B056

background study

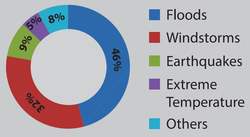
Natural and Manmade disasters are very frequent now a days, during and after disaster a good number of people become injured and died. Hospital's emergency became over crowded and most of the time they are unable to care this sudden number of injured people at that crisis period. Transportation system also collapsed and patients from disaster areas are left without treatments. In this crucial moments people need immediate healthcare support soonest possible time and in this proposal we would like to introduce some Smart facility which would be completely new approach in Healthcare Design.

Top Five most common disasters globally 2005-2014

Flood	Eartquake	Storms	Heatwave	Drought
1,753	1,254	988	262	223

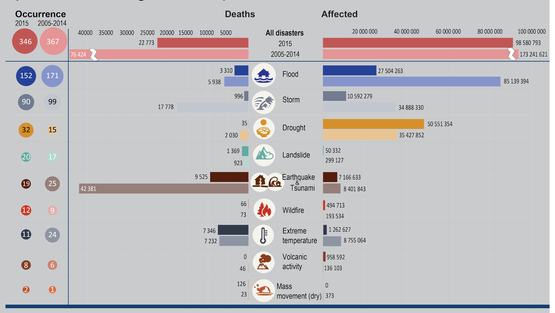
Number of Disaster:

Above chart shows the frequency of natural disasters from last couple of years. The number of disasters are increasing day dy days. in 2015, 346 reported disasters killed 22,773 people, 98.6 million people affected and economic damage is around 66.5 billion USD.



Natural Disasters in 2013

According to International Disaster Database human impact by disaster types (2015 versus average 2005-2014)





percetage data of different types of injured people

Disaster Triage:

A study on Disaster Triage shows four type of injured people based on The Sequential Organ Failure Assessment (SOFA) This triage indicate approximate number of injured and type of injury during disasters. The black marked group need intensive care while red and yellow marked group need emergency treatments. To give treatment this huge group of people on a hospital emergency and transport them to hospital is indeed a huge challenge. the percentage of injury may varied in different disaster but an average number are shown on above diagram.



At Preset along with public facilities, some social and activist group like red crescent, red cross etc. provide immediate healthcare support (first aid) to the victims on disaster areas. As they have limited resource on site, most of the time they could only provide immediate first aid and send the victims to the nearest hospital.

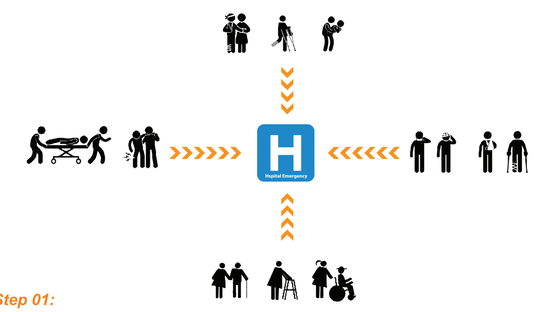
Findings:

From this simple background study, we generate our idea proposal that "during the crisis period not to bring patients (accept the serious one) to the hospital, rather to bring emergency support to the sites of disasters." which we named Crisis Care Cube(CCC). We hope it will able to provide advance treatment on site and reduce the pressure on hospitals. It will save times, save lives and handle the crisis more conveniently.

Sources:

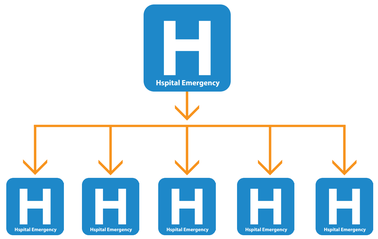
1. EM-DAT (25th January 2016) : The OFDA/CRED - International Disaster Database www.emdat.be Université catholique de Louvain Brussels - Belgium
2. RCRC; Issue 3-2015
3. Guidelines for Crisis Standards of Care during Disasters: American College of Emergency Physicians (2013)
4. www.ifrc.org (International Federation of Red Cross and Red Crescent Society)
5. Hospital emergency response checklist (World Health Organization)
6. Image Source: ICRC/Sona Tarabish; AFP; National Geographic Site

concept generation



Step 01:

Conditions of hospital's emergency during and after disaster are shown in the diagram, all type of ill or injured people gather in the hospital. Most of the hospitals don't have enough facilities to take care of this huge patient.

