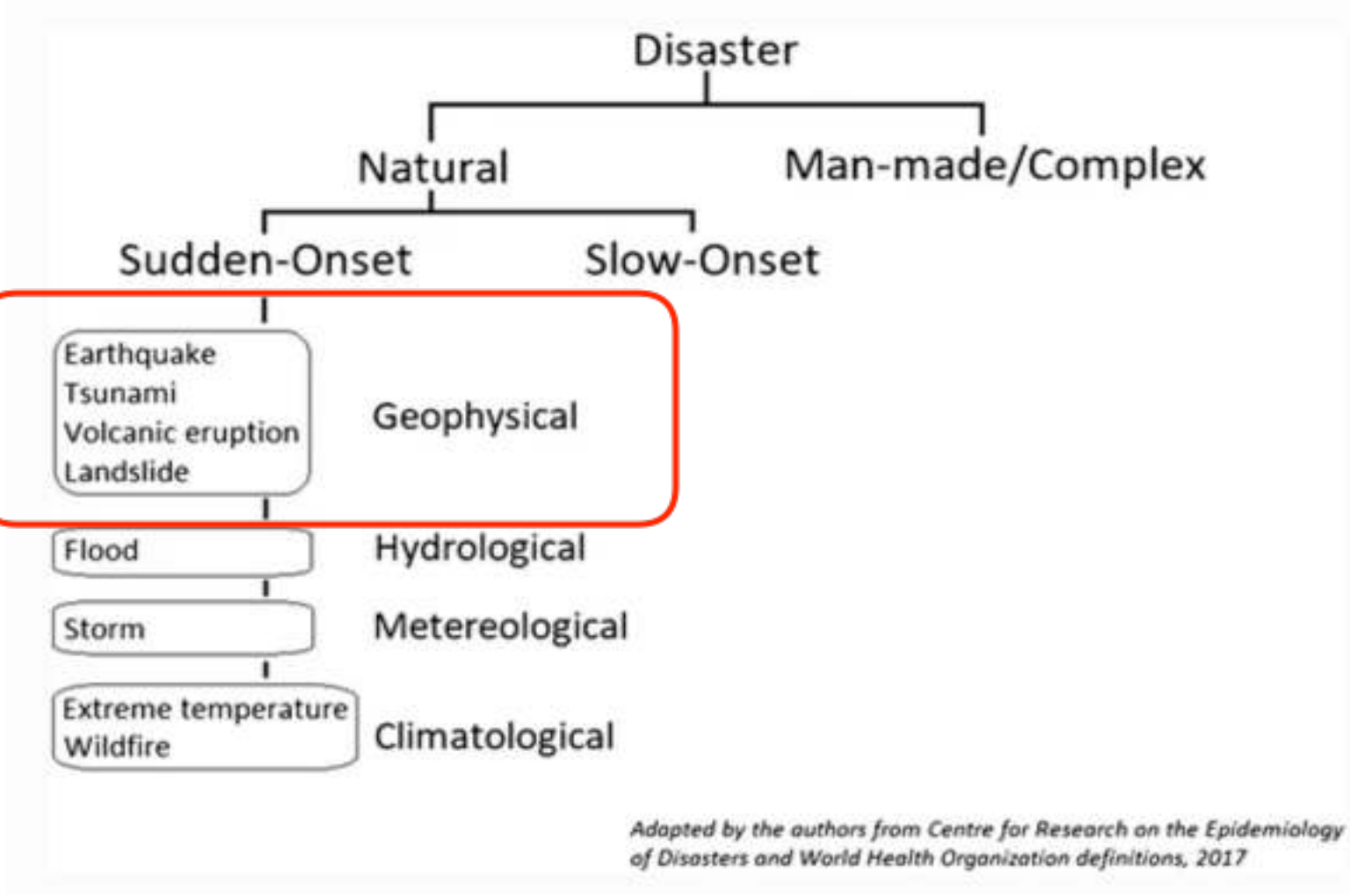
# Deprem Sonrası Gelişen Cerrahi Enfeksiyonlar

Dr Özlem Altuntaş Aydın

SBÜ Başakşehir Çam ve Sakura Şehir SUAM




*Adapted by the authors from Centre for Research on the Epidemiology of Disasters and World Health Organization definitions, 2017*

