credit: THOT Designs


Methods of Anchoring
1995 M6.9 Kobe, Japan Earthquake
Photo credit: California OSHPD
Image credit: THOT Designs


Blood Bank Refrigerators
Photo credit: SEEDS


Earthquake Damage
1994 M6.7 Northridge, California, USA Earthquake
Photo credits: California OSHPD

Methods of Anchoring

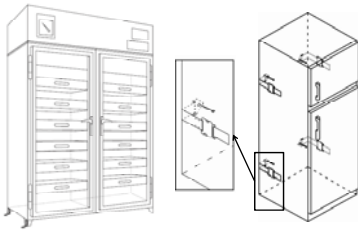


Image credit: THOT Designs

Autoclaves and Sterilizers

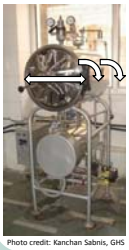


Photo credit: Kanchan Sabnis, GHS

Photo credit: Hari Kumar, GHI

Earthquake Damage

Photo credit: Degenkolb Engineers

Methods of Anchoring

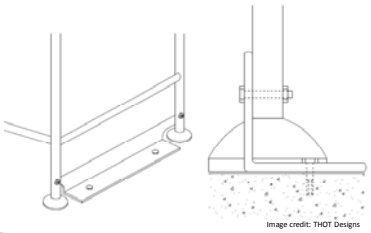


Image credit: THOT Designs

OT Lights

Photo credit: Janise Rodgers, GHI

Photo credit: Kanchan Sabnis, GHS

Damage in an Earthquake Simulation

Photo credit: Multidisciplinary Center for Earthquake Engineering, University of Buffalo

Methods of Anchoring

Image credit: THOT Designs

Anaesthesia Machines

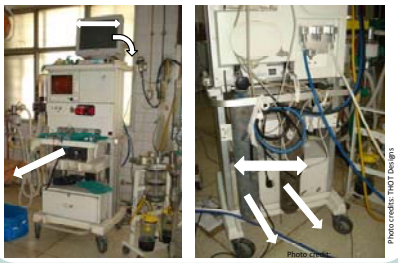
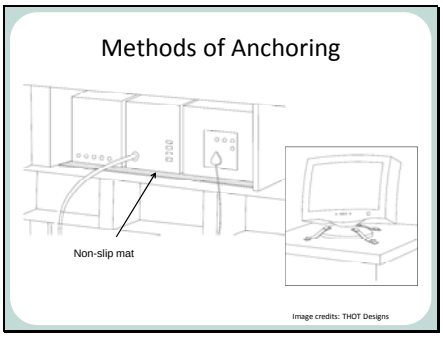
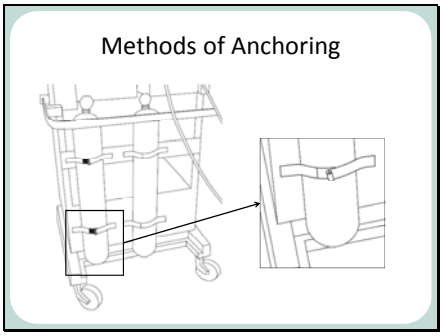


Photo credits: THOT Designs

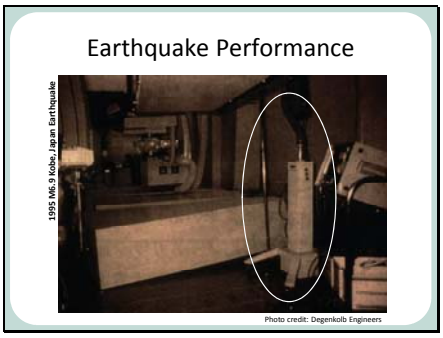
Damage in Earthquake Simulation

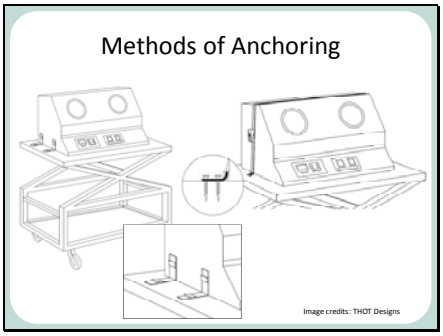
Photo credits: Multidisciplinary Center for Earthquake Engineering, University of Buffalo

