# Mobile Telemedicine Clinics



## Expand your healthcare services to rural areas.

A complete solution by Normeca AS



Mobile (semi-permanent) hospital based in flat pack containers.

With a medical call center linked up with mobile telemedicine clinics.

No need for full-time doctors to operate the clinics (as long as they are connected to a medical call center staffed with necessary doctors).

Complete setup can be operated by nurses and trained staff.

## 😵 Normeca 🕯

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### Introduction

It is an unfortunate fact that many countries around the world is missing the basic healthcare services for their population. This is a huge challenge and especially when you get outbreak of diseases like Ebola. We have seen in West Africa that during the outbreak of Ebola all other healthcare services are shut down drastically. The result is that people with Malaria or other diseases are going from an already very difficult treatment situation to more or less a non-existing treatment situation.

Normeca AS has together with their partners around the world developed a unique concept that could offer a large number of people in rural areas an effective medical healthcare service to a reasonable cost.

The concept consist of two main parts – **part one** is a semi-permanent 20 bed hospital and **part two** is the new and unique concept that consists of two parts again 6 one part is what we have called the Medical Call & Alarm Center and the second part is what we have called the Mobile Telemedicine Clinic.

We have estimated that each clinic can quite easily treat around 50 patients daily or around 15.000 or more yearly. If you have five Mobile Telemedicine Clinics going around all year, you will have the possibility to treat around 75.000 patents a year. The OPD in the hospital will have the same capacity so this means you can treat close to 150.000 patients in the Mobile Telemedicine Clinics and OPD together, in addition we can have close to 3.000 inpatients.



These clinics are perfect for screening of Ebola, Malaria, HIV and many other diseases.



### **Part 1 - System Description**

**Part one** is a semi-permanent 20 bed hospital with additional 4 ICU beds, 3 Recovery beds, 3 observation beds in an emergency department, 2 operating theatres in connection with an emergency department, digital x-ray and Ultra Sound, a dental clinic, laboratory and 5 consultant & treatment room in a OPD with a reception & registration area. The hospital will have separate administration and support block with kitchen and laundry, a technical block and a small isolate for possible infected Ebola patient. If or when it is confirmed that a patient is infected by Ebola, the patient should to be moved to a special Ebola hospital. The hospital will also be equipped with two ambulances.

Normeca AS objective with this concept is to fulfil both long term and immediate needs for medical treatment in a disaster area or areas with immediate need for relief for other reasons, while at the same time securing longer-term need and interest being taken into account.

Mobile and primarily tent-based hospitals have become state of the art wherever medical relief is needed after a disaster and in an emergency situation. They are quite inadequate for longer-term operation and were of course never intended for this.

Normeca AS is introducing a hybrid model: A central 20 beds hospital based on flat-packed containers that may be connected and designed according to the need and purpose with a very short building period. The concept was tried and tested in Thailand after the Tsunami where the victims' identification center was built using 64 flat-packed containers and built in 10 days including an extensive infrastructure.

Containers of this kind may have a lifetime up to 20 years or more dependent on satisfactory maintenance.

Another key ingredient in this flexible concept is the use of local resources to prepare all infrastructures and build the semi-stationary hospital. Also, emphasis has been placed on using standard material and equipment of various kinds that may be purchased locally.

Smaller medical clinics or satellites can be based on the same principles and be placed in an area around the central hospital unit i.e. in a radius of 50 to 150 km depending on the emergency situation and population etc. This way, the turnkey solution will provide relief to a large number of people in a very short time.

When the units are to be disassembled and moved alternatively split into smaller units, this is easily done in this flexible and modular solution.



#### **Clinical Services**

The hospital should be running a strict adherence to infection control procedures all the time during the provision of medical care.

#### **Emergency Care Services.**

The proposed hospital have a 24/7 emergency care services with three beds and all necessary and adequate equipment. In a situation with mass casualty, the recovery room with three beds can also be used for emergency treatment. Also ICU can be extended with two more beds in each room to a total number of six beds in case of mass casualty, but without respirators to all beds.