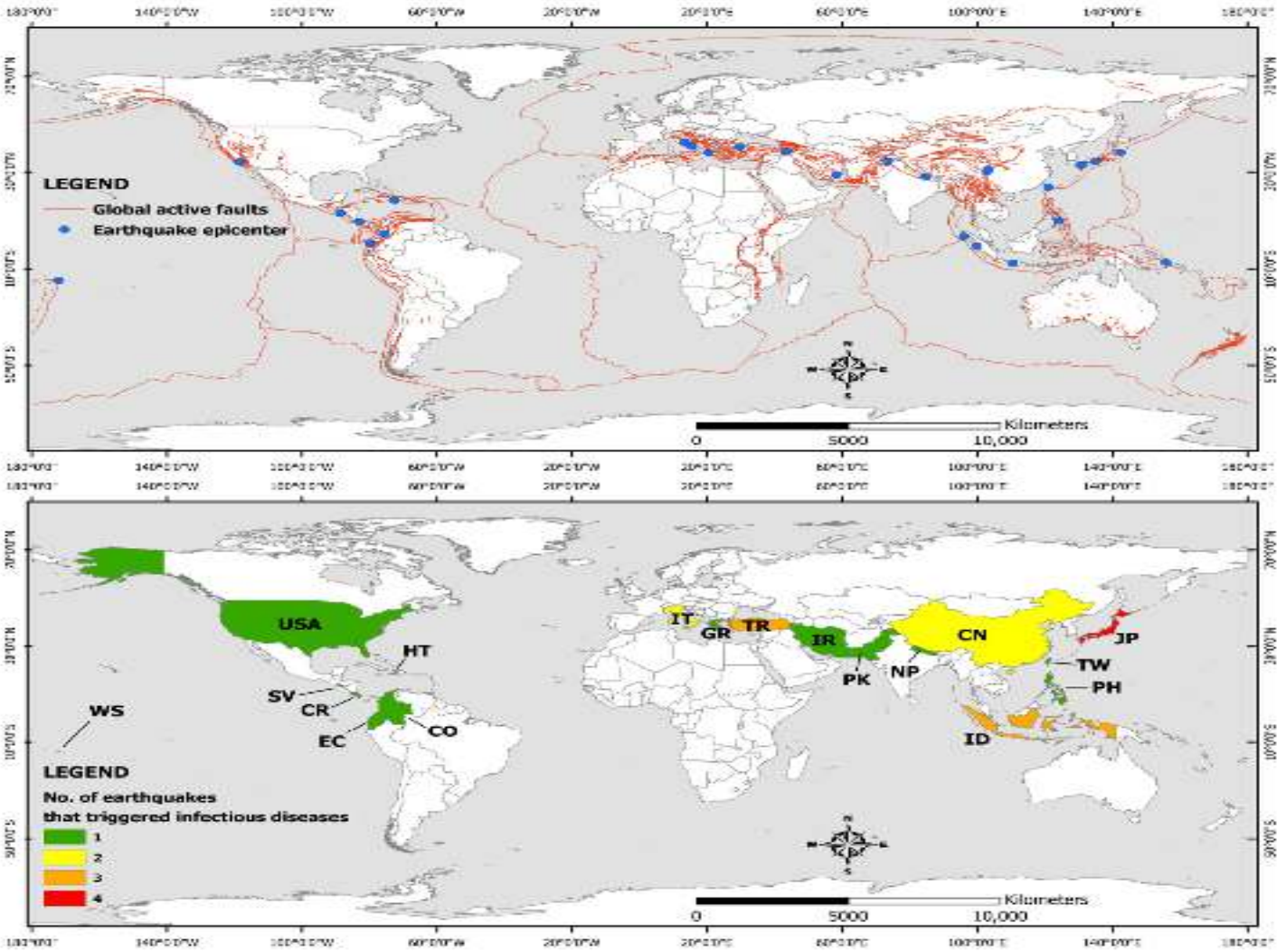



**Figure 1.** **(Up)** Map illustrating the active faults of the world and the epicenters of the earthquakes included in the study. **(Down)** Distribution of the countries affected by earthquake-triggered infectious diseases. The affected countries are located within the red fault zones. The global fault zones are from Styron and Pagani [67]. WS: Samoa, USA: United States, HT: Haiti, SV: El Salvador, CR: Costa Rica, EC: Ecuador, CO: Colombia, IT: Italy, GR: Greece, TR: Turkey, IR: Iran, PK: Pakistan, NP: Nepal,

› Ann Emerg Med. 1992 Apr;21(4):362-7. doi: 10.1016/s0196-0644(05)82651-4.

# Infectious diseases following major disasters

R V Aghababian [1], J Teuscher

## PHASES OF DISASTER

Dividing the response to disaster into phases according to the principal focus of activity allows rescue personnel to predict ongoing service and supply needs and to better organize relief efforts. A classification is currently used by Western and provides a description of four phases of disaster useful primarily from a public health viewpoint.[6] A more clinically oriented classification system is proposed that would be more descriptive of clinical phases, especially in light of infectious disease considerations, where infections not only of the injured but also of the survivors are considered. These are the impact phase (zero to four days), postimpact phase (four days to four weeks), and recovery phase (after four weeks).

Extrication and initial treatment of disaster-related injuries occur during the impact phase. Few trapped survivors would be expected to be extricated alive after this period of time. During the postimpact phase, a first wave of infectious disease problems, including airborne, foodborne, and/or waterborne infections, might be noted. Furthermore, the occurrence of epidemics of pathogens endemic to the area should be expected during this phase. During the recovery phase, victims who have contracted infections with a long incubation period or those with infections related to removal of the usual protective barriers (ie, latent-type infections) may become clinically apparent.

- **<u>0-4 günler:</u>** Afetzedelerin kurtarılması, ilk tedavisi. Afet ilişkili yaralanmaların enfeksiyonları
- **<u>4 gün- 4 hafta:</u>** Toplu yaşam kaynaklı enfeksiyonlar
- **<u>>4 hafta:</u>** Uzun inkübasyonlu-latent enfeksiyon hastalıkları

# Cerrahi Enfeksiyonlar

**Cerrahi girişimler ile ilişkili enfeksiyonlar**

**Review Article**

# Earthquake relief experience of Aga Khan University trauma team

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«İlk on günden sonra akut yaralanmaların spektrumu değişmeye başladı. Kapalı kırıkların redüksiyonu zordu, neredeyse tamamı açık redüksiyon ve çok mücadele gerektiriyordu»

«İkinci hafta içinde açık yarası olan ve artık enfekte olmuş hastaları kabul ettik. Bu yaralar küçük ameliyathanede bazen genel anestezi altında, günlerce, çok sayıda, titiz yara debridmanı yapılmasını gerektirdi»

# Triage of pediatric injuries after the 2008 Wen-Chuan earthquake in China

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**Key words:**
Earthquake;
Children;
Disaster management;
Triage;
Posttraumatic stress disorder

**Abstract**

**Purpose:** The study aimed to review the effect of modifying triage strategies on the consultation and operation waiting times during the Wen-Chuan earthquake in China in 2008.

**Method:** The triage during the post-earthquake period was categorized into 3 phases. The consultation and operation waiting times were analyzed.

**Results:** Of the 119 admitted children, there were 58 boys and 61 girls. Most of the victims were school-aged. In phase 1 (24 hours after the quake), the triage waiting time was 78 minutes. The waiting time for pediatric subspecialty consultation was 3.5 hours. There was an additional 7.5-hour delay before operation. In phase 2 (24-72 hours after the quake), senior pediatric surgeons carried out the triage and consultation. The consultation waiting time was reduced to 31 minutes. Four rotating teams operated 24 hours a day. The waiting time for operation was reduced to 4.5 hours. In phase 3 (4-19 days after the earthquake), gas gangrene screening was implemented. The triage waiting times for closed and open injuries were 47 and 64 minutes, respectively. Operation waiting times of 4.4 and 4.8 hours were recorded for closed and open injuries, respectively. Compared to that of phase 1, the waiting times for both consultation and operation of phases 2 and 3 were significantly shortened ($P < .05$). Most of the (89%) of the injuries were orthopedic traumas with lower limb fracture being the most common injury. Intraabdominal and thoracic injuries were relatively uncommon.

**Conclusions:** (1) Triage by pediatric surgeons in the reception area greatly reduced the delay of treatment and (2) the predominance of orthopedic injuries resulting from the earthquake indicates the focus of medical resource allocation in natural disasters of this type in the future.

