INFORMATICS BEYOND BOUNDARIES: AN EXPERIENCE FROM REMOTE SUPPORT FOR NEPAL EARTHquake 2015

Dr Oommen John

The George Institute
for Global Health
India
FAULT LINES

Image credit: Reuters
Nepal Needs Your Help. We Need Your Help.
DEFAULT OPTIONS FOR RESPONSE

Image credit : MSF
BUT AS HEALTH INFORMATICIANS

- Can we use our expertise in health informatics in this situation?
- What has already been done?
- What can we do differently that is practically useful and maximum impact?
EXISTING EVIDENCE

Prehospital and Disaster Medicine, Volume 28, Issue 5
October 2013, pp. 498-501

Secure Scalable Disaster Electronic Medical Record and Tracking System

Gerard DeMers (a1), Christopher Kahn (a1), Per Johansson (a2), Colleen Buono (a1), Octav Chipara (a2), William Griswold (a2) and Theodore Chan (a1) (φ)

DOI: http://dx.doi.org/10.1017/S1049023X13008686
Published online: 26 June 2013

Abstract

Electronic medical records (EMRs) are considered superior in documentation of care for medical practice. Current disaster medical response involves paper tracking systems and radio communication for mass-casualty incidents (MCIs). These systems are prone to errors, may be compromised by local conditions, and are labor intensive. Communication infrastructure may be impacted, overwhelmed by call volume, or destroyed by the disaster, making self-contained and secure EMR response a critical capability.

As the prehospital disaster EMR allows for more robust content including protected health information (PHI), security measures must be instituted to safeguard these data. The Wireless Internet Information System for Medical Response in Disasters (WITSARD) Research Group developed a handheld, linked, wireless EMR system utilizing current technology platforms. Smart phones connected to radio frequency identification (RFID) readers may be utilized to efficiently track casualties resulting from the incident. Medical information may be transmitted on an encrypted network to fellow prehospital team members, medical dispatch, and receiving medical centers. This system has been field tested in a number of exercises with excellent results, and future iterations will incorporate robust security measures.

A secure prehospital triage EMR improves documentation quality during disaster drills.

A Wireless First Responder Handheld Device for Rapid Triage, Patient Assessment and Documentation during Mass Casualty Incidents

James P. Killeen, MD,1 Theodore C. Chan, MD,1 Colleen Buong, MD,1 William G. Gitwold, PhD,3 and Leslie A. Lenert, MD MS1,2,3

Abstract

Medical care at mass casualty incidents and disasters requires rapid patient triage and assessment, acute care and disposition often in the setting of overwhelming numbers of victims, limited time, and little resources. Current systems rely on a paper triage tag on which rescuers and medical providers mark the patient’s triage status and record limited information on injuries and treatments administered in the field. In this manuscript, we describe the design, development and deployment of a wireless handheld device with an electronic medical record (EMR) for use by rescuers responding to mass casualty incidents (MCIs) and disasters. The components of this device, the WIFSARD First Responder (WFR), includes a personal digital assistant (PDA) with 802.11 wireless transmission capabilities, microprocessor and non-volatile memory, and a unique EMR software that replicates the rapidity and ease of use of the standard paper triage tag. WFR also expands its functionality by recording real-time medical data electronically for simultaneous access by rescuers, mid-level providers and incident commanders on and off the disaster site. WFR is a part of the Wireless Information System for Medical Response in Disasters (WIFSARD) architecture.
PREVENTABLE DEATHS

Survey of Preventable Disaster Death at Medical Institutions in Areas Affected by the Great East Japan Earthquake: A Retrospective Preliminary Investigation of Medical Institutions in Miyagi Prefecture

Satoshi Yamanouchi, Hirokazu Sasaki, Miho Tsutsumi, Yuzuru Ueki, Yoshitaka Kohayagawa, Hisayoshi Kondo, Yasuhiro Otomo, Yuichi Kohgo, and Shigeki Kishimoto

DOI: http://dx.doi.org/10.1017/S1440022X15000114
Published online: 27 February 2015

