2015 UIA-PHG International Student Competition

DESIGN OF A MOBILE ISOLATION, DIAGNOSIS AND/OR TREATMENT UNIT FOR USE IN EBOLA OR OTHER COMMUNICABLE DISEASE EPIDEMICS

1-3 M.I.CUBE

1Process,3Transformations,Mobility,Isolation--Cube

SARS

severe acute respiratory syndrome

A special kind of infectious pneumonia which would affect some organ systems.

November 16th,2002
The first SARS patient appeared in Guangdong.

November,2002--March,2003
SARS had spread to Guang xi,Hu nan,Shan xi and Hong Kong.

March 6th,2003
SARS spread to Beijing.

March,2003--May,2003
SARS spread to He bei, Shan xi and other 26 provinces in China, 31 countries and regions in the world.

During April 25th,2003 to May 7th,2003,there were 16 hospitals to designated hospitals of SARS in Beijing.

April 30th,2003
Xiao Tangshan Hospital was built in Beijing.

In late May,2003,the development of SARS had been controlecd.
China has 5327 confirmed cases of SARS, 349 people died.

Post SARS Era

Future?

■ Symptoms

Cough
Fever
Difficulty in breathing.

■ Way to Spread

Close respiratory droplets, mucous membrane contact transmission

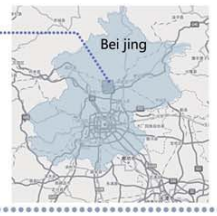
■ Way to Diagnose

Blood test,Urinalysis,Chest X-ray

■ Treatment

Isolation, rest, care, Oxygen to breathing difficulties,corticosteroids, antibiotics, anti-toxin drugs.

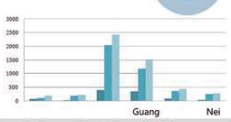
Xiao Tangshan Hospital



April 23th,2003--April 30th,2003
An area of 25000 square meters
About 1000 beds,Use of 51 days
Treatment of 680 patients
Rehabilitation of 672 patients
Located in the north east suburbs of Beijing,away from the city.

QUESTIONS:

■ A large number of medical staff infected.
The incidence of medical staff accounted for 23.25% of social groups.



Porvince	Tian jin	He bei	Bei jing	dong	Shan xi	menggu
Medical staff	67	22	394	346	78	42
Social group	109	188	2040	1168	367	247
Cases	176	210	2434	1514	445	289

■ Reasons for the high rate of infection .
a.Lack of protection.
b.No local isolation for probable patients.
c.Patients and probable patients ramained in the outpatient.

■ Number of cases and proportions of different occupations

Occupation	SARS Cases Number	SARS Cases Proportion	Probable SARS Cases Number	Probable SARS Cases Proportion
Doctor	208	35.49%	8	22.86%
Nurse	286	48.81%	22	62.86%
Technology	28	4.78 %	3	8.57%
Else	64	10.92%	2	5.71%
Total	586	100.00%	35	100.00%

Questions &Answers

Highly Infectious----Isolation Is Important

It has an incubation period less than 2 weeks,2 to 10 days generally.
Once infected,it will be in progression in 2 to 3 weeks.

Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July

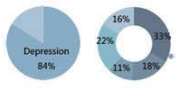
Areas	Number of cases	Number of deaths	Case fatality	Number of recover-
Australia	6	0	0	6
Canada	251	43	17	194
China	5327	349	7	4941
China, Hong Kong	1755	299	17	1433
China,Taiwan	346	37	11	309
France	7	1	14	6
Germany	9	0	0	9
India	3	0	0	3
Indonesia	2	0	0	2
Italy	4	0	0	4
Malaysia	5	2	40	3
Mongolia	9	0	0	9
Philippines	14	2	14	12
Singapore	238	33	14	172
Sweden	5	0	0	5
Thailand	9	2	22	7
United States	27	0	0	27
Viet Nam	63	5	8	58
Else areas	16	1	6.3	19
Total	8096	774	8.9	7219

Transportation Lead To A Wide Range of Infections----Local Isolation Is Important

Xiao Tangshan Hospital

High Rate of Medical Staff Infection----Protect Medical Staff Is Important

■ A high proportion of patients with SARS have mental depression.