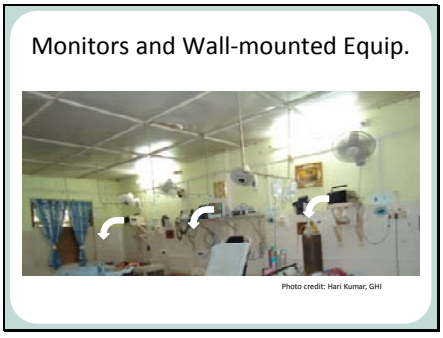

Methods of Anchoring
Non-slip mat
Image credits: THOT Designs


Methods of Anchoring


Wheeled or Trolley-mounted Equip.
Photo credit: THOT Designs
Photo credit: SEEDS


Earthquake Performance
1995 M6.9 Kobe, Japan Earthquake
Photo credit: Degenkolb Engineers


Methods of Anchoring
Image credits: THOT Designs


Monitors and Wall-mounted Equip.
Photo credit: Hari Kumar, GHI

Damage in Earthquake Simulation

Photo credit: Multidisciplinary Center for Earthquake Engineering, University of Buffalo

Methods of Anchoring

Image credit: GCX Corporation

Methods of Anchoring

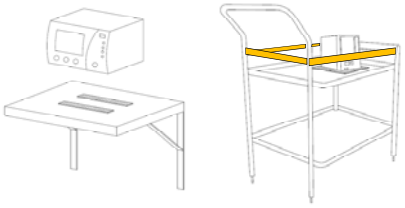


Image credits: THOT Designs

Laboratory Bench-mounted Equip.

Photo credit: SEEDS

Earthquake Damage

1994 Mi.7 Northridge, California, USA Earthquake

Photo credit: California OSHPD

Methods of Anchoring

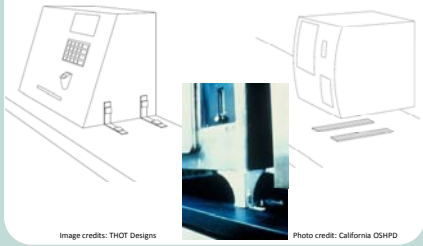


Image credits: THOT Designs

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Questions?

Furnishings and Administrative Systems

- Cupboards
- File cabinets
- Medical records
- Computers

Cupboards

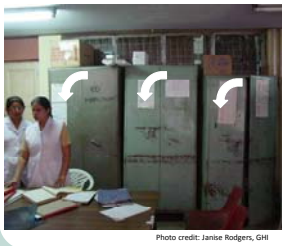


Photo credit: Janise Rodgers, GHI

Photo credit: SEEDS

Earthquake Damage

1995 M6.9 Kobe, Japan Earthquake

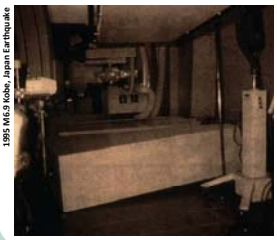


Photo credit: Degenkolb Engineers

2003 M6 8am, Iran Earthquake

Photo credit: EERI

Methods of Anchoring

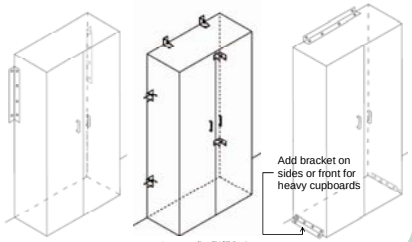


Image credits: THOT Designs

Installation

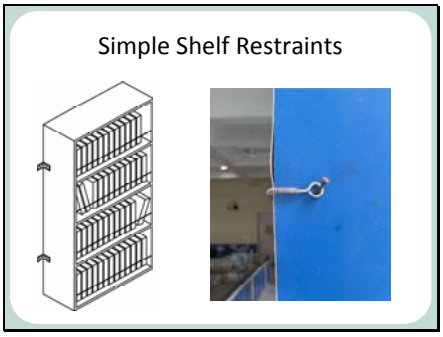
Photo credit: Hari Kumar, GHI


Installation
Photo credit: Hari Kumar, GHI


Medical Records
Photo credit: Hari Kumar, GHI


Earthquake Damage
1994 M6.7 Northridge, California, USA Earthquake
Photo credit: California OSHPD
2010 M7.0 Haiti Earthquake
Photo credit: Veronica Cedillos, GHI