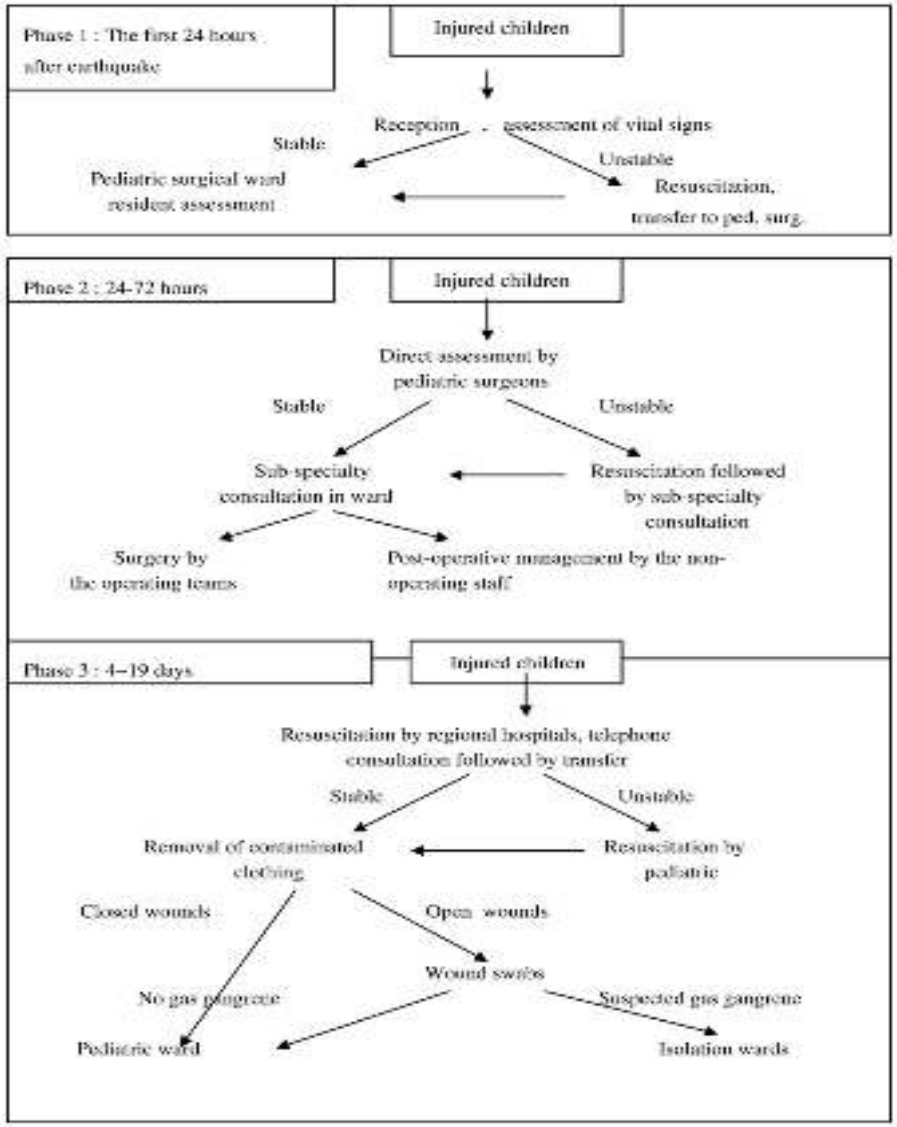


**Fig. 1** The flow charts of triage management through the 3 phases of earthquake resuscitation.

## Enfeksiyon gelişiminde risk faktörleri

- Çoklu travma (kranial, ekstremiteler, torakal, abdominal, spinal)
- Solunum, dolaşım bozuklukları, şok, immün sistem hasarı
- Derin, delici, kopma, ezilme, parçalanma tarzı, doku kaybı, organ hasarı olan yaralanmalar
- Enkaz altında uzun süre kalma
- Kas-iskelet sistemi yaralanmaları, kapalı/açık kırık, nörovasküler yaralanma
- Kanamaları durdurmak amaçlı kirli materyallerin kullanımı
- Yara temizliğinde nehir suları vb kirli suların kullanılması

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World Journal of Emergency Surgery

REVIEW Open Access

# A review of the epidemiology and treatment of orthopaedic injuries after earthquakes in developing countries

James S. MacKenzie[1], Bibek Banskota[2], Norachart Sirisreetreerux[1,3], Babar Shafiq[1] and Eric A. Hasenboehler[1,4*]

**Abstract**

**Background:** Earthquakes in developing countries are devastating events. Orthopaedic surgeons play a key role in treating earthquake-related injuries in the extremities. We describe orthopaedic injury epidemiology to help guide response planning for earthquake-related disasters.

**Methods:** Several databases were searched for articles reporting primary injury after major earthquakes from 1970 to June 2016. We used the following key words "earthquake" AND "fracture" AND "injury" AND "orthopedic" AND "treatment" AND "epidemiology." The initial search returned 528 articles with 253 excluded duplicates. The remaining 275 articles were screened using inclusion criteria, of which the main one was the description of precise anatomic location of fracture. This yielded 17 articles from which we analyzed the ratio of orthopaedic to nonorthopaedic injuries, orthopaedic injury location, type, and frequency, fracture injury characteristics (open vs. closed, single vs. multiple, and simple vs. comminuted), and first-line treatments.

**Results:** Most injuries requiring treatment after earthquakes (87%) were orthopaedic in nature. Nearly two-thirds of these injuries (63%) were fractures. The most common fracture locations were the tibia/fibula (27%), femur (17%), and foot/ankle (16%). Forty-two percent were multiple fractures, 22% were open, and 15% were comminuted. The most common treatment for orthopaedic injuries in the setting of earthquakes was debridement (33%).

**Conclusions:** Orthopaedic surgeons play a critical role after earthquake disasters in the developing world. A strong understanding of orthopaedic injury epidemiology and treatment is critical to providing effective preparation and assistance in future earthquake disasters.