#### **Intensive Care Unit.**

The proposed hospital will have two rooms with one bed each room for ICU treatment. It is based on one nurse for each patient 24/7 and the monitors will be connected to a central station in the nurse station. The ICU rooms will be very well equipped with all necessary medical equipment for use in ICU like respirators, monitoring, infusion pumps, syringe pumps, defibrillator, resuscitation and intubation equipment, suction, O2 flow meter with more and only CE approved equipment will be used.

#### **Surgical Treatment Facilities.**

The proposed hospital will have two surgical operation theatres with a pre-operation room between where also the scrub station will be. One OT room will be for ordinary surgery

including laparoscopy as an option and the second OT will could be used for orthopaedic surgery. The pre-operation room can also be used as an ordinary operation theatre as it is equipped with a smaller anaesthesia machine, operation table and lights if a mass casualty should happen. All equipment used will have CE approval. All treatment can be documented in the patient system and stored at the server in the IT/Medical Report room, it will be easy to find back at any time needed.



#### **Dental services.**

The proposed hospital will have necessary dental services including simple dental prosthesis.

#### **Out Patient Service - OPD.**

The proposed hospital will have OPD that will meet the same standard as for inpatient services. The OPD will be open from Monday to Saturday each day from 08.00 am to 06.00 pm and on Sunday from 10.00 am to 04.00 pm. The OPD will have two treatment rooms, one for female and one for male and three consultant rooms around a reception with separate waiting area for male and female. We have also in connection planned for a separate waiting



area for male and female outdoor in the atrium. The area has separate toilets for male and female, each three toilets next to the reception.

#### **In-Patient Ward Services.**

The proposed hospital will have a separate ward for male and female with each one six beds room, one with three beds room and one VIP room with one bed and its own toilet and shower room. The ward will be staffed 24/7 with a nurse station and a relax room for nurses on duty. It should always be a minimum of one nurse for each five patients. There should be a doctor visiting all patients at least two times a day,

in the morning and in the afternoon. All patients will be served food at least three times a day from the hospital's own kitchen and it should be arranged coffee, tea and water station together with fruits for all in-patients.

#### Laboratory Services.

The proposed hospital will have all necessary laboratory services according with international standard that is open 24/7. The laboratory will have the necessary equipment for testing of biochemistry, liver function, kidney function, pancreas enzyme, cardiac enzyme, haematology, blood grouping, cross-match, blood gas analyse, routine urine, microbiology including cultures and microscopy, malaria screening, pregnancy and HIV. There will also be an Elisa analyser to screen for Ebola.

#### **Radiology Services.**

The proposed hospital will be equipped with a digital x-ray machine and Ultra Sound according to international standard – all equipment with CE approval.

#### **Pharmacy Services.**

The proposed hospital will have its own pharmacy with connected storage room. The pharmacy should have a stock that covers the most common needs and will be managed by a qualified licensed pharmacist.

#### **Non-Surgical Specialist Services.**

The proposed hospital OPD should be staffed with doctors for taking care of the non-surgical services.











#### **Hospital Infrastructure.**

The building itself is based in flat pack containers connected to each other with roof on the top and looks like pre-fabrication when finished. The ICU, OT and Emergency department plus the IT/Medical Report room will have back up on electricity using UPS. All rooms will have emergency lights running for up to half an hour.

The hospital will have the necessary capacity for 24/7 emergency care including triage, resuscitation, stabilization and patient preparation for medevac.

#### **Rapid Deployment**

The containers are all flat packed with four containers on top of each other for one normal standard ISO container during transportation. The weight of each container is approximately 2.000 kg.

#### Materials.

The structure of the building is made by steel and the containers are very well suitable for use in tropical climates. All floors are of play wood and not suitable for the termites to eat.

#### Minimum Maintenance.

The buildings will need only a minimum of maintenance.

#### **Useful Life.**

The building will have a minimum of 20 to 30 years life time with a minimum of maintenance. The building can be taken down and moved for to be set up on another site if necessary.

