

USE OF THE PACKAGED DISASTER HOSPITAL IN NIGERIA

By ROBERT L. PRICE, M.D. Dr. Price, a career Public Health Service officer and deputy director of the Division of Emergency Health Services, Health Services and Mental Health Administration, spent 3 weeks in the summer of 1969 and 7 weeks early in 1970 in Nigeria. His mission was to advise and assist the Nigerians in setting up and using the packaged disaster hospitals. He was accompanied by Arthur D. Cruze, a medical equipment specialist, who assembled the component equipment and assisted with its operation and maintenance. This report evaluates the usefulness of the emergency hospitals.

THE Public Health Service's packaged disaster hospitals (PDH's) were put to their first complete test in the aftermath of the civil war in Nigeria. Twelve of the hospitals were sent to that country to supply badly needed medical emergency facilities.

Although some form of the hospital, which consists of the equipment necessary to convert an existing structure into a 200-bed hospital, has existed in the United States since 1953 and components of the hospitals have been used following several natural disasters, an existing hospital with sophisticated equipment has always been a few hours away (1, 2). Patients needing more intensive or complicated levels of care could be moved to these hospitals after receiving initial treatment at the disaster site.

The situation in Nigeria was different in that all components of the emergency hospitals were used and backup facilities did not exist. Moreover, the disaster hospitals were designed primarily for use as surgical hospitals for victims of atomic attack rather than as the general hospitals needed by ill and injured Nigerians.

Because I had first-hand experience in the reactivation of only two hospitals, I have limited my evaluation to these two. They were the Port Harcourt General Hospital in Port Harcourt, Rivers State, and Queen Elizabeth Hospital in Umuahia, Central Eastern State. Both had been stripped of equipment during the conflict.

The other 10 hospitals were sent to various places. Four went to other locations in Central Eastern State, three were requested by the military so that they could speed the removal of military patients from civilian hospitals, one was sent to the Midwestern State, and one to the Southeastern State. Finally, one was sent to the Royal Orthopedic Hospital in Igbobi in the suburbs of Lagos.

In the summer of 1969, Port Harcourt General Hospital was functioning as a haven for sick and injured victims of the Nigerian civil war which was then in progress. There was very little equipment for treatment of maladies ranging from gunshot wounds, malaria and other parasitic diseases, pneumonia, and mal-

nutrition to parturition. There were approximately 150 patients before the arrival of the packaged hospital. The Port Harcourt hospital had a prewar rated capacity of 250 and an average daily census of nearly twice that number.

In February 1970, the Queen Elizabeth Hospital in Umuahia was empty of equipment, including most of its 200 beds. At the end of the war a small group of Save the Children Fund workers began using the buildings to shelter victims with illnesses similar to those of the Port Harcourt hospital's patients. In Umuahia there were more children suffering from malnutrition and severe injuries caused by exploding land mines.

Evaluation of Component Units

Activation of the PDH operating room unit for the Port Harcourt hospital was delayed pending enlargement of the existing operating suite, and the water supply system of the Queen Elizabeth Hospital was not activated because there was no convenient source of water, but other components of the emergency hospitals were put to use. I will comment on each component.

The PDH has the following 12 units:

- Pharmaceuticals
- Hospital supplies and equipment
- Surgical supplies and equipment
- Surgical dressings and textile products
- Intravenous solution and transfusion supplies
- Dental supplies
- Laboratory supplies and equipment
- X-ray
- Hospital record and office supplies
- Water supplies
- Electrical supplies and equipment
- Maintenance and housekeeping supplies

Detailed inventories of the packaged disaster hospitals have been published (3, 4).

Pharmaceuticals. The pharmaceuticals in the PDH—antibiotics, anesthetics, analgesics, and so forth—were selected to treat trauma and the infections which may follow. A few items such as insulin, procainamide, and chlorpromazine were included to take care of a medical condition which might be encountered occasionally. Our experience in Nigeria has led us to consider the addition of multivitamin tablets. Most of the

Nigerians in the war-torn area suffered anemias, malnutrition, and multiple parasitic diseases. In a nationwide disaster we might for a time escape the parasitisms, but we could expect a hostile environment to cause nutritional problems.