The degree of depression	Proportion
Severe	33%
Moderate	18%
Mild	11%
Unaware of their status	22%
No depression	16%

High Proportion of Mental Depression----Psychological Care Is Important

■ Xiao Tangshan Hospital is in ruins now,it can not continue to be used.

Low Utilization of General Hospital after SARS----Assemblable Hospital Is Important

GOALS:

Because of these problems during the treatment of SARS,it is necessary to design an medical unit,which can deal with the isolation,transfer,diagnose and treatment of SARS.
The medical unit have these advantages below.
a.Mobility b.Isolation
c.Flexibility d.Psychological Care

The large-scale outbreak of SARS caused tremendous damage to the whole China and the world.Now,10 years have passed, SARS is possible to come back again.

We investigated the causes of SARS, mode of transmission, dis ease characteristics, diagnosis and treatment methods.So that when it erupted again, we can deal with this disease quickly a nd effectively.And we can also deal with other respiratory dise ases which have the same causes, mode of transmission, dieas e characteristics, diagnosis and treatment methods with SARS.

We designed a treatment unit which could move at any time,a nd it could achieve the goal of local isolation.Mobility,Isolatio n,Flexibility and Psychological care are advantages of this treat ment unit.

To achieve better therapeutic effect ,the treatment unit can be stretched according to different treatment situations and defo rmation.At the same time,it can befreely combined.