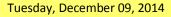






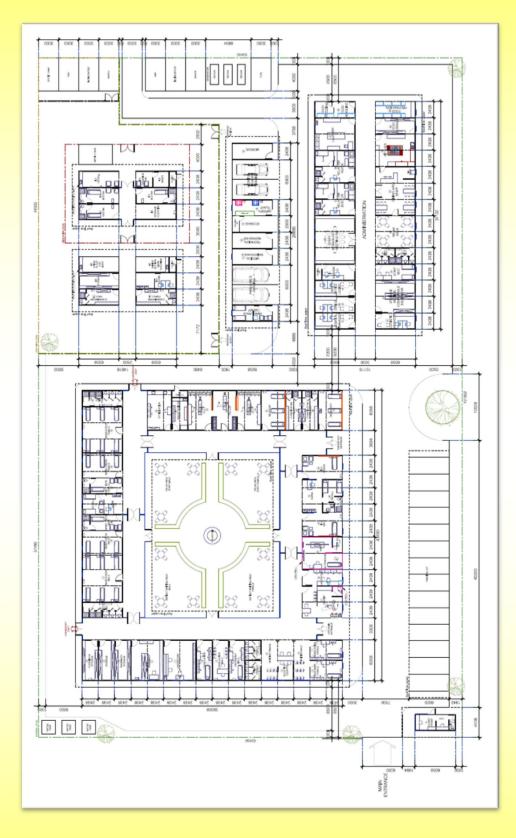








#### **Design Concept.**



The design is based on flat pack containers modules and can be set up in different ways depend on the site.





#### **Electric and Generators.**

All wiring and cables are included with distribution cabinets in each block. The proposed hospital will have three generators each 150 kva where two will run simultaneously with one back up.

#### Air Conditioning.

The proposed hospital will have A/C in most of the rooms. All A/C will have its own remote control to regulate the temperature with more. All rooms will have a mechanical fan as well.

#### Water Treatment and Storage.

The proposed hospital will have its own water treatment system and distribution system. The proposed hospital will have a storage capacity of 30.000 litre water.

#### Waste Disposal and Incinerator.

The proposed hospital will be equipped with incinerator.

#### **Security Fencing.**

It will be a 2,40 meter high fence around the site as well as security lights on strategic places around the site. There will also ve CCTV on strategic places around the hospital.

#### **Construction Timeline.**

We expect 14 to 21 days production time, 3 to 5 days air freight time and around 30 days construction time. It means a total of approximately +/- 45 to 50 days if everything goes as expected.







#### **Facility Management.**

- Normeca AS can provide all necessary kind of management facilities including cleaning, pest control, laundry service, waste management with more.
- Normeca AS can provide all necessary consumables, medical and all other areas in the hospital like toilet paper, soaps with more.
- Under Normeca management the hospital will be fully cleaned two times a day, all toilet every second hour and each OT after each time use. It will always be one cleaning staff on duty in the night time if anything happen and things need to be cleaned. It will be worked out working instruction for all positions.
- The facility management can cover both the hospital and the isolation block and all other buildings belong to the hospital like the administration block, the technical bloc and the security block.

#### Ambulances.

In connection to the hospital there should be two fully equipped ambulances with Codan radio communication with the hospital.





## **Part 2 - System Description**

Part two is unique concept that consists of two parts – one part is what we have called the Medical Call & Alarm Center and the second part is what we have called the Mobile Telemedicine Clinic based in 4 x 4 wheels vehicles. The Mobile Telemedicine Clinic is connected to the Medical Call & Alarm Center in the hospital using Codan or similar. This will allow us to send medical data and video in real time from the Mobile Telemedicine Clinics directly to the Medical Call Center located in the hospital. The medical call center will be staffed with necessary doctors and medical personnel that can decide if the patient can be treated where it is or if the patient should be brought to the hospital.

#### **Medical Call & Alarm Center**

#### **Alarm Central**

The alarm central will have communication with the ambulances and mobile clinics. The central will also track the ambulances and mobile clinics with GPS. The alarm central will be installed with software in order to easily make any kind of statistic. This statistic can be used to give better location of the ambulances and mobile clinics, make the after training of staff more effective, see if there is any particular area where the need is higher than others.



#### Communication

Control room system for alarm handling, dispatching, radio communication, telephony and reporting is an absolute necessarily. COM4500ICS is a user friendly control room application which combines alarm/incident management, radio & telephony communications and reporting into one unified system.