Abstract

The incidence of preventable disaster death (PDD) during the Great East Japan Earthquake remains to be clarified; the present study investigated PDD at medical institutions in areas affected by the Great East Japan Earthquake in order to improve disaster medical systems. A total of 25 hospitals in Miyagi Prefecture (Japan) that were disaster base hospitals (DBHs), or had at least 20 patient deaths between March 11, 2011 and April 1, 2011, were selected to participate based on the results of a previous study. A database was created using the medical records of all patient deaths (n=968), and PDD was determined from discussion with 10 disaster health care professionals. A total of 102 cases of PDD were identified at the participating hospitals. The rate of PDD was higher at coastal hospitals compared to inland hospitals (62/327, 19.0% vs 40/541, 7.4%; P<0.01). No difference was observed in overall PDD rates between DBHs and general hospitals (Ghhs); however, when analysis was limited to cases with an in-hospital cause of PDD, the PDD rate was higher at GHs compared to DBHs (24/316, 7.6% vs 21/553, 3.8%; P<0.05). The most common causes of PDD were: insufficient medical resources, delayed medical intervention, disrupted lifelines, deteriorated environmental conditions in homes and emergency shelters at coastal hospitals, and delayed medical intervention at inland hospitals. Meanwhile, investigation of PDD causes based on type of medical institution demonstrated that, while delayed medical intervention and deteriorated environmental conditions in homes and emergency shelters were the most common causes at DBHs, insufficient medical resources and disrupted lifelines were prevalent causes at Ghhs.

Preventable disaster death at medical institutions in areas affected by the Great East Japan Earthquake occurred mainly at coastal hospitals. Insufficient resources at GHs, environmental factors at coastal hospitals, and delayed medical intervention at all hospitals constituted the major potential contributing factors. Further investigation of all medical institutions in Miyagi Prefecture, including those with fewer than 20 patient deaths, is required in order to obtain a complete picture of the details of PDD at medical institutions in the disaster area.

Insufficient Medical Resources
Delayed Medical Interventions
DEPLOYMENT

Sahana Foundation
Open Source Disaster Management Software

Open Source Disaster Management Software

Making high quality information management systems for emergency preparedness, response, recovery and resilience-building accessible to all.
Nepal Hospitals Status and Requests Spreadsheet (updated)

The spreadsheet below has the current status of hospitals (beds, capabilities available), and the list of medications, supplies and medical professional volunteers that they need. It is regularly updated.

Hospitals in Nepal are in immediate need of medical supplies. Anything that can be used for pre-op, operating room and post-op care will be helpful - e.g bandages, dynamic compression plates, intra-medullary nails for femur/tibia, antibiotics, disposable drapes/clothes, IV fluids, fluid warmers, infusion pumps, colloids/crystalloids/blood products, suture materials, pulse oximeters (portable).

Please see spreadsheet at https://docs.google.com/spreadsheets/d/19vRPssqYvf1w1llJnSL5q6Ezs0BeVNBnzK8OEJd8kPY/edit#gid=373902897 for the exact list of supplies that are needed.

The list is maintained by http://americanepalmedicalfoundation.com/
Nepal Relief updates @Relief4Nepal · 29 Apr 2015

#NepalEarthquake Emergency treatment of drinking water at point of use (WHO). Please print and give to relief crews.
relief4nepal.blogspot.com/2015/04/emerge...

Nepal Relief updates @Relief4Nepal · 29 Apr 2015

#Nepal #Hospitals Status and Requests for medicines, hospital supplies and volunteers updated by #ANMF. Please RT.
relief4nepal.blogspot.com/2015/04/list-o...
Surgical Management of Musculoskeletal Injuries after 2015 Nepal Earthquake: Our Experience

Abstract

We report our experience of handling 80 major musculoskeletal injuries in a brief span of three days immediately after the major earthquake of Nepal in April 2015. Planning, proper utilization of resources, and prioritizing the patients for surgical intervention is highlighted. The value of damage control by orthopaedics in these disasters is discussed. Timely and appropriate surgical treatment by a skilled orthopaedic team not only can save these injured limbs but also the lives of the victims of a major disaster.