Mitigation
Image source: FEMA
Photo credit: California OSHPD
2010 M8.8 Maule, Chile Earthquake
Photo credit: William T. Holmes, Rutherford & Chekene


Simple Shelf Restraints


Installing Spring Shelf Restraints
Photo credit: Hari Kumar, GHI

Computers

Photo credit: THOT Designs

Earthquake Damage

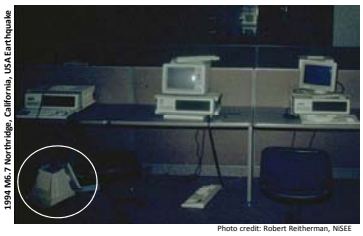


Photo credit: Robert Reitherman, NISEE

Methods of Anchoring

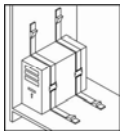
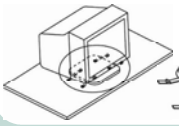


Photo credit: Rebekah Green, Western Washington Univ.



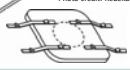


Image credits: THOT Designs

Questions?

Supplies

- On trolleys
- On racks
- Pharmacy
- Sterile storage

On Trolleys

Photo credit: Manisha Dharan, THOT Designs

Earthquake Damage

1991 M7.6 Costa Rica Earthquake

Photo credit: Degenkolb Engineers, FEMA 74

2009 M6.3 L'Aquila, Italy Earthquake

Photo credit: Khalid Mosalam, Univ. of California, Berkeley

Methods of Anchoring

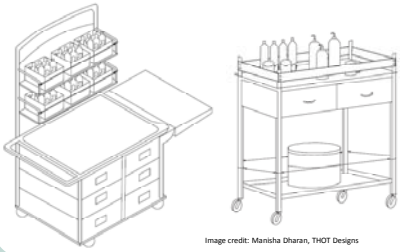


Image credit: Manisha Dharan, THOT Designs

On Racks

Photo credit: D.K. Paul, IIT Roorkee

Photo credit: SEEDS

Earthquake Damage

1994 M6.7 Northridge, California, USA Earthquake

Photo credit: NiSEE (Robert Reitherman)

2010 M7.0 Haiti Earthquake

Photo credit: Veronica Cedillos

Methods of Anchoring

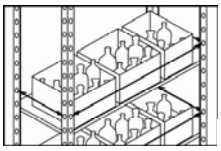


Image credit: Manisha Dharan, THOT Designs

Photo credit: SEEDS

Pharmacy

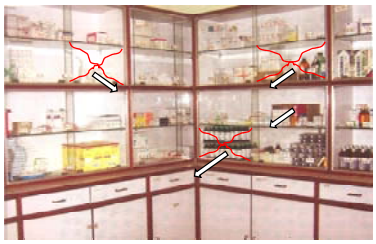


Photo credit: Dr. Shakti Gupta, AIIMS

Pharmacy

Photo credit: Hari Kumar, GHI

Earthquake Damage

1979 M6.4 Imperial Valley, California, USA Earthquake

Photo credit: G. Reagor, US Nat'l Geophysical Data Center

1991 M7.6 Costa Rica Earthquake

Photo credit: Degenkolb Engineers, FEMA 74

Methods of Anchoring

Attach through back directly to wall

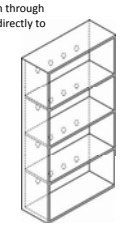


Image credit: Manisha Dharan, THOT Designs

Photo credit: Degenkolb Engineers, FEMA 74

Sterile Storage

Photo credit: Dr. Shakti Gupta, AIIMS

Earthquake Damage

1995 M6.9 Kobe, Japan Earthquake

Photo credit: California OSHPD

Methods of Anchoring

Photo credit: FEMA 74

Image credit: Manisha Dharan, THOT Designs

Questions?

