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FIELD MEDICINE

8TH OCTOBER 2005 EARTHQUAKE – AN EXPERIENCE OF DIAGNOSTIC LABORATORY SERVICES IN DISASTER

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ABSTRACT

An earth quack measuring 7.6 on Richter scale with its epicenter located at 19 km north east of Muzaffarabad struck eight districts of northern areas of Pakistan, and adjacent areas of India. An estimated death toll of about 73,338 was reported. Around +3.5 million people were affected by natural disaster. Such a large number of population required special attention in the form of winterized shelters, heating, medical care, food, water and sanitation. This situation posed a unique challenge for health services including provision of diagnostic laboratory services for short term as well as long term basis. Laboratory services were established at various locations as a part of medical care to provide diagnostic facilities as well as blood transfusion services. This article presents few important lessons learnt in this aspect of medical care.

Keywords: Earthquake, disaster management, field laboratory services, medical facility in field

INTRODUCTION

A natural disaster in the form of earthquake that struck on the morning of October 8, 2005, brought wide spread destruction in its wake. Around 3.5 million people were affected with at least 73,338 deaths and 128,309 injured people. The epicenter and main impact zones were in the North West frontier province and Azad Kashmir. The earth quake measured 7.6 on the Richter scale and affected around 30,000 square kilometers, mainly in the mountainous terrain. Balakot, a town of 30,000 people in NWFP was entirely destroyed.

According to preliminary damage and needs assessment report by Asian Development Bank eight most heavily affected areas included: Abbottabad, Batagram, Kohistan, Poonch, Mansehra, Muzaffarabad, Bagh and Shangla. The total estimated damage in terms of financial impact was calculated to be around 5.2 billion US dollars; which included immediate relief, death and injury compensation, emergency medical care, early recovery, restoration of livelihoods and reconstruction [1]. In subsequent management around 3.5 million shelters less persons may require on going medical facility for prolonged duration (table -1). This most debilitating natural disaster in Pakistan's history brought greatest challenge to medical services including laboratory services in affected areas. The emergency response by the Pakistan Army and Army Medical Corps remained excellent because of its success and uniqueness with extremely meager resources. The earthquake situation also indicated that military functions have expanded beyond the conventional wars to encompass a range of unique tasks related to humanitarian goals including provision of diagnostic laboratory in unfavourable environments, beyond the original capabilities. Healthcare delivery systems in such disaster required special emphasis in different areas and provision of laboratory

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diagnostic facility and transfusion services remained essential component at all levels.

Overview of Situation and Response by Various Agencies:

The 2005 earthquake without any doubt was the most debilitating natural disaster in Pakistan's history. Azad Jammu and Kashmir (AJK) and the eastern district of the North West Frontier Province (NWFP) suffered the main impact, interms of loss of life, injuries and extensive loss of life infrastructure. According to Government of Pakistan there was complete demolition of health care infra structure in three districts of AJK and five districts in NWFP. A huge population was left to face the unfavourable environment with inadequate medical care facility [2].

Pakistan Army and Government of Pakistan responded immediately, mobilizing all the available health care resources along with other rescue operations. Two Army Divisions moved into AJK and NWFP and organized five advanced staging posts for facilitation, distribution of relief goods and provision of health care to injure. Unprecedented number of helicopter – rescue operations were carried out.

During the initial phase of rescue operations medical facilities were provided by Army Medical Corps. Later on many NGOs from world over rendered valuable healthcare services. Army medical teams comprising of medical officers and paramedics were moved to more than thirteen locations in affected areas, five teams were equipped with basic field laboratory set up including blood transfusion facility.

Challenges Faced by Medical Teams and Laboratory Setup:

Earthquake affected area was a home to a scattered population of some 3.5 million people. The geographical terrine is challenging as most of the population is in hilly, mountainous rural settlement which lacks basic civic facilities and road infrastructure. The situation posed a unique problem in the management of casualties, subsequent evacuation and supplies for the maintenance of laboratory services. Medical staff was also exposed to extreme environmental vulnerability, including land slides and unchecked weather conditions. In addition to provision of life saving emergency treatments medical corps also focused on most vulnerable groups including children, women and disabled elderly population [3]. The original health management in civil as well as army – set up in earthquake affected areas was almost paralyzed. According to Government of Pakistan Earthquake Reconstruction and Rehabilitation Authority (ERRA) the existing health care system in earthquake affected areas were completely demolished. This led to total disruption of primary as well as secondary health care systems. The needs of health care sector were substantial, both in terms of emergency requirements as well as long term establishment of health facilities. Multiple resources were required including Pakistan Army Medical Corps, Ministry and departments of health, United Nations agencies, NGOs and local resources [4].

Main health challenges faced in addition to emergency care were

- Restoration of primary health services
- Establishing secondary referral care system
- Preventive services
- Establishment of laboratory and transfusion services at all levels
- Mental health care
- Rehabilitation efforts
- Establishing indigenous logistic support and power supplies.

A unique and special challenge in earthquake affected area was to establish diagnostic laboratory services at various levels and to recover, re-equip the devastated laboratory services. Initially the main

emphasis was on establishment of emergency transfusion services in various advance trauma centers. Army Medical Corps in its initial relief efforts very adequately provided vital diagnostic support to its surgical and medical teams deployed in various districts of NWFP and AJK [5,6].