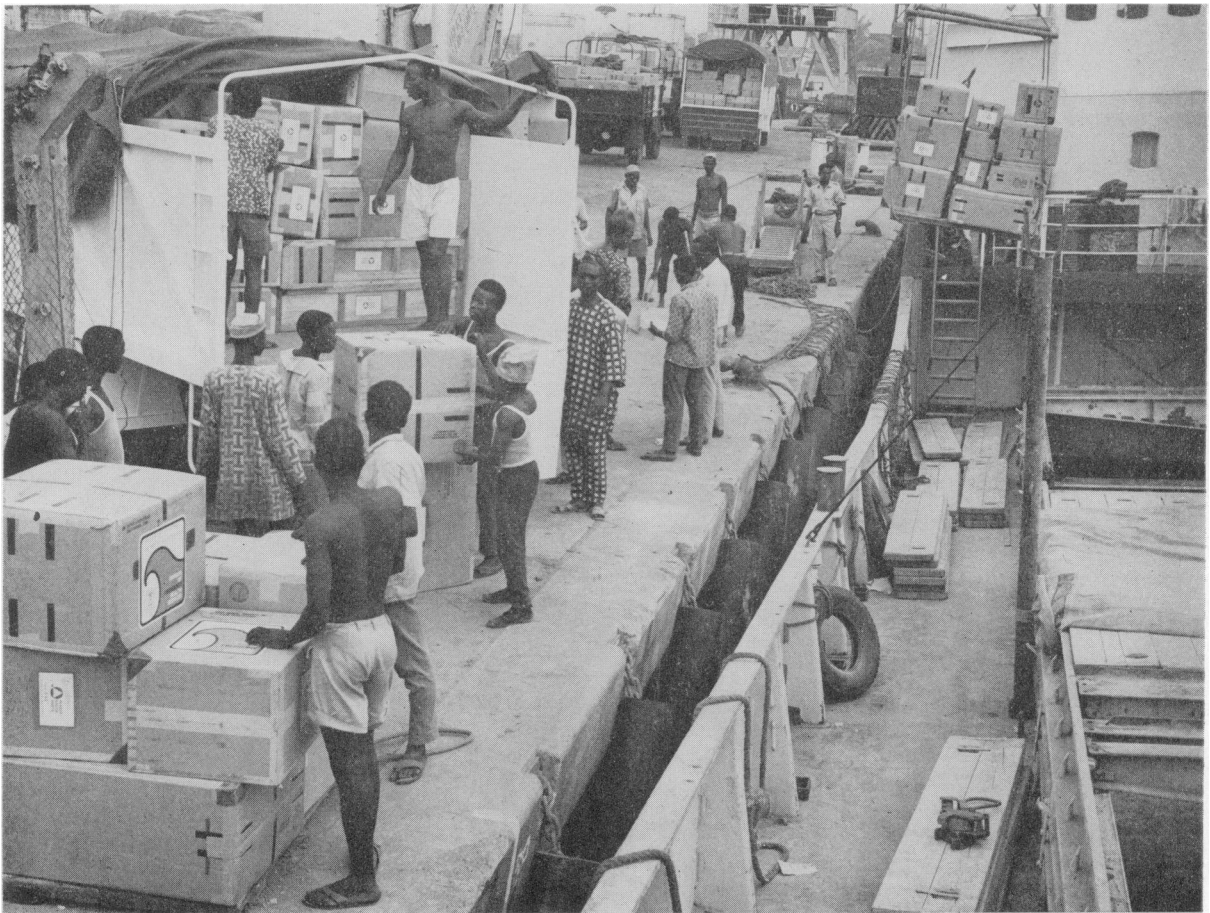
A few drugs such as diuretics, antihistamines, and antidiarrhea drugs could preserve the ability of critical technical and professional survivors of a nuclear holocaust to function effectively.

The PDH does not contain narcotics because the security problem they create would be unmanageable. This omission would have caused considerable suffering in Nigeria had there not been an alternative source of major analgesics. This situation dramatized for us the necessity to investigate the possibility of including in the PDH a major non-narcotic painkiller such as pentazocine.

If we again ship a PDH to a foreign country, we will, if time allows, consider adding drugs needed in the particular area. In Nigeria the additions would be drugs to prevent and treat parasitic disease.