Mechanical and Electrical Equipment

- Emergency power: generators, batteries
- Electrical: transformers, cabinets, switchgear
- Fire-fighting: fire water pumps, extinguishers
- Communications: cabinets, rooftop equipment
- Cooling: chillers, cooling towers, rooftop units, window ACs and coolers
- Heating/hot water: Boilers, geysers

Air Coolers in Windows

Photo credit: L. Thomas Tobin, GHI

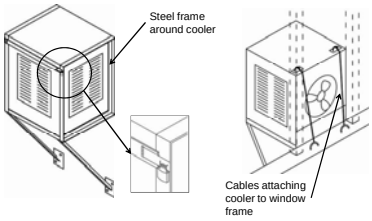
Photo credit: Janise Rodgers, GHI

Photo credit: L. Thomas Tobin, GHI

Earthquake Damage

Photo credit: Veronica Cedillos, GHI

Methods of Anchoring

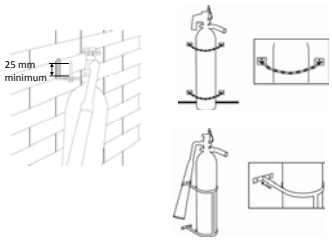


Fire Extinguisher Canisters

Photo credit: D.K. Paul, IIT Roorkee

Earthquake Damage

Methods of Anchoring



Questions?

Architectural Elements

- Parapets, sunshades, balcony walls
- Masonry partition walls
- Suspended ceilings
- Pendant light fixtures and ceiling fans
- Windows and glass
- Other items: jalies, decorative ceramic tile veneer, entrance canopies

Pendant Light Fixtures and Fans

Photo credit: Hari Kumar, GHI

Earthquake Damage

Methods of Anchoring

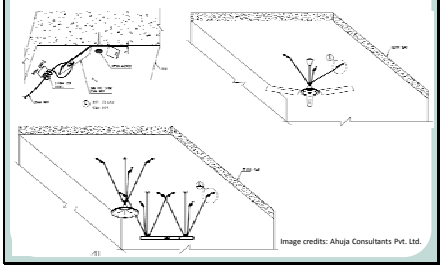


Image credits: Ahuja Consultants Pvt. Ltd.

Windows and Glass

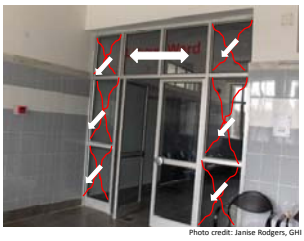


Photo credit: Janise Rodgers, GHI

Earthquake Damage

2003 M6 Bam, Iran Earthquake

Photo credit: EERI 2003 Bam, Iran Eqk. Recon. Report

2010 M7.2 Baja California Earthquake

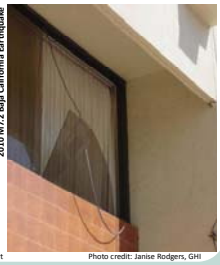
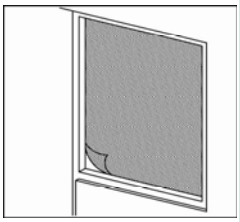


Photo credit: Janise Rodgers, GHI

Earthquake Damage

Methods of Anchoring

- Film is available in different thicknesses
- Can also be used for security purposes



Exterior Falling Hazards

Earthquake Damage

Photo credit: Rabindra Vasvada

Mitigation Measures

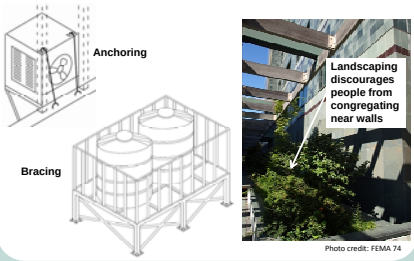


Photo credit: FEMA 74

Questions?

HAZARD HUNT EXERCISE

Hazard Hunt Tips

- "Earthquake eyes"
- Questions to ask:
  - What can happen here?
  - Will it hurt someone?
  - Interrupt life support?
  - Harm patients' health?
- Use the checklist and make detailed notes

IMPLEMENTING RISK REDUCTION MEASURES

Is it too heavy?

If two people can't lift it, you probably need an engineer to help anchor it.