This system can be configured in a way that it fulfills requirements for different environment such as:

- National control rooms
- Regional control rooms
- Local control rooms
- Fallback control rooms





#### Mobile control rooms

CAD is the communications application that holds a number of functions very similar to functions found in Private Branch eXchanges, e.g. Transfer of calls, conferences between more subscribers, monitoring conversations. All these functions works seamlessly between ISDN lines, GSM phones, Tetra radios and Analogue radios. GIS is the presentation application that on an electronic map displays alarms and resources geographical position and actual status.

All the cars should be equipped with IHM Status Panel which makes it simple to transmit status and text messages from all types of TETRA mobile radios (e.g. MOTOROLA, EADS, Sepura & Cleartone).

#### **Mobile Telemedicine Clinic**

The Mobile Telemedicine Center is equipped like a real good equipped doctor's office or a clinic with ECG 12 lead, Ultra Sound, NIBP, SaO2, Spirometer, Audiometer, Defibrillator, Laboratory and much, much more. The unique thing is that you do not need to be a doctor to use it. All equipment is very easy to connect to the patient and all data is sent online directly to the Medical Call Center where a doctor will analyze all information and video in real time. The doctor can then easily make the decision what to do with the patient.



#### **MCU and the Inmarsat BGAN Satellite telecom**

The following is based on Broadband Global Area Network Satellite system and the MCU.

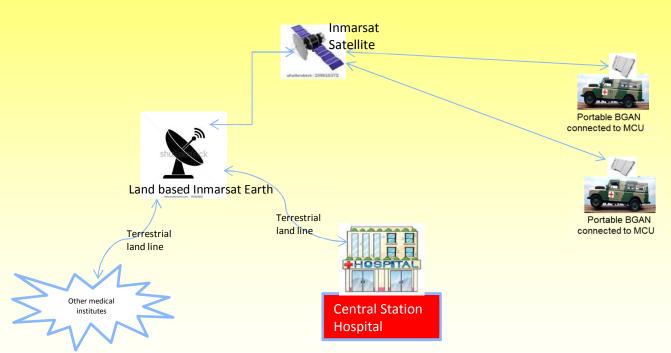
Each Mobile unit (4x4 wheel car) will have a Medical Care Unit (MCU) and a portable Broadband Global Area Network (BGAN) satellite uplink system.

The MCU will enable for an onsite medical examination to be performed at any remote site necessary. With the MCU one need not have a former medical education as all data will be transmitted to a medical central base (Hospital) and/or to another medical center anywhere in the world.

From here the onsite staff (at remote site) can receive directions as to what to look for and which examinations need to be performed. Meantime the medical personnel (at medical center) can not only see the patient via video transmission, but also evaluate the data transmitted via satellite (Ultra sound, ECG, NIBP, Blood and Urine samples, Orthoscopic, etc.).

The MCU in the mobile vehicle will be connected to a BGAN. The Inmarsat BGAN can be easily set up in order to transmit the collected medical examination information. Data can be sent either in batches, after all examinations are performed, in order that the





medical staff can review, OR be sent in a streaming mode, so that the medical staff can give Real-time consultancy and have a Virtual-onsite-presence.

The BGAN connects to an Inmarsat Satellite which has coverage almost around the entire earth. The data signals are relayed through the Inmarsat satellite to an Earth Station. An Earth Station can be found in many different locations around the world.

From here all data is sent through a terrestrial link (land line cable) to the receivers (Medical Centers, Hospitals, Specialists). The Inmarsat BGAN is a 2 way communication system (send and receive). Please see <u>http://www.inmarsat.com/service/bgan/</u> for further information.

The great advantage with this Telemedicine system is that now several areas can receive onsite medical assistance with less medical personnel. Patients need no longer have to travel long distances to visit a medical site.

Also this MCU and BGAN solution gives access to multiple medical centers around the world. In any instance where a medical specialist needs to be consulted then this Telemedicine system can provide this possibility without the loss of time or cost of money (transport, accommodation, visa, etc.).