Transfer Track

Transfer Track and Forklift for Discharge Isolation Unit

Transfer Track and Inner Structure of Isolation Unit

■The Flow Chart Of Isolation Treatment 1--- Isolution And Transhipment

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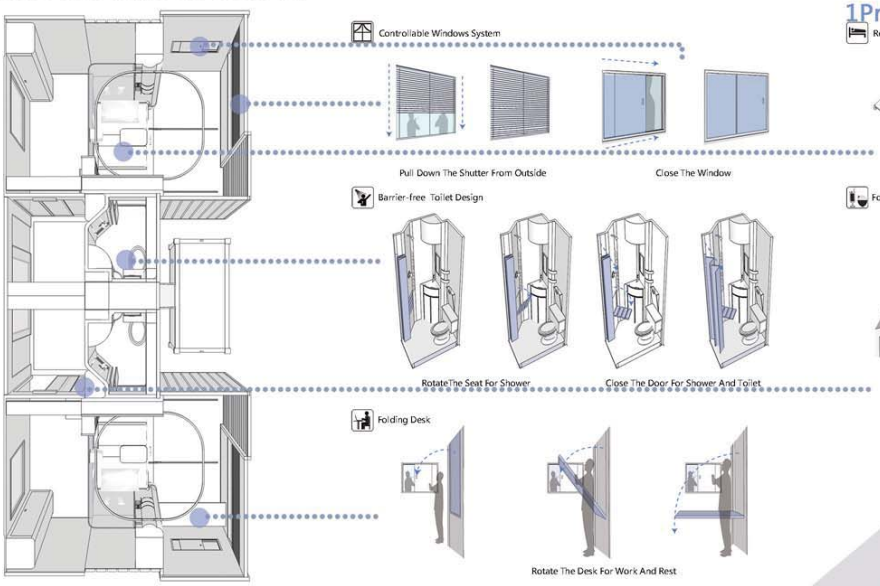
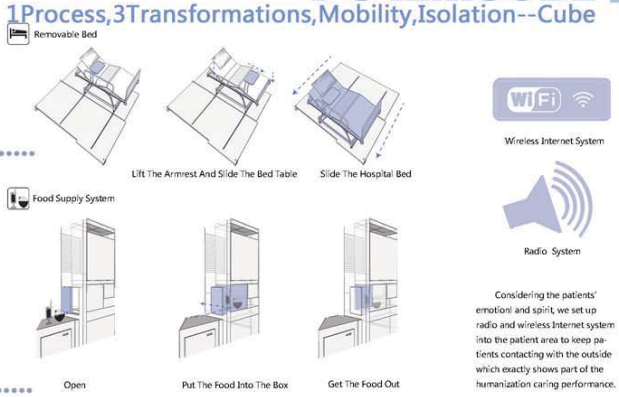
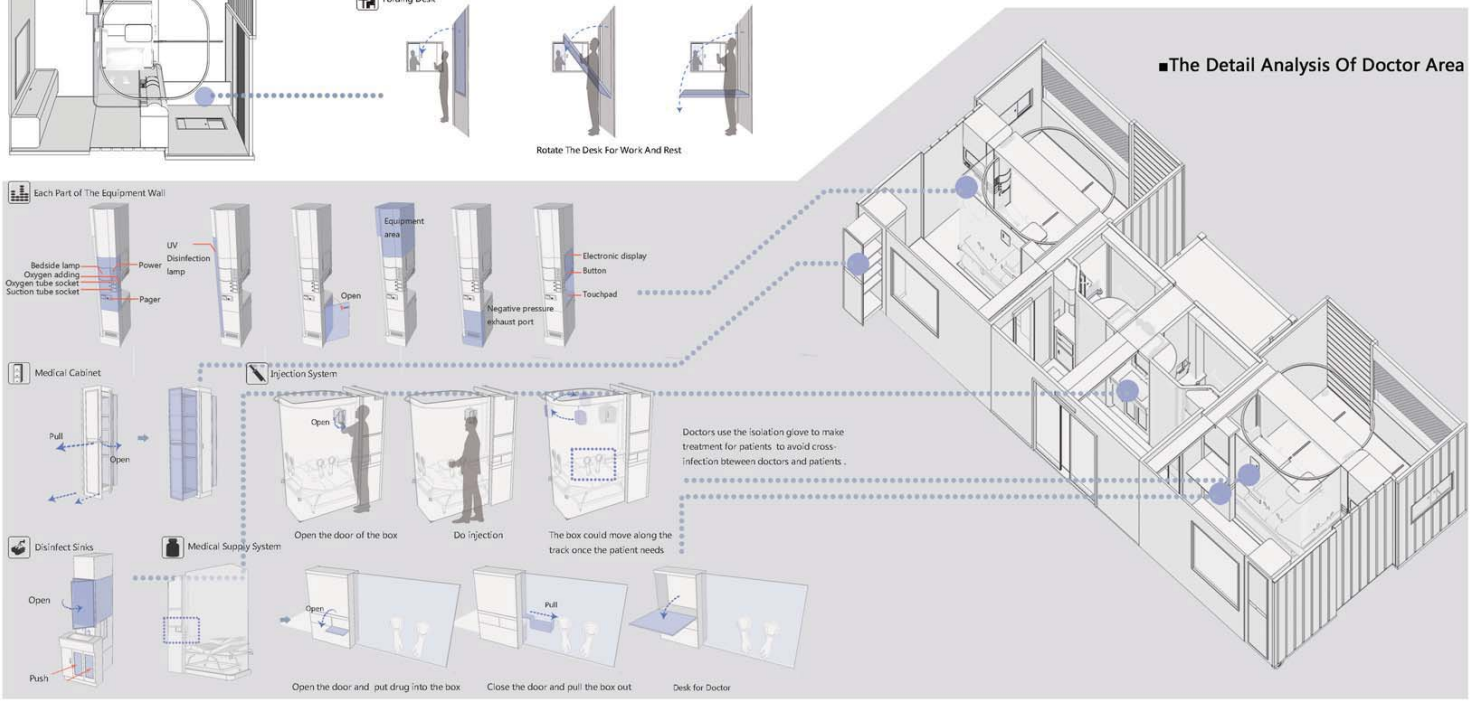
■The Detail Analysis Of Patient Area



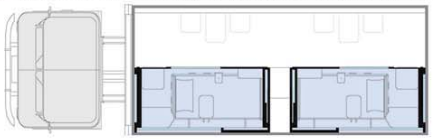


Considering the patients' emotional and spirit, we set up radio and wireless Internet system into the patient area to keep patients contacting with the outside which exactly shows part of the humanization caring performance.

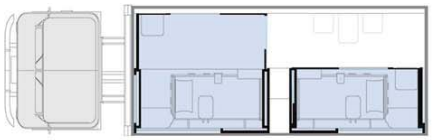
■The Detail Analysis Of Doctor Area



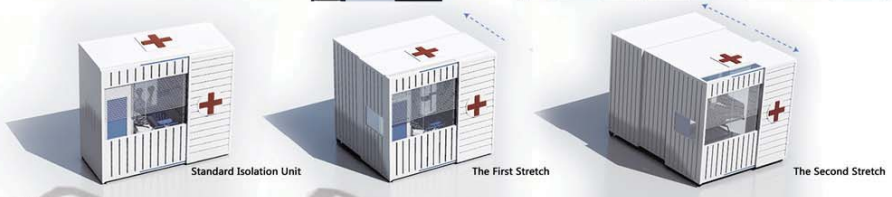
■Moble Isolation, Diagnosis And/Or Treatment Unit Plan