**Keywords:** Developing countries, Earthquake, Epidemiology, Orthopaedic injury

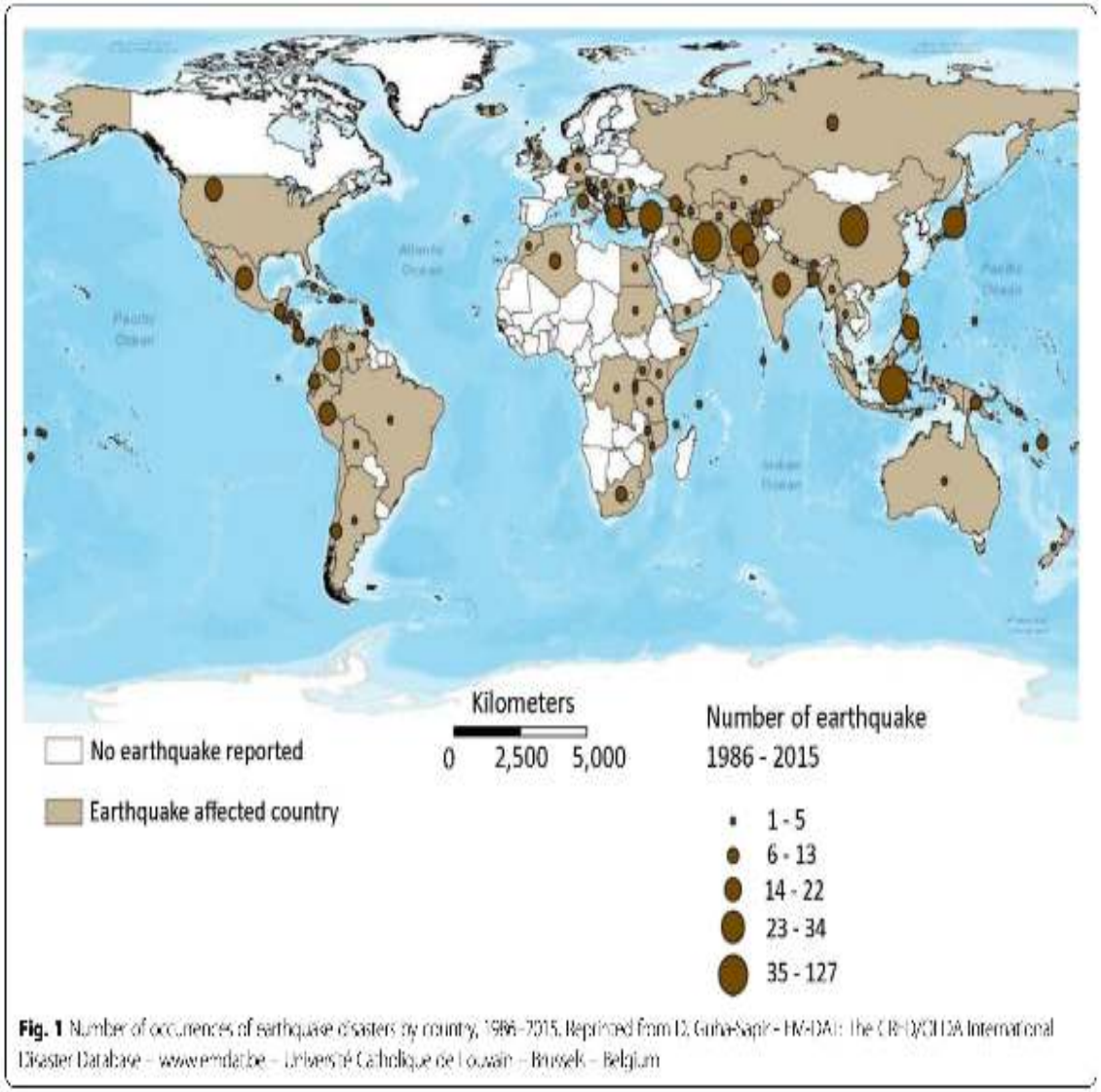


**Fig. 1** Number of occurrences of earthquake disasters by country, 1986–2015. Reprinted from D. Guha-Sapir - IMMDA: The CRED/OFDA International Disaster Database – www.emdat.be – Université Catholique de Louvain – Brussels – Belgium

**Table 1** Classification of type of 1549 injuries sustained in earthquakes

| Study | No. of injuries reported | | | |
|---|---|---|---|---|
| | Orthopaedic | Nonorthopaedic | | |
| | | Head | Thoracic | Abdominal |
| Tahmasebi et al. [13] | 228 | 32 | 17 | 18 |
| Gormeli et al. [8] | 260 | 14 | 17 | 17 |
| Dai et al. [7] | 258 | 8 | 15 | 9 |
| Kaim Khani et al. [9] | 150 | 8 | 6 | 3 |
| Roy et al. [11] | 125 | 9 | 3 | 3 |
| Phalkey et al. [10] | 324 | 12 | 11 | 2 |
| Total | 1345 (87%) | 83 (5.4%) | 69 (4.4%) | 52 (3.4%) |

**Table 2** Anatomic location of 3988 fractures sustained in earthquakes

| Study by country (year) of earthquake | Tibia/fibula | Femur | Ankle/foot[a] | Radius/ulna | Pelvis[b] | Humerus | Wrist/hand[c] | Clavicle/scapula |
|---|---|---|---|---|---|---|---|---|
| Nepal (2015) | | | | | | | | |
| Valysa [24] | 14 | 17 | 2 | 16 | NR | 9 | 2 | NR |
| Bar-On [15] | 34 | 10 | 30 | 11 | 9 | 7 | 7 | 4 |
| Turkey (2011) | | | | | | | | |
| Guner [15] | 100 | 36 | 64 | 70 | 61 | 23 | 25 | 22 |
| Gormeli [8] | 77 | 12 | 42 | 37 | 51 | 17 | 13 | 18 |
| Haiti (2010) | | | | | | | | |
| Bar On [14] | 109 | 95 | 73 | 26 | 38 | 36 | 18 | 4 |
| Blumberg [25] | 41 | 66 | 53 | 14 | 34 | 18 | 24 | 3 |
| China (2008) | | | | | | | | |
| Dai [7] | 81 | 38 | 48 | 60 | 29 | 23 | 10 | 15 |
| Chen [17] | 271 | 140 | 170 | 138 | NR | 70 | 69 | NR |
| Xiang [26] | 19 | 23 | 16 | 13 | 12 | 12 | NR | 1 |
| Pakistan (2005) | | | | | | | | |
| Kaim Khani [9] | 45 | 23 | 24 | 14 | 8 | 8 | 15 | 5 |
| Rajoura [27] | 24 | 11 | 11 | 9 | 2 | 7 | 7 | NR |
| Bozkurt [18] | 45 | 42 | 34 | 20 | 46 | 26 | 46 | 10 |
| Iran (2003) | | | | | | | | |
| Emami [4] | 29 | 21 | 2 | 15 | 17 | 22 | 5 | 9 |
| Tahmasebi [13] | 25 | 28 | 12 | 15 | 17 | 6 | 6 | 6 |
| India (2001) | | | | | | | | |
| Roy [11] | 20 | 17 | 19 | 7 | 15 | 8 | NR | NR |
| Phalkey [10] | 115 | 63 | 76 | 28 | 30 | 21 | 5 | 5 |
| Nicaragua (1972) | | | | | | | | |
| Whittaker [28] | 27 | 21 | 57 | 30 | 24 | 21 | 30 | 30 |
| Total | 1074 (27%) | 666 (17%) | 673 (17%) | 493 (12%) | 383 (9.6%) | 334 (8.4%) | 277 (6.9%) | 150 (3.8%) |

**Table 3** Type of initial treatment of 1260 orthopaedic injuries sustained in earthquakes, by study

| Study | Debridement | CR/casting/CRIF | ORIF | External fixation | Amputation |
|---|---|---|---|---|---|
| Valysa et al. [24] | 24 | 11 | 43 | 9 | 15 |
| Guner et al. [15] | 166 | 138 | 117 | 37 | 12 |
| Gormeli et al. [8] | 45 | 29 | 30 | 22 | 7 |
| Bar-On et al. [14] | 91 | 27 | 18 | 73 | 23 |
| Phalkey et al. [10] | 87 | 100 | 93 | 5 | 38 |
| Total | 413 (33%) | 305 (24%) | 301 (24%) | 146 (12%) | 95 (7.5%) |