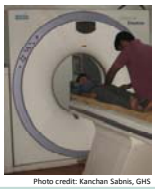
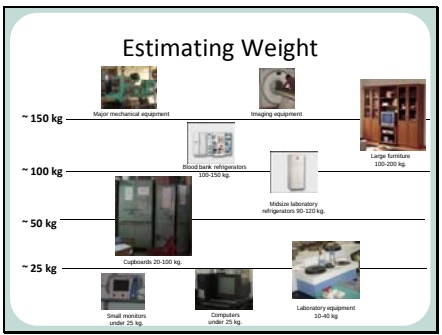


Photo credit: Kanchan Sabnis, GHS

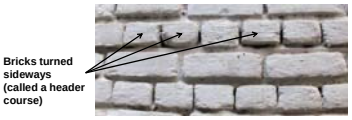
Photo credit: SEEDS

Estimating Weight



Is the brick wall strong enough?

- Two bricks wide (220 mm) and some rows of bricks turned sideways: objects 230kg or less



- If wall is one brick wide (110 mm) OR two bricks wide and no sideways bricks: anchor to a floor-to-ceiling support called a *strongback* instead

Anchoring to Masonry Walls

- In concrete frames you must first verify that wall fits tightly against the beam at the top
- Install the right type of anchor according to manufacturer instructions
- Insert anchors into bricks, not mortar joints
- Check mortar condition with coin or small tool such as pen knife
- Consult an engineer for objects too heavy for two people to lift when working together

Anchoring to Concrete

- Install the right type of anchor according to manufacturer instructions
- Avoid rebar when drilling holes for anchors
- If you accidentally hit rebar, STOP drilling and relocate the hole – DO NOT cut thru rebar
- Clean the dust out of the hole

Safety

- Don't "do it yourself":
  - Electrical power systems
  - Inflammables and gases
  - Hazardous chemicals
  - Heights

- Follow safety practices:
  - Use eye protection and tie back long hair when using drill machines or other power tools
  - Move heavy items properly to avoid back injuries

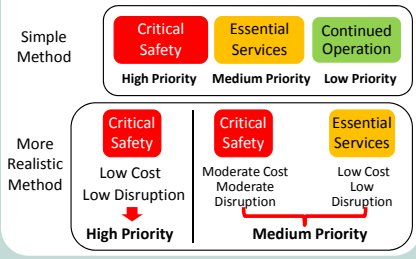
Planning & Coordination

Ask whether you need to:

- Take equipment out of service?
- Switch off utilities (electrical power, water)?
- Avoid times when the equipment sees heavy use?

Coordinate with hospital administration and facilities to plan for and minimize disruption

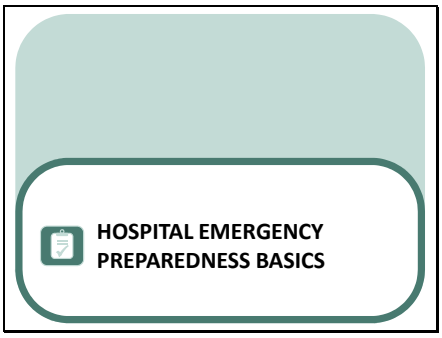
Prioritising Risk Reduction Measures



Estimating Costs

Questions?

EXERCISE: SMALL GROUP DISCUSSIONS ON POTENTIAL SOLUTIONS FOR HAZARDS



Before an Earthquake

- Form a hospital safety committee
- Understand the hazards you face
- Assess your risk and impacts on operation
- Train your staff and drill regularly
- Make the following plans:
  - Mitigation plan
  - Emergency response plan
  - Continuity of operations plan
  - Continuity of business plan
- Identify alternative sites/facilities to operate from

Hospital Safety Committee

Representatives from all departments, including:

- Administration
- Nurses and doctors
- Medical departments: ED, Radiology, etc.
- Facilities/engineering
- Security
- Laboratory
- Housekeeping

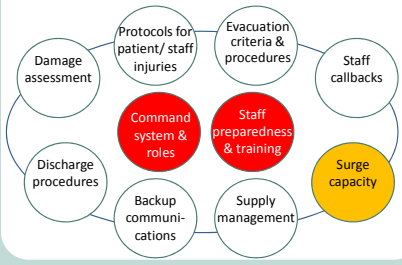
Determine Hazards and Threats

- Hazards:
  - Earthquakes: shaking & secondary hazards like fire
  - Floods
  - Fire
  - Cyclones
- Threats:
  - Epidemics
  - Terrorist acts
- Multi-hazard assessment tools available