■Transfer Treatment Unit Plan



■ Isolation Unit Plan And Model



■The Flow Chart Of Isolation Treatment 2--- Splicing And Assembling

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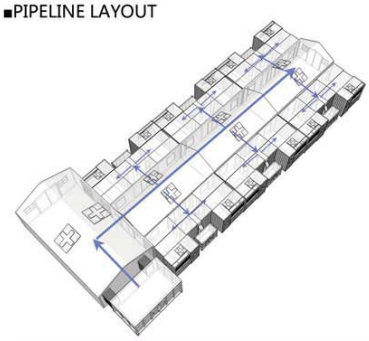
■PIPELINE LAYOUT



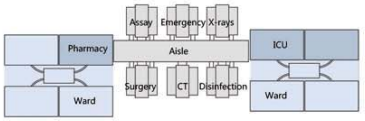
The energy for everyday-life and treatment in the compartment is supplied by the precast equipment box of the shelter hospital.The pipelines are installated below the medical corridor base, attached to each prefabricated bathroom module,and then connected to the compartments on the both sides.

Gas Pipeline
& the Indoor Air Flow

Power lines

Water Pipes & Sewage

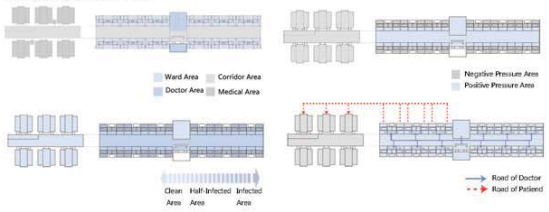
- China's existing mobile medical model--Mobile field hospitals.
- In the 1990s,China began to design Mobile field hospitals.
- In 1996, the first generation of Mobile field hospital was designed..
- In 2003, the second generation of Mobile field hospital was designed.
- Dump truck is its capacity to maneuver.
- It is used in a variety of emergency treatment of natural disasters .
- Modular and can be combined flexibly.



Plan of Mobile field hospitals

Plan of Medical Unit

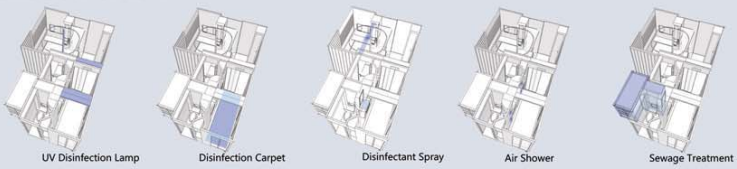
■AREA ANALYSIS PLAN



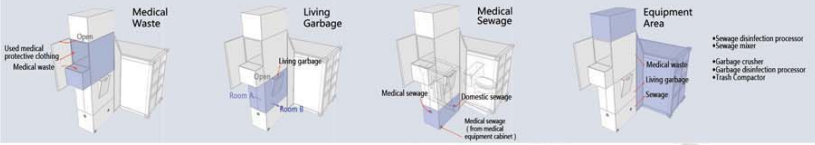
There are 6 medical modules in the medical technology area.With the number 6 as the module to establish the combination system,considering reasonable nursing route,24 isolation units are combined as a group of isolation ward.To coincide the isolation units,12 prefabricated bathroom modules are needed.As both the isolation unit and the bathroom module are a quarter of the standard cabin,it will be very efficient in terms of transport.

The combination mode can be choosed flexibly,in order to adapt to different terrain,or to meet the needs of patients using medical equipment in the medical technology area.

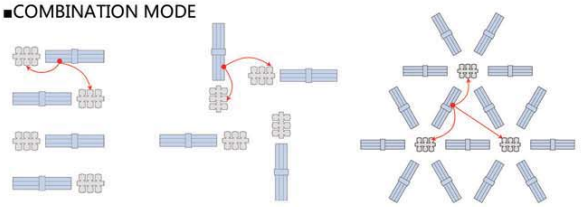
■DISINFECTION SYSTEM



■GARBAGE DISINFECTION& TREATMENT DEVICE



■COMBINATION MODE



■The Flow Chart Of Isolation Treatment 3--- Shrink And Check