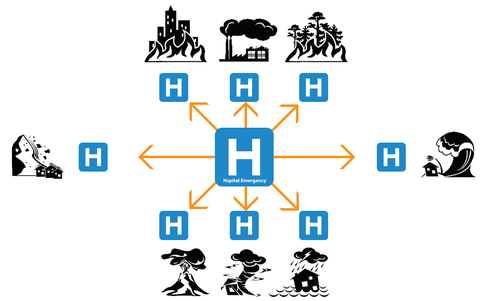


Step 02:

Dividing hospital emergency in several parts, or design new portable medical emergency unit, which would be modified and simplified hospital emergency for addressing injury on different types of disasters/crisis. For example, during or after cyclone, a crisis care cube is well equipped with relevant injury, will send to the site for providing treatment.

Step 03:

Rather than bringing patients/people in the hospital, sending emergency unit to disaster sites. Those crisis care cube should be light weight, easy to transport to several crisis regions. In flood affected region it should be floated, on a hilly area it should able to sit on uneven surface.

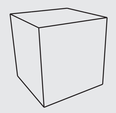


crisis care cube

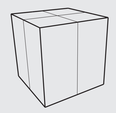
an emergency hospital unit during disaster



Design Initialization:


1

3m x 3m x 3m cube; easy to carry, enough storage space for emergency medications and equipments.


2

Divided the cube into four divisions.


3

All four chambers are the workstations for four doctors and at a time, it could serve four patients.


4

This central core will stored all necessary tools and equipments, medicines, power and water for emergency situations.


5

Adding partitions to the cube, which are mountable, made with light weighted and durable materials. This operable partitions will expanded and created 9m x9m workstation.


6

Adding roof and floor. The roof contain four more roofs; and the floor contain more floors, which will expanded at the time of need.

Sustainable Features:


central core envelop with partitions, roofs and floors.


medicine and tools storage


Solar paneled roof & power storage


water supply and waste water storage

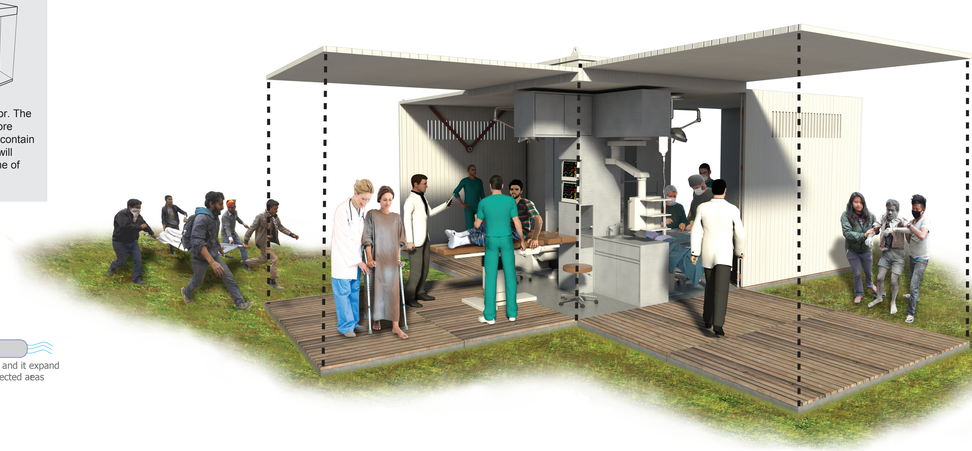

medical waste are stored inside CCC and transfer to safer place


adjustable leg to fit CCC on uneven surface

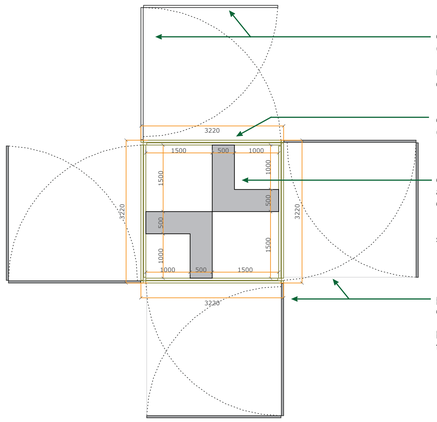

an air tube installed inside the base and it expand to float CCC while it serve flood e◆ected aeas


CCC should always connected to hospital via modern telecommunication technology, advices from specialists through video conference from hospital to site.