*Abbreviations*: *CR* closed reduction, *CRIF* closed reduction/internal fixation, *ORIF* open reduction/internal fixation

**Table 4** Types of orthopaedic injuries ($n = 1365$) sustained in earthquakes, by study

| Study | No. of injuries | | | | |
|---|---|---|---|---|---|
| | Fracture | Crush injury | Compartment syndrome | Major soft tissue | Crush syndrome |
| Tahmasebi et al. [13] | 147 | 22 | 18 | 35 | 6 |
| Guner et al. [15] | 442 | 72 | 40 | 24 | 41 |
| Gormeli et al. [8] | 144 | 46 | 28 | 20 | 22 |
| Dai et al. [7] | 160 | 40 | 18 | 21 | 19 |
| Total | 893 (65%) | 180 (13%) | 104 (7.6%) | 100 (7.3%) | 88 (6.4%) |

**Table 5** Characteristics of fractures sustained in earthquakes

| Study | No. of fractures | | | | | |
|---|---|---|---|---|---|---|
| | Multiple fracture | | Comminuted fracture | | Open fracture | |
| | No | Yes | No | Yes | No | Yes |
| Bar-On et al. [14] | NR | NR | NR | NR | 261 | 99 |
| Bar-On et al. [16] | NR | NR | NR | NR | 89 | 37 |
| Chen et al. [17] | 287 | 336 | NR | NR | NR | NR |
| Dai et al. [7] | 42 | 112 | 109 | 51 | 105 | 55 |
| Gormeli et al. [8] | 70 | 74 | 97 | 47 | 123 | 21 |
| Guner et al. [15] | 386 | 56 | 423 | 19 | 405 | 37 |
| Kaim Khan et al. [9] | NR | NR | NR | NR | 92 | 48 |
| Total | 785 (58%) | 578 (42%) | 629 (84%) | 117 (16%) | 1075 (78%) | 297 (22%) |

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ORIGINAL PAPER

# Review of Van earthquakes form an orthopaedic perspective a multicentre retrospective study

Savas Guner · Sukriye Ilkay Guner · Yasemin Isik · Gokay Gormeli · Ali Murat Kalender · Ugur Turktas · Mehmet Ata Gokalp · Abdurrahim Gozen · Mustafa Isik · Sezai Ozkan · Tulin Turkozu · Sevdegul Karadas · Mehmet Fethi Ceylan · Levent Ediz · Mehmet Bulut · Yusuf Gunes · Ayse Gormeli · Cemil Erturk · Metehan Eseoglu · Recep Dursun

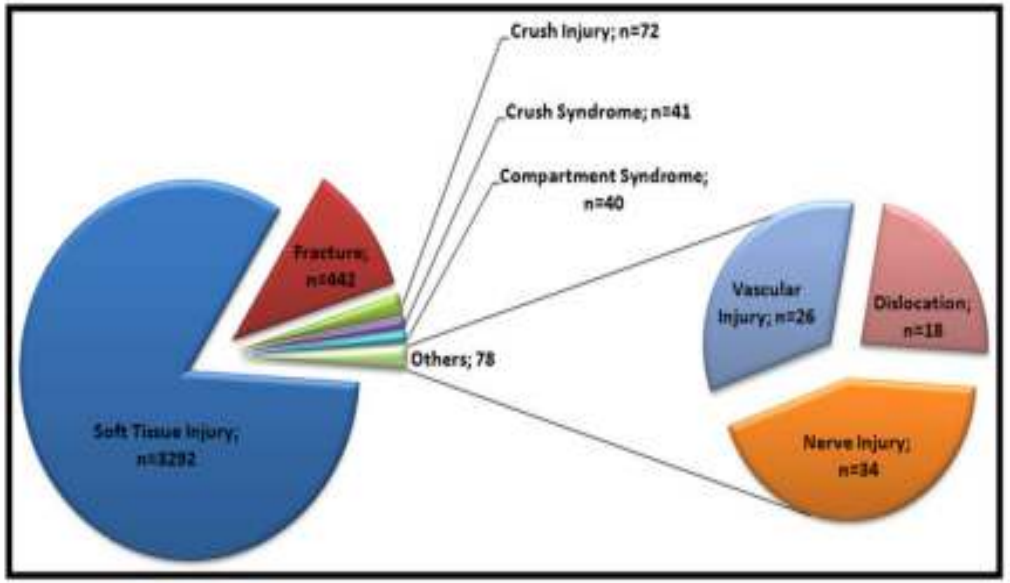



Fig. 3 Profile of musculoskeletal injuries in the earthquake of Van, Turkey

**Table 1** Distribution of fractures based on anatomical site

| Fracture location | Frequency | Percent (%) |
|---|---|---|
| Upper extremity fracture | 138 | 31.2 |
| Scapula and clavicle | 22 | 5.0 |
| Humerus | 23 | 5.2 |
| Radius and ulna | 70 | 15.8 |
| Carpus, metacarpus and phalangeal | 23 | 5.2 |
| Pelvic fracture | 54 | 12.2 |
| Acetabulum fracture | 7 | 1,6 |
| Lower extremity fracture | 205 | 46.4 |
| Femur | 36 | 8.2 |
| Patella | 5 | 1.1 |
| Tibia and fibula | 100 | 22.6 |
| Tarsal, metatarsal and phalangeal | 64 | 14.5 |
| Vertabra fracture | 38 | 8.6 |
| Total | 442 | 100 |

**Table 2** The table shows the number of procedures performed for patients

| Treatment types | Number of patients | Percent |
|---|---|---|
| Debridement | 166 | 33.1 |
| Closed reduction and casting | 91 | 18.2 |
| Closed reduction and internal fixation | 47 | 9.4 |
| External fixation | 37 | 7.4 |
| Open reduction and internal fixation | 117 | 23.4 |
| Fasciotomy | 31 | 6.2 |
| Amputation | 12 | 2.4 |
| Total | 501 | 100 |

# Enfeksiyonlar???

Clinical profile of musculoskeletal injuries associated with the 2008 Wenchuan earthquake in China

71/205 (%34.6)