Portable B GAN linking the MCUs to the Central Station Hospital through an Inmarsat Satellite. It is also possible to transmit data to other medical institutes, anywhere in the world, at the same time.



#### **MEDICAL ASSISTANCE – ANYTIME - ANYWHERE**



The **MCU** or **Mobile Care Unit** is the only portable medical kit system which offers Ultra Sound (examine for internal damage, broken bones, heart, pregnancy) and Orthoscopic (examine ears, nose, throat) plus many more options.

The pictures (both video and still) can be sent to your medical center in real-time for instant observation and analysis. In addition the **MCU** allows for both urine and blood samples.

The "user" doesn't need to have a medical background then the "user" can be directed by the doctors on the other side. Video makes it very easy for the doctor to have the "on-site feeling". The **MCU** screen allows for both sides to see 3 windows (1 of the patient, 1 of the doctor and 1 of the exam pictures/video being sent). All exams are done by pressing the icon on the PC screen.

The **MCU** then does the exam automatically and sends the results in real-time to your medical center and/or other doctors or specialists any place in the world via all forms of telecommunication (Satellite, LAN, WLAN, 3G, WIFI, PSTN). All examination information is sent in real time. If there is no connection then the information is saved in the **MCU** and can be sent later. The size of the data transmitted is very small, much like a few words written for a text message.

The **MCU** is a portable, fully automatic, robust system which allows you to do a complete physical examination (Ultra Sound, Orthoscopic, ECG, Non-Invasive Blood Pressure, Spirometry/Lung Capacity, Pulse Oximetry/SPO2 with more) onsite anyplace in the world. It



allows anyone, even with very little medical knowledge to perform a complete medical examination according to instruction from the doctor via "telemedicine".

All examination functions in the **MCU** are fully automatic.

In regards to the ECG you only need to place the ECG reader box on the patient's chest and it is not a lot of cables with sticky tape which need to be correctly placed.

This is ideal if you just have used the defibrillator in the **MCU** kit and needs to monitor the patient's situation.

The **MCU** is capable to automatically perform the following functions:

- 1. Ultrasound (to examine for broken bones, heart or internal bleeding)
- 2. Orthoscopic (for ear, nose, throat exams)
- 3. NIBP Blood pressure which is performed and read automatically
- 4. ECG heartbeat, NO adhesive sensors, with a lot of wires, are necessary
- 5. Defibrillator (Heart Starter)
- 6. SPIRO measurement of the lungs capacity
- 7. SPO2 measurement of oxygen in blood
- 8. Other analyses and tests (blood glucose, cholesterol, urine analysis, vision, hearing)
- 9. Test of Malaria, HIV, Hepatitis
- 10. A Camera allows for real time visual examinations



Menu from the computer screen



The **MCU** can be delivered in a suitcase showed in the picture or build into a cabinet in a Van like Mercedes Sprinter or similar car together with an examination table, small office and other equipment if wanted as a complete and fully **Mobile Clinic with its own laboratory**.

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#### The software can be delivered in different languages.

This system is amongst many other areas a very good solution for countries with lack of medical services in one or another way to quickly solve the "top" of the problems in a cheap and easy way. If you set up a central with specialists within the different areas, they can support many teams at the same time in the field. Only patient's with "really" need of medical treatment and/or surgery in a hospital need to be brought in.

If you already have hospitals and clinics/healthcare centers in your country, but with missing equipment and/or doctors and nurses, set up an examination clinic each place connected to one or more centrals with medical specialists. If you are lack of hospitals and clinics too, set up the necessary numbers of mobile clinics to go around in areas which need this kind of services. In this case we can also offer semi-permanent hospital ready to use after some few months any places in the world including management and all kind of necessary staff if needed.