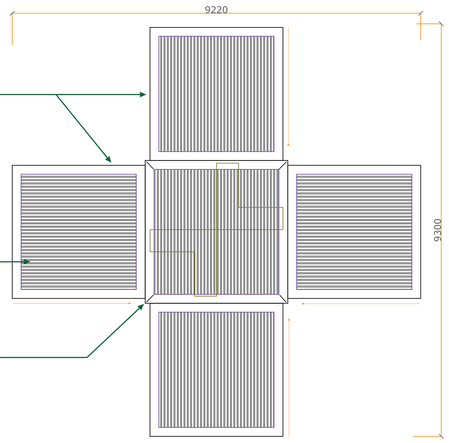




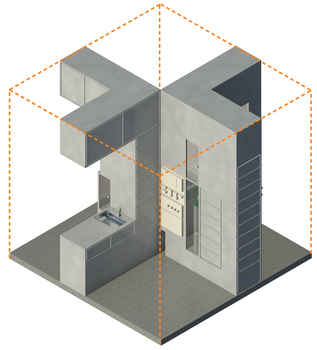




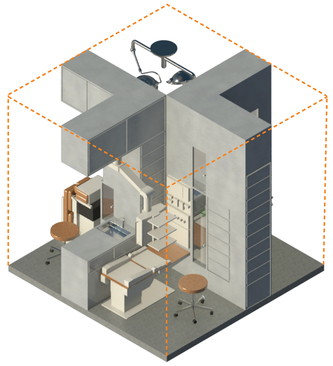
plan @ working level



plan @ roof level

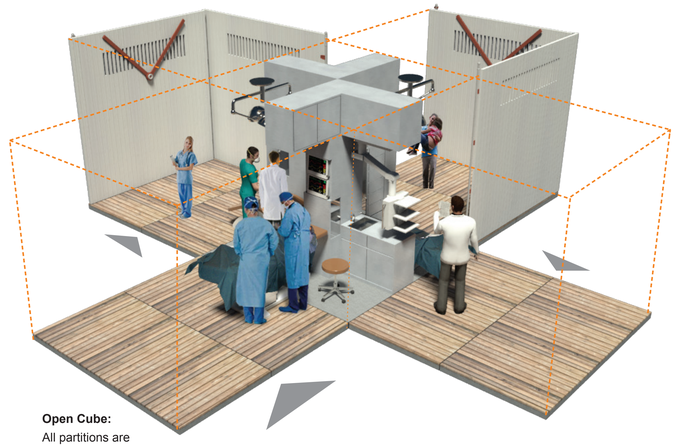


core of ***crisis care cube***



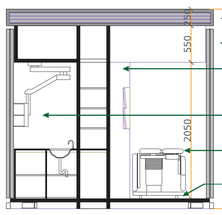
Closed Cube:

All equipments are folded when the CCC is closed. all specially design equipments are used which can folded and unfolded when nece sary. We also proposed multi purposes use of all medical equipments.

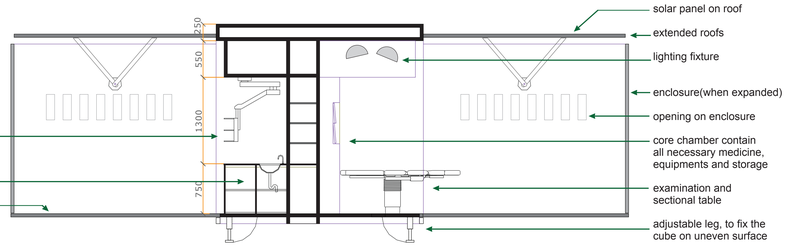


Open Cube:

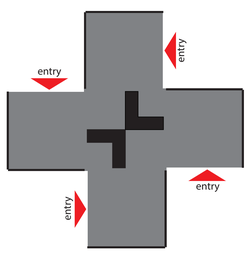
All partitions are
unfolded, floors are fixed with ground or on available surface.
Equipments for treatment like sectional tables are open to operate.



section (when the cube is ready to transport)



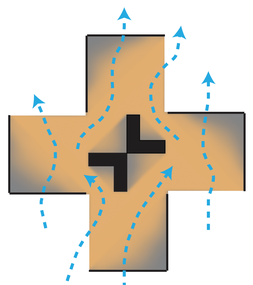
section (when the cube is in working condition)



Workable Space

Storage Area

The Gray colored area is the working zone for four patients at the same time while the black center core contain all necessary medical storage.



Natural Light Access Area

Air Circulation

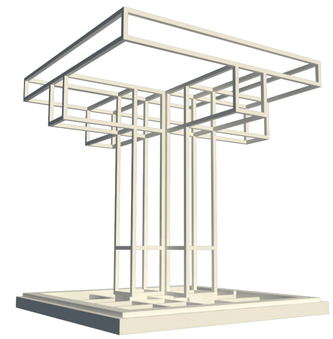
Open entrance & opening on vertical enclosures allow free air flow, cross ventilation and permit the maximum access of natural light.