Earthquake and Laboratory Services:

Armed Forces Institute of Pathology and Armed Forces Institute of Transfusion played a vital role in providing diagnostic facilities as well as adequate donor bank at tertiary care level and provided blood transfusion services and blood components in various surgical emergencies in advance trauma support centers. More than 5000 donations and reserve stored blood products were made available to military and civil hospitals on demand.

Armed Forces Institute of Pathology provided all the necessary diagnostic support to earthquake affected areas in the form of emergency field laboratories and main diagnostic facility to Combined Military Hospital Rawalpindi, where maximum casualties were managed. Field medical laboratories equipped with latest chemistry and haematology analyzes were established at Muzaffarabad, Bagh, Batagram and Mansehra (table-2).

Qualified Pathologists and trained laboratory staff was deputed to work in these field laboratories. Infrastructure of diagnostic laboratory services in earthquake affected areas was badly affected. Armed Forces Institute of Pathology focused especial emphasis on the restoration and re-equipment of destroyed laboratories. Combined Military Hospital Muzaffarabad Laboratory, CMH Rawalakot and Bagh were provided with all essential laboratory equipment required for routine primary and secondary health care. In addition to routine diagnostic facilities laboratories in these areas also provided expert and technical support to prevent various infections, control of possible out breaks and technical advice in the provision of safe drinking water (table-3). Various international NGOs also played a vital role.

Table-1: Key impacts of earthquake

Indicators	Latest estimate
Area affected	30,000 sq km
Population affected	3.5 million
Deaths	73,338
Injured	128,309
Houses	400,153 (damaged and destroyed)
Families affected	500,000 (7 persons per family on average)
Number of food insecure	2.3 million
Latrines needed	160,000
Number of children needing school support	10,000
Number of unaccompanied children	Approx. 3,000 children registered so far

Table 2: Equipment provided to field laboratories

Nomenclature	No
Auto Clave	03
Sysmex Haematology Analyzer	04
Metrolab 1600 DR – Chemistry Analyzer	06
Microscope Binocular	06
Centrifuge	01
Water Bath	01
Hot Air Ovan	01
Sartorius Balance Portable PT 600	01
pH Meter	01
Sahli Haemoglobinometer	01
Micropipette 10-100 ul	01
Micropipette 100-1000 ul	01
Westegren's tube for ESR	01
Needle Cutter	01
Staining Jars	01
Haemocytometer	01
Refractometer	01
Postmortem Set	01
Plastic Rack	04

Unique Challenges Faced by Laboratories in the Field:

- Non availability of shelters specified for laboratory equipment to work in uncontrolled environment. Drastic changes in temperature badly affected the efficiency of sensitive automated analyzers; at times sun light was utilized to raise equipment temperature.
- Electricity supply in calamity hit areas was particularly damaged. Lack of

availability of generators with the medical units led to the complete dependence on others resources for provision of power supply which was never free from fluctuations posing a challenge to maintain quality control of lab-results due to frequent shut down of equipment.

- Regular supply and storage of sensitive laboratory reagents and diagnostic kits was a great challenge.
- Critical shortage of field equipment for establishment of safe drinking water and its constant monitoring to avoid water contamination.

Points to Ponder:

- It is a known fact that no organization, no matter how well equipped and trained, can withstand any challenging situation without adequate, efficient and reliable logistic support. It was a common observation that lack of effective logistic support was a major hindrance in making this relief operation an ideal effort. Laboratories in the field also require independent logistic and technical support, in the form of specialized tentage or fiberglass huts with its dedicated power supply. Capability to move on wheels is an essential requirement.
- Regular training of laboratory staff to work in unfavorable conditions with improved technology peculiar to disaster management is required. Staff trained in disaster management may be placed at various hospital laboratories at peace time and can immediately be mobilized to any disaster affected area.
- It is mandatory to establish specialized mobile laboratory units on wheels, equipped with essential laboratory analyzers and self sustainable environment. Armed Forces Institute of Pathology may consider establishing a specialized cell to procure and maintain such field laboratory set ups.

Table-3: Diagnostic tests provided at field laboratories

Tests Description
Blood Grouping and ABO compatibility
Blood Bank and Transfusion facilities
Routine clinical pathology
Blood Haemoglobin estimation
Erythrocyte Sedimentation Rate (ESR)
Blood complete picture
Peripheral blood film examination
Absolute values
Routine body fluids examination
Blood glucose estimation
Blood urea
Blood creatinine
Blood Electrolyte
Liver function tests.
Serum uric acid estimation
Serum calcium estimation
Serum albumin estimation
Routine microbiology including microscopy, Gram staining and Z-N staining

- Laboratory staff trained for disaster affected areas should be able to train local staff and labs should be able to work for a longer period in field condition to participate in rehabilitation phase, till the permanent facilities are restored.
- Chain of supply of equipment repairs and reagents supply are the key factors for successful disaster management operations.
- Presently no comprehensive data is available about the establishment of diagnostic facilities in such natural disaster situation. Establishment of laboratory services require separate guide lines beside general health care services. Lesson learnt from previous disaster situations never considered laboratories as a separate facility.

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