14'ünde *E. coli*

12'sinde *C. perfringens*

11'inde *S. aureus*

9'unda *P. aeruginosa*

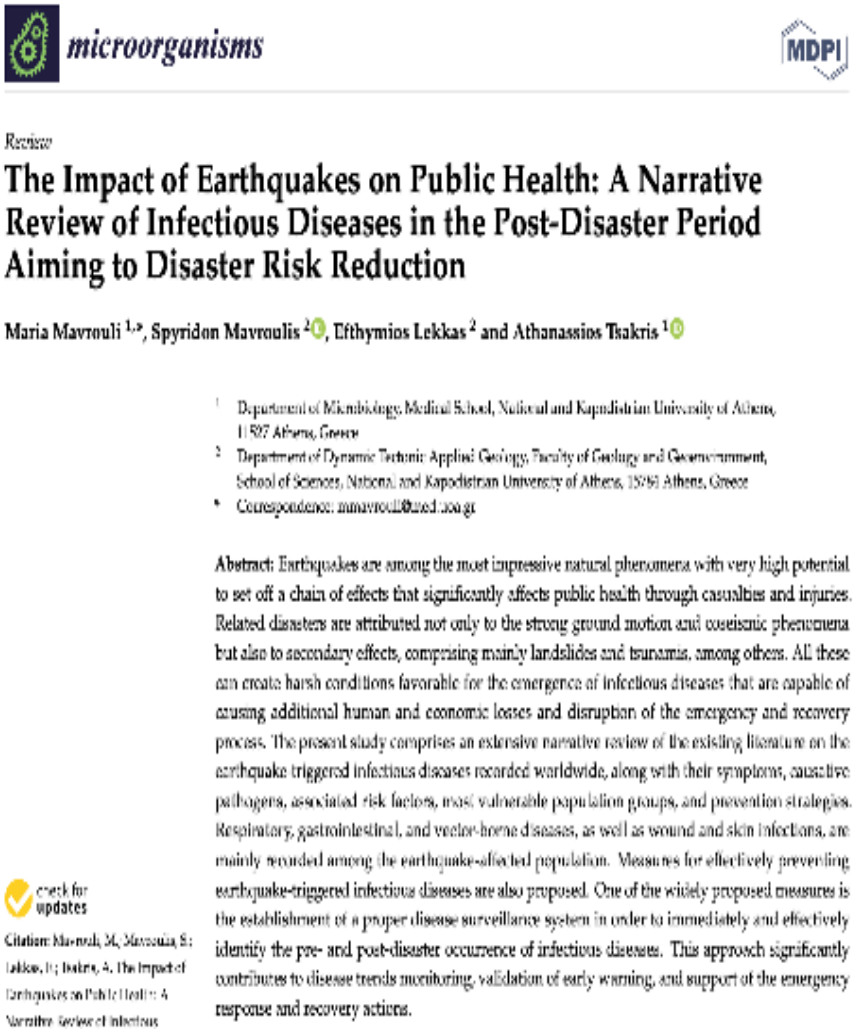
2'sinde *C. tetani*

**Table 1.** Distribution of fractures based on anatomical site

| Localization | Frequency | Percent |
|---|---|---|
| Upper limb fractures | 63 | 18.1% |
| Humerus | 23 | 6.6% |
| Radius | 16 | 4.6% |
| Ulna | 14 | 4.0% |
| Metacarpus&bones of fingers | 10 | 2.9% |
| Lower limb fractures | 176 | 50.4% |
| Acetabulum | 6 | 1.7% |
| Femur | 38 | 10.9% |
| Pelvic bones | 3 | 0.9% |
| Tibiofibula | 81 | 23.2% |
| Ankle | 19 | 5.4% |
| Calcaneus | 13 | 3.7% |
| Talus | 6 | 1.7% |
| Metatarsal bone | 5 | 1.4% |
| Bone of toe | 5 | 1.4% |
| Spine | 50 | 14.3% |
| Pelvis | 20 | 5.7% |
| Scapula | 7 | 2% |
| Ribs | 25 | 7.2% |
| Clavicle | 8 | 2.3% |

**Infection**

There were 71 patients (34.6%) with infection among the 205 patients with musculoskeletal injuries. These included 12 cases with bacillus aerogenes capsulatus, 11 cases with *Staphylococcus aureus*, 14 cases with *Escherichia coli*, 2 cases of tetanus bacillus, 9 cases with *Pseudomonas aeruginosa*, and 17 other kinds of bacteria in 23 cases. Most of them were combined anaerobic infections, and there was no case of sepsis.



*microorganisms*

MDPI

Review

# The Impact of Earthquakes on Public Health: A Narrative Review of Infectious Diseases in the Post-Disaster Period Aiming to Disaster Risk Reduction

Maria Mavrouli [1,*], Spyridon Mavroulis [2], Efthymios Lekkas [2] and Athanassios Tsakris [1]

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**Abstract:** Earthquakes are among the most impressive natural phenomena with very high potential to set off a chain of effects that significantly affects public health through casualties and injuries. Related disasters are attributed not only to the strong ground motion and coseismic phenomena but also to secondary effects, comprising mainly landslides and tsunamis, among others. All these can create harsh conditions favorable for the emergence of infectious diseases that are capable of causing additional human and economic losses and disruption of the emergency and recovery process. The present study comprises an extensive narrative review of the existing literature on the earthquake triggered infectious diseases recorded worldwide, along with their symptoms, causative pathogens, associated risk factors, most vulnerable population groups, and prevention strategies. Respiratory, gastrointestinal, and vector-borne diseases, as well as wound and skin infections, are mainly recorded among the earthquake-affected population. Measures for effectively preventing earthquake-triggered infectious diseases are also proposed. One of the widely proposed measures is the establishment of a proper disease surveillance system in order to immediately and effectively identify the pre- and post-disaster occurrence of infectious diseases. This approach significantly contributes to disease trends monitoring, validation of early warning, and support of the emergency response and recovery actions.

check for updates

Citation: Mavrouli, M.; Mavroulis, S.; Lekkas, E.; Tsakris, A. The Impact of Earthquakes on Public Health: A Narrative Review of Infectious

- Depremin büyüklüğü, zamanı (yaz mevsiminde risk yüksek, uykuda yaralananlar – proksimal kemiklerde hasar)
- Ortaya çıktığı bölge (deniz kıyısı, dağ)
- Depremin tetiklediği durumlar (heyelan, tsunami)