Structural Frame of Core:

The frame of the core is made of 30x30mm SS frame. Base is made of 50x150mm SS frame and 2mm Aluminum sheet and the roofs structure made of 30x30mm SS frame.

Building Materials:

Structure: Stainless steel frame
Cladding materials: aluminum and ss sheet
Main floor: vinyl floor finishing on the top of metal sheet flooring.
Additional floors: wooden flooring on metal frame.
Roof: sandwich panel roof with solar panel. periphery aluminum frame
Side partitions: 50mm sandwich panel with peripheral aluminum frame.
Enclosures on entrance: vinyl curtain.



Major Medical Equipments List:

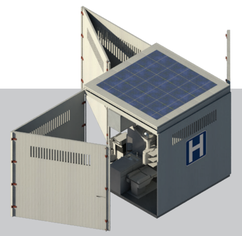
Sectional Tables, Power Treatment Table
Flexible Heating Elements
Patient Warmer
Laboratory Washer
Temperature Therapy
Dialysis Machine
Autoclave
Accasoris for Personal Protection
Patient Assessment/Diagnostic Tools
Stethoscope in Sizes
Blood Pressure Cuffs
2 Patient Care Flashlights
Thermometer(s)
Scissors for Cutting Clothing, Belts, and Boots
Pulse Oximeter
Suction Equipments
Suction Aspirator
Airway Management tools
Portable Oxygen Unit,
Bleeding Control and Wound Management
Burn Care Supplies
Rigid Cervical Immobilization Devices in all Sizes
Head Immobilization Device
Short Backboard with Straps.
Pediatric Spinal Immobilization Device
Cardiac Other Medical Care
Defibrillator & Defibrillator Pads
OB Kit;
Sterile Scissors or Other Cutting Utensil
Bulb Suction, Sterile Gloves
Appropriate Heat Reflective
Two-Way Communication Device.
Medications
Ocular Irrigation Device
Hot Pack(s), Cold Pack(s)
Emesis Bags/Basin
ANSI II Reflective Vests
DOT Emergency Response Guide
Hacksaw with Extra Blade
Screwdriver
Adjustable Wrench, Hammer, Chisel(s)
Tin Snips, Crow Bar
Fire Extinguisher,
Nebulizer Equipment
ETC.

How this CCC will Work



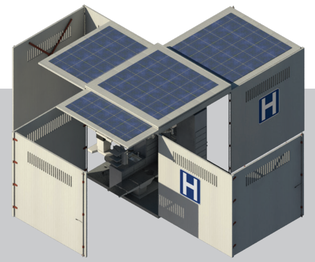
Step 1

closed cube is ready to transport; the core chambers are enveloped with folding partitions, floors and roofs. Total weight - around 10,000 kg and total volume - 36 cum



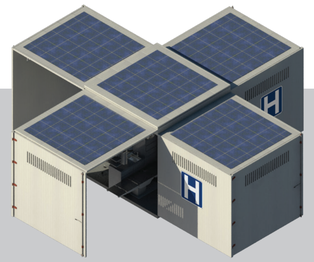
Step 2

Once this crisis care cube is installed in disaster site, the flexible and mountable floors and partitions will be expanded for serving injured people.



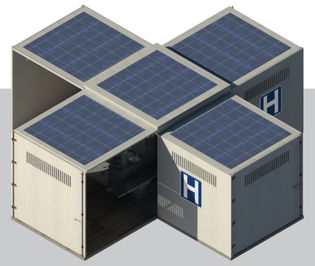
Step 3

All four chambers are expanded for serving. If the location has limitation of available space, this cube can be functional opening two or three chambers.



Step 4

Roofs and floors are unfolded; roofs are supported by partitions, solar paneled roof are the primary source of energy. Floors can be locally supported or arranged. This cube for flood effected area may have spacial type floor for flouting the cube.



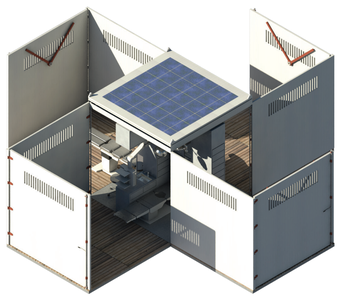
Step 5

The CCC is ready for serving injured people. vinyl curtain can be used on entrance.





The **CCC** is Serving Flood Affected Area



Axonometric View of The **CCC** (without extended roofs)



Perspective View of The **CCC** During Serving Time

The **CCC** can be transported by Land, Water and Air.