Hospital supplies and equipment. This unit includes cots, instrument trays, sterilizers, litters, operating tables, and so forth. For a future overseas air shipment we might leave out many of the heavy litters and some of the Balkan frames, but the basic listing seems to be adequate in number and variety. The traditional folding canvas and wood cots which are in all the units have been criticized in the past, but they proved remarkably comfortable both for staff and patients when compared with makeshift or no beds. The wheeled litter cots performed well, and two stacked together made a comfortable gurney. The wooden Balkan frames were almost immediately put to good use.

Surgical supplies and equipment. Hemostats, scissors, drills, needles, sutures, suction apparatus, and anesthesia machines are among the items in this unit. Some were put to use in Port Harcourt, but the bulk of them was assembled and stored in a warehouse awaiting construction of an enlarged operating room to accommodate the new equipment. At Umuahia the entire section was unpacked and put into place. Within 3 days the hospital was ready, except for staff, to receive and care for patients



PDH in approximately 485 boxes is loaded at Lagos for a trip by river steamer to Port Harcourt

needing definitive surgical treatment. In view of the fact that Queen Elizabeth Hospital was stripped of practically all of its own equipment, this short period was impressive. It took 2 weeks for staff to be recruited and the operating room to be put to use. Although there is sufficient equipment to set up two more operating rooms in a PDH, the caseload at the hospital was limited because there was neither space nor staff for them in Umuahia. I learned of the actual use of the operating room after my departure.

The unit contains reusable surgeon's gloves. Since the useful life of a surgeon's glove is short, they have been replaced with a larger quantity of disposable gloves.

The PDH contains drainage and suction apparatus with tank and hand pump. This device proved quite useful since it could be operated,

without regard to location or availability of power, in the operating room, on the ward, or in the emergency room.

Surgical dressings and textile products. This component includes such items as sheets, blankets, bandages, drapes, and gowns. During my periods of observation in Nigeria none of these were in short supply. The use of bedsheets was restricted because of the primitive conditions which prevented washing large amounts of laundry. Interestingly, the blankets, despite tropical temperatures, were valued by patients who complained of being cold.

One strange omission was noted. For some reason scrub suits have been overlooked by all the experts who have reviewed the components over the entire history of the PDH. Of course, these will be added.

Intravenous solution and transfusion sup-

plies. These were put to immediate use. The 30-day supply of intravenous fluids weighing 7 tons creates problems in transportation and storage. While we do not feel that the amount projected is excessive, it may be necessary to scale down amounts in future assemblies and admit that, for this capability, only a few days' supply can be managed. In the tropical setting of Nigeria an insulated box for transporting blood was needed, but perhaps in the United States the excellent, ubiquitous expanded foam cooler could be easily found in the community to serve this need.

Dental supplies. This section contains necessary items for relief of pain and minimal treatment, and also for repair of broken dentures. The hospitals did not have a dental service, but dental supplies were used in clinics elsewhere in the communities. We have considered the possibility of substituting the excellent dental equipment set of the Armed Forces if we ever send a unit to a developing nation again. However, this equipment would be too expensive on a mass purchase basis where other priorities would rule.

Laboratory supplies and equipment. The equipment in this section of the PDH was too austere even for use in a developing country. It has a centrifuge, microscope, glassware, and reagents to perform simple tests on blood, urine,

and feces. It should also include a distilling apparatus, bacteriological incubator, microtome, laboratory drying oven, and supplies for handling culture media and preparation of slides.

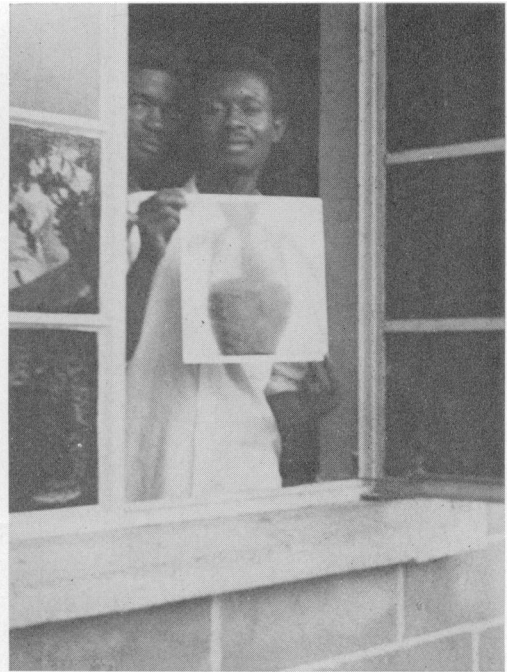
X-ray. The equipment has proved most useful because it uses the Polaroid paper method and can be operated without a water supply. It also has its own generator. Unfortunately, we have not solved the problem that would be created by radioactive fallout which would fog the X-ray paper. Only the fluoroscope would be useful in such a circumstance. The state of the art and cost prevent us from adopting the xeroradiography technique which is immune to fallout.

