MASS CASUALTY PREHOSPITAL NANAGEMENT

Prof. Kobi Peleg, PhD, MPH

- Director, National Center for Trauma & Emergency Medicine Research
- Head, Disaster Medicine Department, Tel-Aviv University

Czech Technical University, Praha, Nov 2019

Basic Assumption

- Disaster & mass casualty occur - “out of the blue” or at very short warning
- “The name of the game” - Organization, Management, Command & Time Control:
  - Planning & Training before the event
  - Planning & Management of time
  - Coordination & Transportation

Experience shows that the name of the game in MCI is OCCCC:

Organization

Command

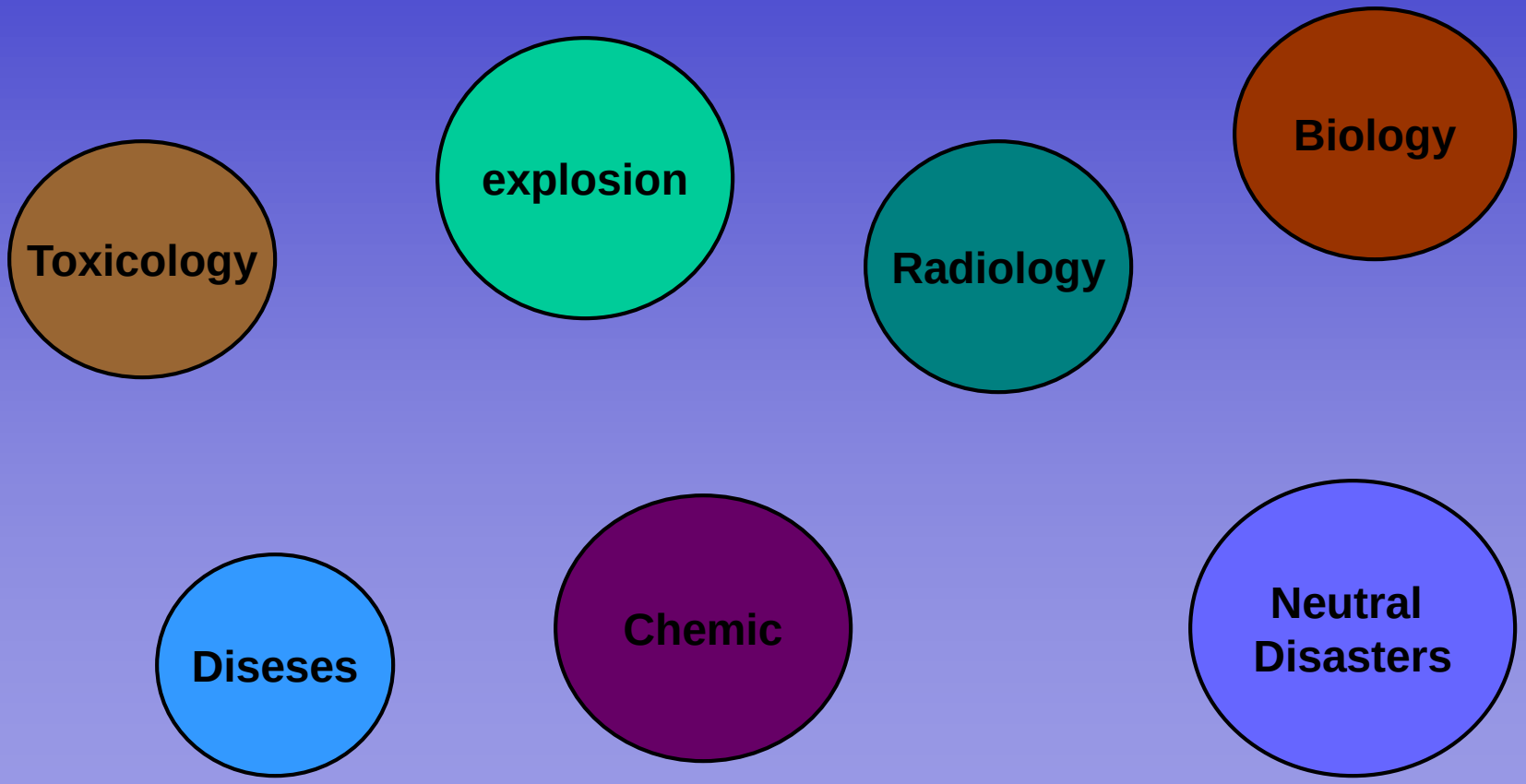
Control

Communication

Coordination between the emergency services.