Determine Vulnerability

- Buildings
- Equipment, contents, architectural elements and building utility systems
- Access to and egress from buildings and site
- Transportation systems and utilities serving hospital

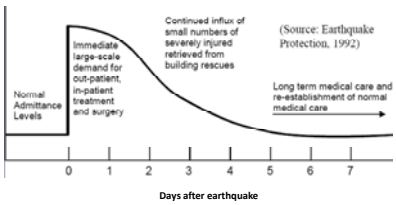
Elements of a Hospital Emergency Plan



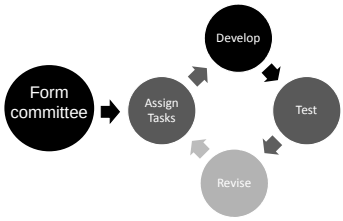
Surge Capacity

- Damaging earthquakes often:
  - Create mass casualties
  - Damage or affect the hospital directly
- How will you handle the influx of patients?
- Where and how will you triage patients?
- Treat them?
- What will you do with the "walking wounded" and the "worried well"?

Number and Severity of Casualties



Process for Developing a Plan



Tasks and Plan Development

- Gather information:
  - How are things done normally?
  - What would change after a disaster?
  - How can we do things better?
- Identify needs and gaps
- Each portion of the plan will have specific tasks
- Someone will need to write each draft section

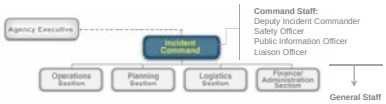
Testing the Plan

- Tabletop exercises
  - Simple
  - Enhanced
- Mock drills
- Large-scale exercises

Incident Command System

Standardized, all-hazards system for event or emergency management

Organization in a hospital could look like:



Expands or contracts based on incident size

Incident Response System

ICS adapted to Indian administrative context

Coming soon ….

Organization looks like:

IRS/ICS is designed to

- Meet the needs of events of any kind or size
- Allow personnel from a variety of organizations and agencies to meld rapidly into a common management structure
- Provide logistical and administrative support to operational staff
- Be cost effective by avoiding duplication of efforts
- Be flexible – no need to match the organizational structure for day-to-day operations

Slide credit: FEMA

Command and Control

- Unity of command
  - Clear
  - Creates accountability
- Transfer of command
- Span of control
  - Leader directly manages small number of resources
  - Optimal number in ICS is five; maximum is seven
  - ICS organizational structure expands and contracts as needed to maintain manageable span of control

Security and Crowd Control

People will converge on the hospital. Security will:

- Control access
- Provide perimeter security
- Manage vehicle traffic at emergency entrance
- Facilitate entry of patients and triage
- Designate areas outside the hospital but within secured perimeter for family members and the media

Communication and Liaison

- Communication of accurate and useful information is critical
- ICS/IRS specifically provides command staff
  - Information and Media Officer
  - Liaison Officer
- Communication with family members needs special consideration

Scenario

Photo credit: Janise Rodgers, GHI

Prepare People and Provisions

- Train the staff and repeat training on a schedule
- Conduct regular drills
- Implement preparedness measures called for in the plan
- Keep enough supplies on hand for 72 hours, including for your mass casualty plan

Mitigate Risk

- Seismic retrofit of building or replacement with earthquake resistant new construction
- Anchor, brace and protect
- Backup systems
- Insurance

During an Earthquake

Drop, Cover and Hold On

After an Earthquake

Put your plan into action!

- Help rescue/treat injured staff and patients
- Take protective measures
- Shut off leaking oxygen or gas if any nearby
- Be prepared for aftershocks
- Evacuate only if building in danger of collapse or if patients can't be treated inside

Protective Measures

- Don't put yourself in dangerous situations
- Don't use lifts
- No open flames
- Wear protective clothing: sturdy shoes, plus masks, gloves, and medical gowns

Questions?