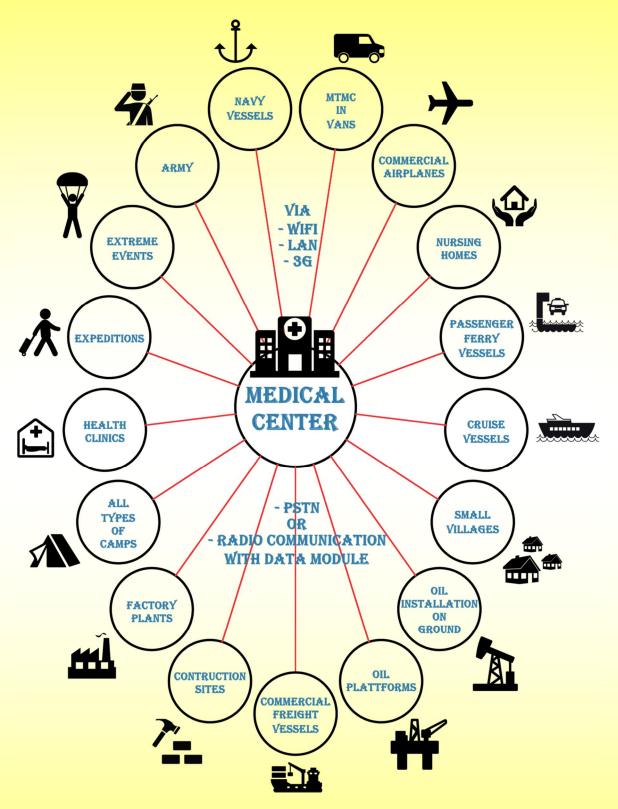
The **MCU** is also perfect onboard in ships, oil installations and platforms, any kind of plants with many workers and much, much more.



**Normeca** can offer complete packages including management, medical specialists and other necessary staff to run the operation during the time we are training your local staff to take over the operation after an agreed period of time. Please contact us today for more information and an informal offer.



#### **MOBILE TELEMEDICINE UNITS & CLINICS**



## Summary

What we would propose in this binder is the following configuration;



List #	Description	Qty.	
01-00	Infrastructure	1	
01-01	Ward - 6 beds	2	
01-02	Ward - 3 beds	2	
01-03	Ward - 1 beds	2	
01-04	Nurses Office	1	
01-05	Morgue	1	
01-06	Cleaning Ward	2	
01-07	OT I - Orthopedics	2	
01-08	OTII	2	
01-09	Anesthesia Room	1	
01-10	Surgical Instruments	3	
01-11	Post Op - 3 beds	2	
01-12	Changing	4	
01-15	Trauma / Day surgery	1	
01-16	Emergency - 2 beds	1	
01-17	ICU - 2 beds	1	
01-18	X-ray/ Ultrasound	1	
01-20	Sterilization	1	
01-21	Doctors Office	2	
01-23	ENT	1	
01-24	Ophthalmology	1	
01-25	Gyn	1	
01-27	Dental	1	
01-29	Laboratory	1	
01-30	Pharmacy	1	
01-31	Blood Bank	1	
01-33	Ambulance Central	1	
01-37	Storage	5	
01-39	Maintenance/Biomedical Workshop	1	
	IT (incl. server, patient software, switchboard		
01-41	etc.)	1	
01-44	Waiting Room	5	
01-45	Reception	5	
01-46	Outside waiting area	1	
01-47	Incinerators	1	
01-48	Guard House w/CCTV System	1	
01-51	Bedroom	4	
01-52	Consumables	1	
01-53	Medicine	1	
01-54	Clothing	1	
01-55	Orthopedics implants	1	
01-57	Plates & Screws	1	
01-58	Personal Protective Equipment	1	
01-59	Oxygen Plant	1	



MEDICAL H	HEALTH	CARE	SERVICES
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01-60	Hospital director/meeting room	1
01-61	Offices	9
01-62	Kitchen	1
01-63	Dining	1
Mobile Clin	ic & Ambulances	
List #	Description	Qty.
01-64	Ambulances	2
01-65	Mobile Telemedicine Clinic	5
Freigh & Ins	surance	
Treigh & Ins		
1 1	Freight to site	1

The estimated price for a configuration like the proposed is around USD 10 mill for the hospital including the ambulances, mobile clinics, freight, insurance and erection (all listed up above turn-key) and we expect it will have a running cost of approximately USD 10 mill a year for all staff, fuel, food, spare parts and consumables.