Hospital records and office supplies. The unit contains the stationery and forms necessary to operate a completely independent hospital. This portion of the PDH was not used in Nigeria since each hospital was already using a different record system.

Water supplies. This portion of the PDH contains a 1,500-gallon collapsible tank, a pump, hose, and chemicals for treating and testing water. This inventory of equipment gives some cause for concern since most existing buildings depend on community water supplies. Other sources, such as a river or pond from which water could be pumped, are likely to be at too great a distance, as happened in Umuahia.



Wood and canvas cots of the PDH (behind two small Nigerians) were quickly put to use



Left: PDH's intravenous recipient sets were used to save starving children. Right: Technician with X-ray. PDH's X-ray equipment was especially fortuitous because it uses Polaroid paper which does not require water. Water for Queen Elizabeth Hospital had to be carried 5 miles

There is no capacity in the PDH to drill a well or, for that matter, to lift water from it except from shallow depths. In Port Harcourt, city water at low pressure was available intermittently. The PDH tank and pump were used to collect and deliver it to an existing elevated tank on the hospital grounds, thus providing running water of reasonably good quality. But in Umuahia the city water was cut off and would be for a long time. When I left there, water was still being brought in cans from a source 5 miles away. It is possible to run a hospital this way but it is difficult and unsatisfactory.

Electrical supplies and equipment. This section of the PDH contains generators, electric lamps, fuses, flashlights, extension cords, plugs, and so forth.

In Umuahia where the generators were too far from some of the hospital's buildings to supply them with power, flashlights were essential, and the usage rate of the 200 dry cells was higher than anticipated. There was no city power in Umuahia, and the tropical night is long and dark.

With the generators are cables which may be hooked to existing wiring. The experience in Nigeria confirmed the opinion of some of our staff that a wiring harness to hook directly to the PDH equipment would be most useful. Such an arrangement would avoid the risk and time loss involved in adapting or scavenging existing wiring.

Maintenance and housekeeping supplies. In the PDH are such things as brooms, buckets, mops, garbage cans, detergent, nails, portable toilets, lanterns, and other items in common use.

It might be argued that most of these could be scrounged from the community at time of activation. Our experience leads us to believe that the investment in these items is worthwhile because in times of stress these items become expensive and cannot necessarily be obtained readily.

The collapsible field commodes were found to be essential for comfort and convenience of staff, Washtubs and scrubboards are not in the PDH and they should be part of the equipment. Hospital laundries are dependent upon large

amounts of running water and power, neither of which is likely to be available.

Tools in the packaged disaster hospital include an axe, wrecking bar, hammers, pliers, wrenches, screwdrivers, saw, pick, shovel, and chisels. These were all most useful. We have suggested an increase in number and variety of screwdrivers and a greater variety of wrenches. Also, we noted that there were security problems with tools and suggest hinges, hasp, and lock for the toolbox.

The inventory of equipment and supplies in the packaged disaster hospital has been conceived over a period of years by a variety of people in a strictly theoretical atmosphere. Additions, deletions, and changes in the various components have been based on opinions of groups of experts who were given different assumptions and projections and who were given or assumed various practical limitations such as budget, weight, space, staff estimates, casualty load estimates, and the like. In general, it was designed to be mainly a surgical hospital to treat injuries of casualties under austere conditions. As it has turned out, the PDH can be used to create a good general hospital.

The conflict in Nigeria and its aftermath provided the first real opportunity to use these units in their entirety and to assess the usefulness of the concept. The packaged disaster hospital performed magnificently as a general hospital and, if it is ever used to provide care for large numbers of casualties, it also has the capacity to relieve medical problems created by loss of other facilities, medications, food, services, and other features of a hostile environment.