EXERCISE

PERSONAL AND FAMILY PREPAREDNESS

If an earthquake happened now…

- How would you contact your family?
- Can they manage while you are working at the hospital?

If you were at home:

- What would you eat?
- Drink?
- How would you get to the hospital?

Create a Family Emergency Plan

- ✓Hold a family meeting
- ✓Designate an out of area contact
- ✓Pick locations for family to reunite
- ✓Identify safest places and exits in house and each room
- ✓Make sure everyone knows how to protect themselves

Protect Your Family Physically

- Check that your home or building was built to code with earthquake resistant features
- Identify and anchor falling hazards
- Secure gas cylinder
- Have a fire extinguisher and know how to use it
- Get one family member trained in First Aid

Home Hazard Hunt

- All family members should participate
- Check places where your family spends most time: where people sleep, eat, work and play
- Make a list of what needs to be done and tackle it one by one until it's finished
- Do the Hazard Hunt from the level of the shortest member of the family!

Prepare Emergency Supplies

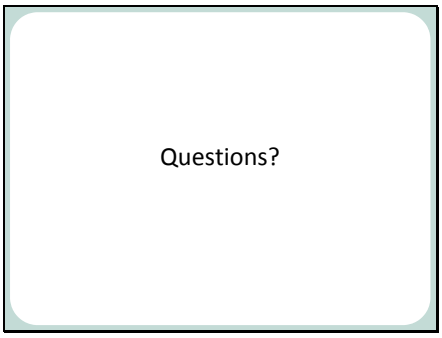
- You should plan to be on your own, without external aid, for 3 days at least
- What will you and your family need for those 3 plus days?

Sample Family Emergency kit

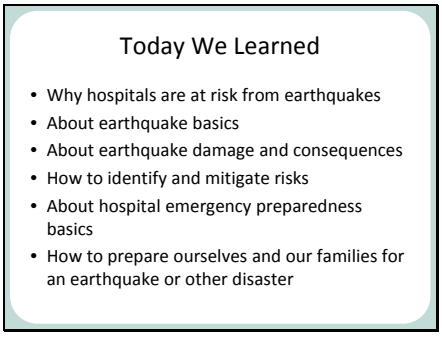
- Non-perishable food to last 72 hours
- Water (10 liters per day per person)
- First aid kit + prescription medicine + sanitary items
- Torch + spare batteries
- Radio + batteries
- Emergency cash
- List of emergency telephones
- Copies of valuable documents (scan & email)
- Spare eye glasses etc..
- Whistle

Get Trained

- Coordinate with your hospital's disaster preparedness committee
- Utilize local resources for training


Questions?


WRAP-UP


Today We Learned
• Why hospitals are at risk from earthquakes
• About earthquake basics
• About earthquake damage and consequences
• How to identify and mitigate risks
• About hospital emergency preparedness basics
• How to prepare ourselves and our families for an earthquake or other disaster

Next Steps

- Summary of next steps for project; will vary with situation

What YOU can do

- Think about your role
- Create a family emergency plan
- Drill and practice

Questions?

Help us improve

- Please fill out the questionnaire
- Let us know how we can improve:
  - the training
  - the manual
- Email any additional feedback to info@geohaz.org

Thank You

GeoHazards International — www.geohaz.org

GeoHazards Society India — www.geohaz.in

This training course was made possible by generous support from:

Swiss Re

Appendix – Resource Materials

Hospital Building Systems and Contents
Hazard Assessment Checklist

Section/ Block:	Date of Assessment:
Room Number/Use:	Assessment Conducted By:

Potential Hazards	Check if item present	Total no. of units	Does item need to be: Moved	Does item need to be: Anchored	Priority Level	Engineering required?	Supplies and tools needed
Medical Equipment							
Autoclave	□		□	□	2	☑	
Anesthesia machine	□		□	□	2		
Monitor	□		□	□	1 or 3		
Operation theatre light	□		□	□	2	☑	
Ventilator	□		□	□	2		
Imaging equip. (X-ray, CT, etc.)	□		□	□	2	☑	
Radiant warmer	□		□	□	2		
Wheeled or trolley mounted equip.	□		□	□	3		
Small wall-mounted equip.	□		□	□	3		
Laboratory bench-mounted equip.	□		□	□	3		
Blood bank refrigerator	□		□	□	2		
Other:	□		□	□		□	
Furnishings and Hospital Administrative Systems							
Cupboards	□		□	□	1 or 3		
File cabinets	□		□	□	3		
Medical records storage	□		□	□	3	☑	
Computer Equipment	□		□	□	3		
Other:	□		□	□		□	
Supplies							
On racks	□		□	□	3		
On trolleys	□		□	□	3		
Pharmacy	□		□	□	3		
Sterile storage	□		□	□	3		
Other:	□		□	□		□	
Mechanical and Electrical Equipment							
Emergency generator	□		□	□	1	☑	
Batteries for emergency power	□		□	□	1	☑	
Boiler	□		□	□	2	☑	
Geyser	□		□	□	3	☑	
Chiller	□		□	□	3	☑	
Cooling tower	□		□	□	3	☑	
Curb-mounted rooftop unit	□		□	□	3	☑	
Window or wall unit air conditioner	□		□	□	3	☑	
Window unit air cooler	□		□	□	1	☑	
Electrical cabinet or switchgear	□		□	□	1	☑	
Transformer	□		□	□	3	☑	
Domestic water pump	□		□	□	2	☑	
Fire suppression pump	□		□	□	1	☑	
Fire extinguisher	□		□	□	1		
Other:	□		□	□		□	

Potential Hazards	Check if item present	Total no. of units	Does item need to be: Moved	Anchored	Priority	Engineering required?	Supplies and tools needed
Pipes, Ducts and Conduits							
Small rigidly-attached pipes	□		□	□	3	☑	
Small suspended pipes	□		□	□	3	☑	
Large pipes	□		□	□	3	☑	
Conduits	□		□	□	1 or 3	☑	
Ductwork	□		□	□	3	☑	
Tanks and Medical Gases							
Compressed-gas cylinders	□		□	□	1		
Bulk medical gas tanks	□		□	□	1	☑	
Rooftop water tanks	□		□	□	3	☑	
Horizn. oriented cylindrical tanks	□		□	□	1 or 3	☑	
Other tanks:	□		□	□		☑	
Architectural Elements							
Parapets	□		□	□	1	☑	
Sunshades	□		□	□	3	☑	
Masonry partition wall	□		□	□	3	☑	
Suspended (false) ceiling	□		□	□	3	☑	
Pendant (hanging) light fixture	□		□	□	3		
Pendant ceiling fan	□		□	□	3		
Windows and glass	□		□	□	3		
Jalies larger than 1 m x 1 m	□		□	□	3	☑	
Entrance canopy	□		□	□	1	☑	
Other:			□	□		□	
Lifts							
Lift rail systems	□		□	□	3	☑	
Lift motors and generators	□		□	□	3	☑	
Lift control panel/cabinet	□		□	□	3	☑	

Priority levels: 1 = Critical Safety, 2 = Essential Services, 3 = Continuous Service

Notes:

GeoHazards International

A Nonprofit Working Toward Global Earthquake Safety

Cost Estimation Worksheet

Item to Be Anchored	Location of Item	Hardware Type	Unit Price (Rs.)	Quantity	Material Cost (Rs.)	Labor Cost (Rs.)	Total Cost (Rs.)	Priority (High/Medium/Low)
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
					0		0	
Total costs					0	0	0	

Total Cost for High Priority Items
0 Rs.

Total Cost for Medium Priority Items
0 Rs.

Total Cost for Low Priority Items
0 Rs.

Total Cost for All Items
0 Rs.

Disclaimer: All parties, including but not limited to GeoHazards International, GeoHazards Society, and Swiss Reinsurance Company are not responsible for any earthquake damage or the consequences thereof that occur despite or because of the application of measures described in this training course. In addition, trainees and users of this instructor guide are solely responsible for maintaining safe and appropriate practices when installing restraints or securing objects. Work on electrical systems, lift systems, pressure vessels, and certain other items described herein, is inherently hazardous and any work must be carried out by a professional tradesperson. All parties, including but not limited to GeoHazards International, GeoHazards Society, and Swiss Reinsurance Company, are not responsible for damage or consequences arising from installation or application, properly or improperly, of measures described in this training course.