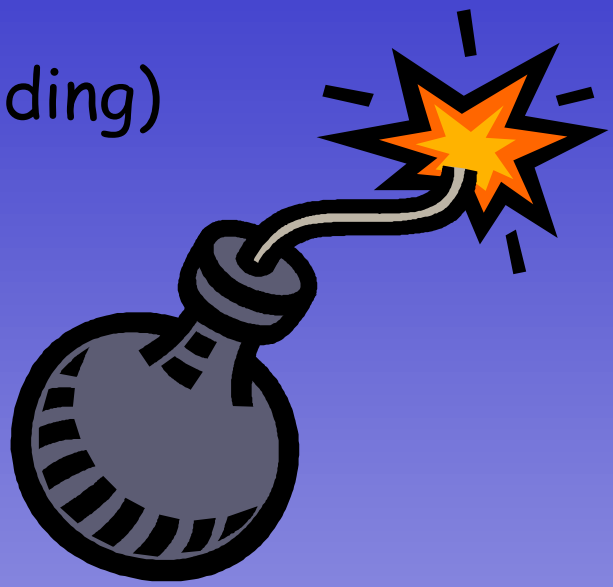
Who is in Command???

Type of MCIs


Toxicology
explosion
Radiology
Biology
Diseses
Chemic
Neutral
Disasters

What affects the injury?

- Type of area (open closed, bus or building)
- Type of explosive used
- Weight of explosive
- Density of crowd
- Protective gear (clothing, armor, helmet)



What affects the response?

- Number of casualties, their severity and distribution
- Time until rescue and treatment
  - Timing of the event
  - Geographical location / distance from hospital
  - Evacuation time and EMS quality of care
- Hospital preparedness and organization (bottlenecks)
- Control and cooperation between responding organizations

Types of EMS Response

- Scoop and Run
- Stay and Play
- (“Scooter”)
- (“Stooter”)

MC in Urban Areas

- Short duration
- Short distance = ambulance availability
- Scoop & Run (0.5C+AW + Bleeding)

MC in Rural Area

- Extended period of arrival - Forces, Command & Evaluation
- Treatment according to PHTLS
- Evacuation according to medical priorities
- Helicopters - best means of transportation

The EMS Steps in a Mass Casualty

- First response
- Fast Assessment
- Safety
- Report to the CCC
- Casualty allocation
- Divide the area to sections
- Triage
- PHTLS approach
- Allocation of the casualties in a designed treatment area
- Gathering of commanders & forces
- Evacuation (including priorities)
- Debriefing & lesson study


Divide the area to sections

Triage in MCI

MCI Definition

MCI is any incident in which EMS resources are overwhelmed by the number and severity of casualties.

(Wikipedia)

The aim of Triage in MCI

Ramesh & Kumar (2010):

“Triage is absolutely required for categorizing the casualties in accordance with medical priorities”.

Reisner (Disaster Medicine – Ciottone):

Triage is an effective soring for patients into categories of priority to rationally allocate limited resources.

Triage is an ongoing procedure!!!

Field Medical Care

Mass Casualty Incidents

Victims with no vital signs - Not treated

Life-saving procedures on scene :

- Airway control, Intubation, Needle Application, Tourniquet.