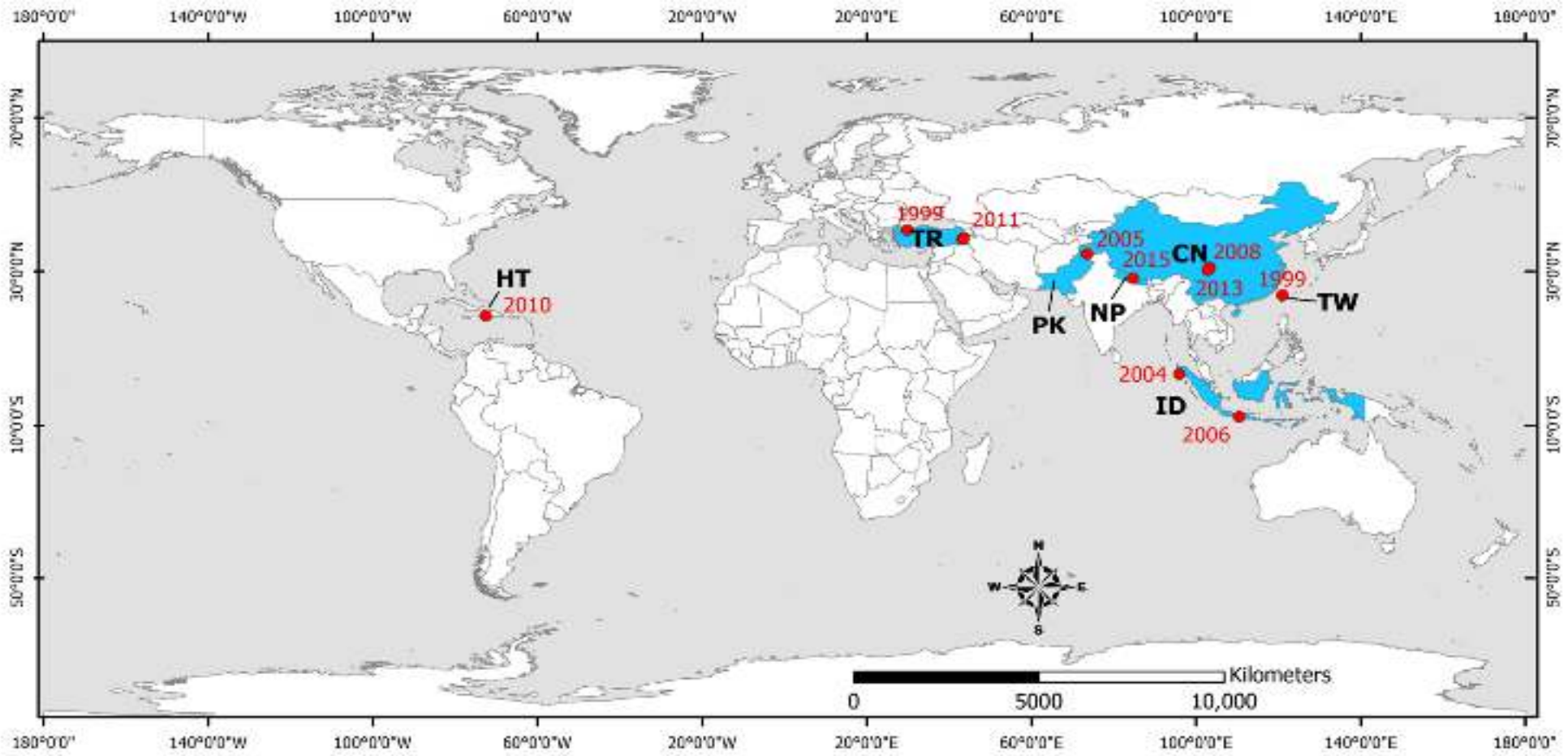


**Figure 5.** Countries affected by earthquake-triggered wound and skin infections. HT: Haiti, TR: Turkey, PK: Pakistan, NP: Nepal, CN: China, ID: Indonesia. The epicenters of the studied earthquakes are also illustrated (red dots), along with the occurrence year (red numbers).

**The characteristics of infections in crush syndrome**

*R. Kazancioglu[1], A. Cagatay[2], S. Calangu[2], D. Korular[1], A. Turkmen[1], N. Aysuna[1], S. Sahin[1], S. Bozfakioglu[1] and M. S. Sever[1]*

| Earthquake Occurrence (DD/MM/YYYY) | Earthquake-Affected Area | Infectious Diseases (Causative Factors/Cases, Outbreaks, Epidemics) |
|---|---|---|
| | | Infections/infestations, cutaneous superficial fungal infections (Tinea pedis), cases of viral skin diseases, insect bites |
| | | Infectious complications (wound infections): gram-negative bacteria (mainly *Acinetobacter* spp.), *Staphylococcus* spp. |
| 26/12/2004 | Indonesia | Wound infections: tetanus (106 cases), *Clostridium tetani* |
| | | Infections—infestations, traumatic skin lesions, and contact dermatitis |
| | | Wound infections (*Aeromonas* spp., *E. coli*, *K. pneumoniae*, *P. aeruginosa*, *Proteus* spp.) |
| | | issue infections |
| | | Infected supe… n the limbs and face (recurrence: necrosis of un… need for repeated cleaning, and …of wounds) |
| | | Tetanus outbreak |
| 08/10/2005 | Kashmir, Pakistan | Gas gangrene of the limbs and tetanus requiring respiratory support (51 patients with tetanus, of whom 22 died) |
| | | Wound infections: *P. aeruginosa*, *Enterobacter* spp. and *Acinetobacter* spp. (multi-resistant strains) |
| 27/05/2006 | Yogyakarta, Indonesia | Wound infections: tetanus (71 cases) |
| | | Wound infections: tetanus (26 cases) |

En çok sepsis ve yara enf
Fasiyotomi uygulananlarda daha fazla !!!

Tsunami

- Enkaz altında kalma süresi uzun
- Ciddi yaralanmalar (fasyotomi-amputasyon oranı yüksek)
- Hava sıcaklığı yüksek

Gram negatif etkenler ön planda

- Çocuklar

Kraniyal yara ve intrakraniyal enf.da

| | | Infectious Diseases (Causative Factors/Cases, Outbreaks, Epidemics) |
|---|---|---|
| | | Wound infections (*E. coli*, *S. aureus*, *S. haemolyticus*, *A. baumanii*, *A. cloacae*, *P. aeruginosa*, C-type chain coccus, and *Bacillus aerogenes capsulatus*), gas gangrene (*Clostridium perfringens*) |
| | | 67 probable cases (2.41%) of gas gangrene of which 5 were confirmed by culture (*C. perfringens*) |
| | | Crush syndrome–wound infections: *A. baumanii*, *P. aeruginosa*, *E. cloacae*, and *E.coli* |
| | | Wound infections: Gram-negative bacilli, Gram-positive bacteria, *Candida* spp., Gram-negative cocci, *Clostridium sordelli* |
| | | Skull wound infections: Gram-positive bacteria (*S. aureus*, *S. epidermidis*), Gram-negative bacteria (*E. cloacae*, *K. pneumoniae*, *Serratia rubidaea*) |
| | | Wound infections in 50 children: Gram-positive bacteria (16%), Gram-negative bacteria (82%) (*A. baumannii*, *E. cloacae*, *P. aeruginosa*), 1 month after the earthquake |
| | | Wound infections (24.4% Gram-positive bacteria: *Staphylococcus aureus*, —73.2% Gram-negative bacteria: *Escherichia coli*, *Acinetobacter baumannii*, *Enterobacter cloacae*, and *P. aeruginosa*) |
| | | Crush syndrome—wound infections: *A. baumannii*, *E. coli*, *S. aureus*, gas gangrene |
| | | Wound infections: Gram-negative bacteria |
| | | Wound infections: *A. baumannii*, *Burkholderia cepacia*, *S. aureus*, and *Enterococcus* spp. |
| | | Crush syndrome |
| | | Wound/skin infections |
| 12/01/2010 | Haiti | Wound infections (polymicrobial, 89% Gram-negative bacteria, antimicrobial resistant) |
| | | Wound infections: tetanus (2 cases) |
| 23/10/2011<br>09/11/2011 | Van, Turkey | Wound infections: Gram-negative aerobic bacteria and *A. baumannii*, *P. aeruginosa*, *E. coli*, and *E. faecium* |
| 20/04/2013 | Lushan, China | Intracranial infection (initial stage of hospitalization: *S. aureus* and *E. coli*—prolonged stay in ICU: *A. baumannii* and *K. pneumoniae* |
| 25/04/2015 | Gorkha, Nepal | 56 human losses: 68% Gram-negative bacilli (55%, Enterobacteriaceae) |