Keywords: earthquake, disaster, orthopaedics, musculoskeletal injuries, fractures, nepal
REQUEST FROM NEPAL DOCTORS

Can guidelines on managing crush injury and musculoskeletal injuries during mass causalities be made available for early response teams and hospital based clinicians?
Prevention and treatment of acute kidney failure due to crush injury after natural disasters - a field guide

After head injuries and bleeding, the medical staff need to watch for and prevent hyperkalemia (causes arrhythmias), myoglobinuria and myoglobinemia (cause acute renal failure), hyperphosphatemia, hypocalcemia, acidosis and later on, onset of compartment syndrome in victims of crush injuries whose muscles were crushed or compressed by rubble. These can begin to set in soon after extrication of the victim from rubble when circulation is restored, and the intracellular potassium and myoglobin from crushed tissue enter the circulation.

Follow the field guide produced by the International Society of Nephrology Renal Disaster Relief Task Force, published in the journal Nephrology Dialysis Transplantation(2012). Screenshots of relevant flowcharts embedded as images for quick reading. The information here is reproduced with kind permission from the International Society of Nephrology.
Step 1. IV or subcutaneous fluids before extrication under the rubble
(avoid potassium containing fluids)

Crush Recommendations: Short Field Version

![Flowchart]

Ensure personal safety and capacity to work

**BEFORE EXTRICATION**
(victim under rubble)

Try to initiate fluid administration
**AVOID potassium containing fluids**

- No vein accessible
  - No fluids given
  - Hypodermoclysis s.c.
    - isotonic NaCl (1 ml/min.)
- Vein accessible
  - Intravenous isotonic NaCl
    - 1000 ml/h in adults
    - 15-20 ml/kg/h in children

Initiate intravenous fluid as soon as possible

If extrication time >2 hrs. →
reduce IV fluids to 500 ml/h or by 50%

Fig. 1. Management of the victims while under the rubble.
BUT WHEN TELECOM AND INTERNET IS DOWN

How can these useful clinical guidelines reach those who need it the most?
M HEALTH COMES TO THE RESCUE
Is vein accessible?

- Yes
- No, the vein is not accessible
- Not able to give fluids

To learn more about interventions before extrication, please click the "Instructions" button below.

Instructions

If vein is not accessible insert sub cutaneous needle.

Administer Isotonic Saline 1ml/minute.

If unable to give fluids, click here

More Instructions
QUAKE CARE

Is the victim still under the rubble?
- Yes, extrication is yet to begin
- No, the victim is being extricated
- No, the victim has been extricated

Manage Complications
- Airway Obstruction
- Pain
- Hypotension
- Hypertension
- Myocardial ischemia and infarction
- Left Ventricular Failure
LESSONS LEARNED

- Health Informatics Community can play a very important role in emergency and disaster settings to play the pivotal “back end role” to support and coordinate the relief.
- It was important for us to look beyond the traditional “Information Science” and “Data” centric world view.
- Having a closely collaborative multi-country team helped roll out the relief portal and the mobile app within days.
- Leveraging professional networks increased visibility and added credibility.
WAY FORWARD

- Leverage the experience and lessons learned to develop an online network of health informatics and healthcare professionals
- Prepare a resource kit for disaster relief including the current web portal and digital assets created during the Nepal Earth Quake
- Create within APAMI network a Disaster relief taskforce and use the member country hubs as a nerve center for disaster relief within the APAMI countries
ACKNOWLEDGEMENTS
SINCERE GRATITUDE

- Senthil K. Nachimuthu, University of Utah School of Medicine, Salt Lake City, Utah, USA
- Klaus D Veil, Adj. Associate Professor, Western Sydney University, Sydney, Australia
- Prof. Vajira H. W. Dissanayake, Professor, Faculty of Medicine, University of Colombo, Sri Lanka
- Dr S B Gogia, President, APAMI
- Prof. Vivekanand Jha, Professor of Nephrology, University of Oxford
- Prem Kurian Philip, CEO, Songbird Technologies, Chennai, India
Technology is just an enabler
We just deployed technology to connect h2h