- **Stabilizing procedures - en route**:
- IV lines
- Back boards
- Cervical collars

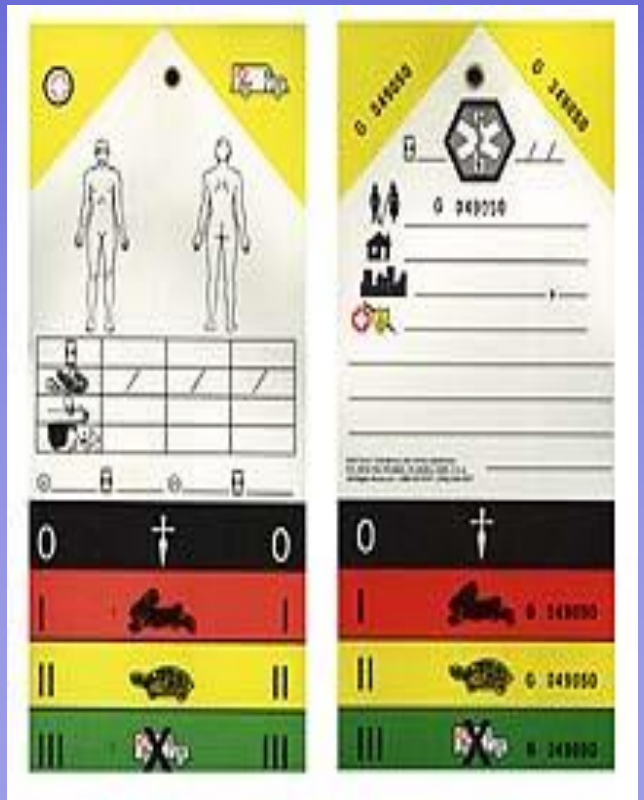
Field medical care

Secondary Triage (Body Tag)

1. Urgent unstable
   First priority evacuation.

2. Urgent stable
   Second priority evacuation.

3. Non-urgent
   Evacuation is delayed.



Triage in Israel - In Theory

- The “butterfly system”
- Sampling & signing
- A + B + 0.5 C
- START:
  - Conscious situation
  - AW
  - Breathing (10-30)
  - Massive Bleeding

Transportation triage

Distribution of victims to various hospitals

The right injured to the right hospital

Severe injured to the level 1 trauma center (if there is one)

Moderate & mild to other hospitals

Don’t over-load the hospitals

Don’t under-load the hospitals

Use the hospital representative

Summaries:

The management of a MCE is a complicated task incorporating both medical and operational forces/non medical that assist in the operational aspects.

The wise incorporation of these forces, together with familiarity with the territory and the modus operandi of the medical teams will help manage the event efficiently and save as many lives as possible.



Teaching & Training programs for the Public in Israel

Prof. Kobi Peleg

Head, The National Center for Trauma & Emergency Medicine Research,

The Gertner Institute for Health Policy & Epidemiology

The use of mass wisdom in Disasters and Emergency incidents

- The use of **mass wisdom** in disasters and emergency incidents is extremely effective.
- Emergency incidents and especially disaster are events that create a **shortage of professional forces**.
- The masses in this situation have many advantages:
  - ✓ The masses are **scattered more widely and at higher numbers**
  - ✓ They are **available in a short time** everywhere
  - ✓ A large proportion of survivors require only **basic rescue operation**, which the masses can perform and save a lot of lives.

We believe that training & education of the public has added value in:

Saving lives

Improving self-ability & self-confidence

Increasing resilience

Willingness to help others

Purchase Tools for Emergency by Age in Israel

Exercise in the kinder gardens	**HFC Emergency Education & Training (5th class)**	**FA course + light S&R**	**18 Hours FA course**	**Local Emergency Team, FR Volunteers**
Childhood	Elementary Schools	High Schools	IDF	Adults




CPR to the public

CPR to the Public

Real Time Video
scene to the EMS CCC


9 1 1

מיקום בסמס | תמונה בסמס

שלח | סמן סיום

MobileApps 972526339503
11/18/2016 10:25:14 AM

can you send us a picture of the patient please ?
972526339503 נפר יודב
11/18/2016 10:08:01 AM

נשלח סמס לבקשת תמונה
972526339503 נפר יודב
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נשלח סמס לבקשת תמונה
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נשלח סמס לבקשת מיקום
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יוסי בן נעים
ירושלים