Brief History of Emergency Hospitals

The packaged disaster hospital is an atomic age concept, and it consists of the supplies and equipment necessary to improvise a hospital in an existing building. The unit began as the improvised hospital and later was called the civil defense emergency hospital. A prototype was developed in the early 1950's using the list of equipment for the mobile army surgical hospital (MASH) somewhat as a guide. However, it was not intended that the prototype be as sophisticated as the military hospital or include shelter.

Early in the atomic age it was deemed neces-

sary to provide additional hospital beds to care for the unprecedented numbers of casualties which would result from an atomic bombing of the United States. Studies were made of buildings which would be suitable as improvised hospitals and of the supplies and equipment which could be collected in the community to provide for this need and for the destruction of facilities (unpublished paper by Dr. Carlisle Lentz, formerly with the Division of Emergency Health Services).

It was soon evident that items in common use and readily available everywhere would not provide acceptable means of caring for casualties. Consequently, the components of the mobile army surgical hospital were studied. Even without the tentage, the cost, level of sophistication, and bulk of the MASH were seen to be too great. Accordingly, the component list for the 200-bed improvised hospital was developed. In its original concept, the hospital consisted mostly of durable equipment; it was expected that supplies for long-term operation would be brought after a day or two. With the advent of vastly more destructive thermonuclear weapons and the expectations that survivors' mobility would be limited by fallout and disruption of transportation and communication, it became necessary to beef up supplies to operate the hospital for 30 days.

Beginning in 1953, and continuing thru 1957, 1,800 civil defense emergency hospitals were acquired by the Federal Civil Defense Agency. There were some changes in the components as experience and the passage of time dictated. In 1961 the program was transferred to the Public Health Service. In 1962, 750 new hospitals with supplies to last 30 days were acquired by the Public Health Service, and a program of adding to the supplies of the earlier models was begun, but never completed.

In 1965 and 1966, an interagency panel reviewed the history and component listing and, for economic reasons, directed that the units, now called packaged disaster hospitals, should be even more austere. There has since been a program of refurbishment and restoration to adjust the already acquired hospitals to this latest design. The program is incomplete, and again marking time because of economic reasons. No additional units have been acquired since 1962.

The experience in Nigeria as well as in other types of emergencies demonstrates the usefulness of the concept of a packaged, quickly activated hospital and justifies the modest expense necessary to maintain readiness to respond to disaster.

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Tearsheet Requests

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Standards for Nursing Homes with Medicaid Patients

New regulations now govern standards for nursing services in skilled nursing homes receiving Federal funds for Medicaid patients. These regulations are a revised form of interim regulations published June 1969.

Medicaid, authorized by title XIX of the Social Security Act, requires that skilled nursing home services for persons over 21 be included in every State Medicaid program. Currently about 30 percent of the money spent on medical assistance goes for nursing home services and totals more than \$1 billion a year.

The new regulations change the qualification requirements for persons who have overall responsibility for the nursing services of the institution when there is no registered nurse on duty. Until July 1, 1970, there was no requirement for training for the person in this position. It could be filled by a practical nurse, whether or not she had had training, provided that she held a license as a practical nurse and had been holding such a position on July 1, 1967. After July 1, 1970, this position must be filled by a registered nurse or by a practical nurse who, in addition to being licensed, has graduated from a State-approved school of practical nursing or has had other training considered by the State agency responsible for the licensing of practical nurses to be the equivalent.

In institutions for the mentally retarded which are certified as skilled nursing homes, other categories of licensed personnel may serve as charge nurses, provided their training in nursing is the equivalent to training given

in State-approved schools of practical nursing.

In all homes, nursing services must be under the direction of a professional registered nurse who is employed full time, and is on duty during the day shift.

The Social and Rehabilitation Service will issue guidelines to indicate the numbers and kinds of personnel necessary to provide adequate nursing care for a given number of patients.

Other standards for skilled nursing homes covered by the regulations include:

- Meals in a skilled nursing home must be planned and supervised by qualified professional personnel.

- Standards relating to the maintenance of medical records, the dispensing of drugs, physician coverage, and environment and sanitation must match those in effect for extended care facilities under the Medicare program.

- Nursing homes must have agreements with local hospitals for inpatient hospital care when needed.

- After December 31, 1969, homes must have met the provision of the Life Safety Code of the National Fire Protection Association, or a fire and safety code imposed by State law, that adequately protects patients in nursing homes.

- The State agency administering Medicaid may grant waivers to standards affecting arrangements for inpatient hospital care and environment and sanitation under some conditions.