Normeca can build clinics, hospitals, accommodation and/or offices based in flat pack containers in any size and with any layout up to three floors. These units can be complete with all kind of medical equipment and infrastructure like kitchen, dining, laundry, café, Internet café, fitness center, shops with more within very short time. We have very short delivery and construction time.

We also have around 275 nurses, doctors and administration/field operation management more or less on standby ready to go to any palace at any given time on a very short notice.

Normeca can also supply all kinds of protection equipment in connection with for instance the Ebola treatment as well as body bags, tents and mobile (telemedicine) clinics with more.

We hope our products and services can be of interest for you and it will be a pleasure for us if we can assist you in one or another way. Please do not hesitate to inform us if more information is wanted.

## **Training**

We can work out a complete education and training program for all staff who will be involved in the project. The focus will be on the operation of each module of equipment and infrastructure. We will work out specific programs for each part of the education and training.



### **Normeca AS - History**

Normeca AS (<u>www.normeca.no</u>) has since its start in 1983 and until 1993 primarily been engaged in selling to the domestic health care market in Norway. The main areas have been anesthesia, ICU, CCU and emergency care. Products have been imported primarily from Denmark, Sweden, Germany, England and USA.

Normeca AS has been the leading Norwegian supplier of anesthesia machines and ventilators since 1983. During most of these years our market share has been approx. 90-97 %. Normeca AS was in many years the only company in Norway that was able to offer a complete range of gas-related medical equipment, from centralized gas supply systems to the tube in the patients' mouth. The competition of anesthesia machines has increased over the last 5-10 years which has led to a reduction of the market share.

For many years, Normeca AS had agreements with 65-70 % of the Norwegian hospitals for preventive maintenance on anesthesia machines and ventilators. This is carried out once or twice per year depending on the specific requirements.

Normeca AS has had an extensive program of courses relating to anesthesia and to a lesser extent heart monitoring. A total of approx. 2.300 doctors, nurses and medical-technical personnel have attended these courses. Our course "Safety during anesthesia" was a part of a curriculum for anesthesiologists in Norway. The course is today being arranged by Rikshospitalet, but a number of doctors have asked us to start these courses again.

In addition Normeca AS has arranged a number of seminars on field hospitals both in Norway and abroad. These have been attended by approx. 1.500 people. Local seminars have been held in countries like amongst others Japan, South Korea, China, Malaysia, Philippines, Thailand, Indonesia, Taiwan, India, United Arab Emirates, Hungary, Czech Republic, Poland, Great Britain, Portugal, U.S.A., Venezuela, Romania, Slovakia and Norway.





#### The company's aim

The company's aim has changed substantially during the last years. Today its aim can be divided into categories as follows:

- To sell medical equipment and disposables to the health care sector in Norway.
   Primary areas are anesthesia, ICU, CCU, emergency areas and the operating theatre.
- To export mobile- and semi-permanent hospitals, primarily to the world-wide "defense & emergency relief" markets.
- The company's aim is to be a leader in the world within storing mobile hospital and mobile clinics on behalf of GO and NGO.
- Normeca also provides complete management and administration program related to hospital and clinic deliveries.





# **GLOBAL DISASTER MANAGEMENT TEAM**



Thai Tsunami Victim Identification Centre



Inside OT in KATIKO Referral Hospital



All kinds of clinics or hospitals in MultiSpace



NorCat Floating Hospitals





KATIKO Referral Hospital, Southern Sudan

😵 Normeca 🕏

Number One in the world within partly and turn key solutions incl. Transportation, Erection, Management, Training, Maintenance, Education, Administration, Storage, Out sourcing, Medevac, etc.





MSF Hospital, Hattian Bala, Pakistan



Inside MSF Hospital in Hattian Bala



Cuban Hospital, Muzaffarabad, Pakistan



All kinds of Mobile Clinics



In Saudi Arabia, please contact SESNEBER INTERNATIONAL | WWW.SESNEBER.COM 10 Olaya Avenue Bldg. | King Fahad St. | P. O. Box 87437 | Riyadh 11642 | Saudi Arabia Phone: +966.11.454.1222 | Fax: +966.11.453.7890 | E-mail: info@sesneberinternational.com

Normeca <sup>a</sup>