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doi:10.1053/jhin.2002.1205, available online at http://www.idealibrary.com on IDEAL®

# Hospital-acquired infections following the 1999 Marmara earthquake

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532 olgu, 220'si 48h'den fazla hospitalize

41'inde (%18.6) SBİE, %46.5'i yara yeri enf

*Acinetobacter baumannii, S. aureus, P. aeruginosa, E. coli*

*K. pneumoniae, S. maltophilia*

- Vücut savunma mekanizmaları bozuk
- Hayatı tehdit eden yaralanmalar
- Yoğun kontaminasyon (eksojen ve endojen)
- İdeal cerrahi müdahele koşulları yetersiz
- Cerrahi enfeksiyon riski yüksek

**Cerrahi**

**+**

**Antibiyoterapi**

# Fasiyotomi


Crush - sıklıkla kapalı yaralanma, deri ideal bariyer

**Endikasyonu iyi değerlendirilmeli**

- Yarayı açık hale getiriyor, enfeksiyon ve sepsis riski artıyor
- Fasiyotomi kaynaklı enfeksiyon ile ampütasyon riski de artıyor
- Plazma sızıntısı, kanama – hemodinamik dengeyi bozabilir

# Proflaktik – Pre-emptif

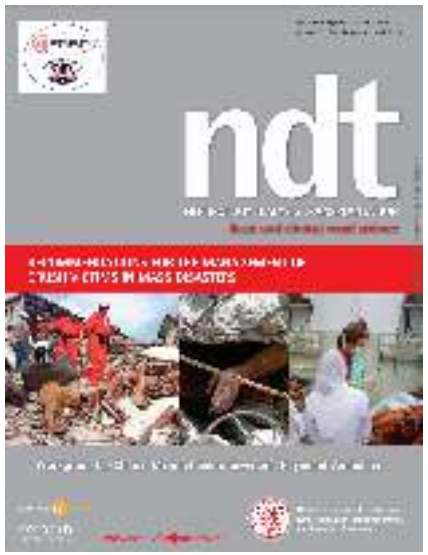


**Table 9.** Suggested prophylactic/preemptive antibiotic treatment protocols in wound infections of traumatized victims [180–184]

| Type of the trauma | Possible pathogens | Commonly accepted treatment[a] | Alternative |
|---|---|---|---|
| Head trauma | Staphylococci | Cefazolin | Ampicillin-sulbactam[b] |
| Maxillofacial fractures | Staphylococci | Cefazolin | Ampicillin-sulbactam |
| Chest thoracostomy | Staphylococci, streptococci | Cefazolin | Ampicillin-sulbactam |
| Abdominal injury | Gram-negative bacilli, anaerobes | Ceftriaxone + Metronidazole | Ampicillin-sulbactam |
| Bone fractures, closed | Staphylococci | Cefazolin | Ampicillin-sulbactam |
| Bone fractures, open | Staphylococci, Gram-negative bacilli | Cefazolin + Ciprofloxacin | Ampicillin-sulbactam |
| Fasciotomy | Staphylococci, Gram-negative bacilli, anaerobes | Cefazolin + Ciprofloxacin | Ampicillin-sulbactam |
| Crush with AKI | Staphylococci, Gram-negative bacilli, anaerobes | Cefazolin | Ampicillin-sulbactam |
| Burns | *Staphylococcus aureus, Pseudomonas aeruginosa, Acinetobacter* spp., fungi | Topical antimicrobials | |

[a]For patients allergic to penicillin, substitute cefazolin and ampicillin-sulbactam by clindamycin. If possible pathogens include Gram-negatives, however (i.e. cases with abdominal injury, open fractures, fasciotomy wounds), moxifloxacin or tigecycline monotherapies should be considered in place of beta lactams.
[b]Oral amoxycillin-clavulanate may be used in place of parenteral ampicillin-sulbactam.
*Abbreviation:* AKI, Acute Kidney Injury.

> Infect Dis (Lond). 2017 Nov-Dec;49(11-12):862-864. doi: 10.1080/23744235.2017.1337276. Epub 2017 Jun 15.

# Therapy for wound infections after earthquakes requires inclusion of drugs targeting Gram-negative bacteria

Muhammed Bekçibaşı [1], Salih Hoşoğlu [2], Özcan Develi [3], Saim Dayan [3]

**Table 1.** Isolations of bacterial specimens.

| | Blood culture | Wound culture | Catheter culture | Total (%) |
|---|---|---|---|---|
| Acinetobacter baumannii | 3 | 3 | 1 | 7 (70%) |
| Pseudomonas aeruginosa | 1 | – | – | 1 (10%) |
| Escherichia coli | – | 1 | – | 1 (10%) |
| Enterococcus faecium | 1 | – | – | 1 (10%) |

**Table 2.** Clinical data of patients.

| | Infected Group ($n = 7$) | Non-infected Group ($n = 21$) | $p$ value |
|---|---|---|---|
| Age (years) | 24.6 ± 14.5 | 33.4 ± 20.2 | .254 |
| Time under the rubble (h) | 27.0 ± 11.5 | 27.0 ± 15.4 | .873 |
| Crush syndrome | 85.7% | 33.3% | .029 |
| Central venous catheterization | 100% | 38.1% | .007 |
| Surgical intervention | 85.7% | 47.6% | .184 |
| Haemodialysis | 71.4% | 23.8% | .063 |
| Mortality | 71.4% | 9.5% | .004 |

2011 Van depremi, 48 h içerisinde hospitalize edilen 28 hasta

*Acinetobacter baumannii* MDR karbapenem dahil

*A. baumannii* toprakta, suda, hayvanlarda ve insanlarda mevcut. Deprem bu bakteri yayılımı için risk

- Cilt bütünlüğünün bozulması, iskemik doku hasarı
- Hastaların hastaneye kabulünde kateterler, cerrahi direnler, endotrakeal tüpler *A. baumannii* kolonizasyonuna katkı