25027
נתנאל שוור
בית שמש

26575
אלרון זבסנ
ירושלים

28166
דייב שרפמ
ירושלים

21288
חיים צבי וו
ירושלים

23113
נתן אברהם
בית שמש

26454
נתי הלוי
נה"ז קרית

21950
דוד שונפלד
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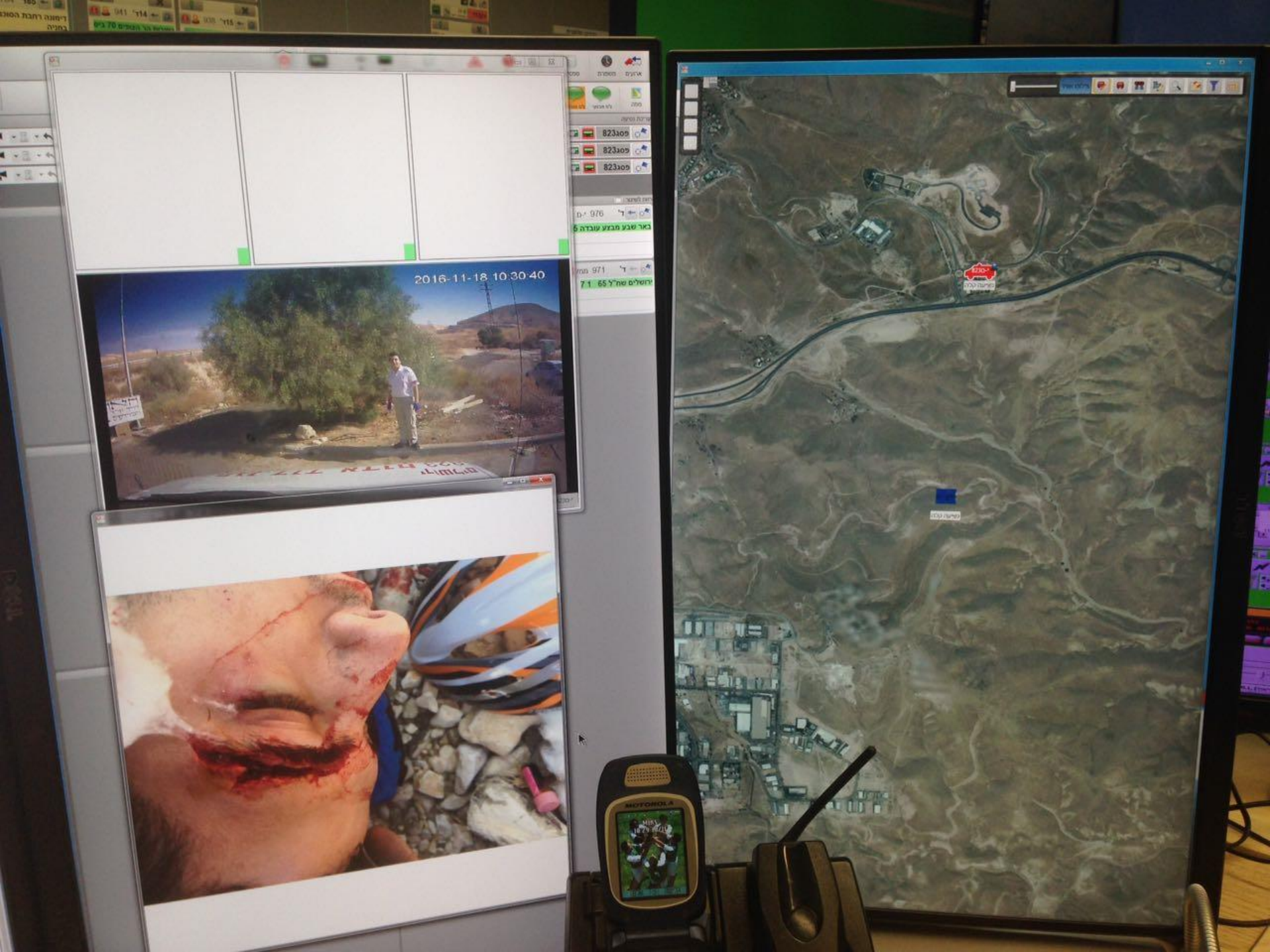
ישראל ליכנ
בית שמש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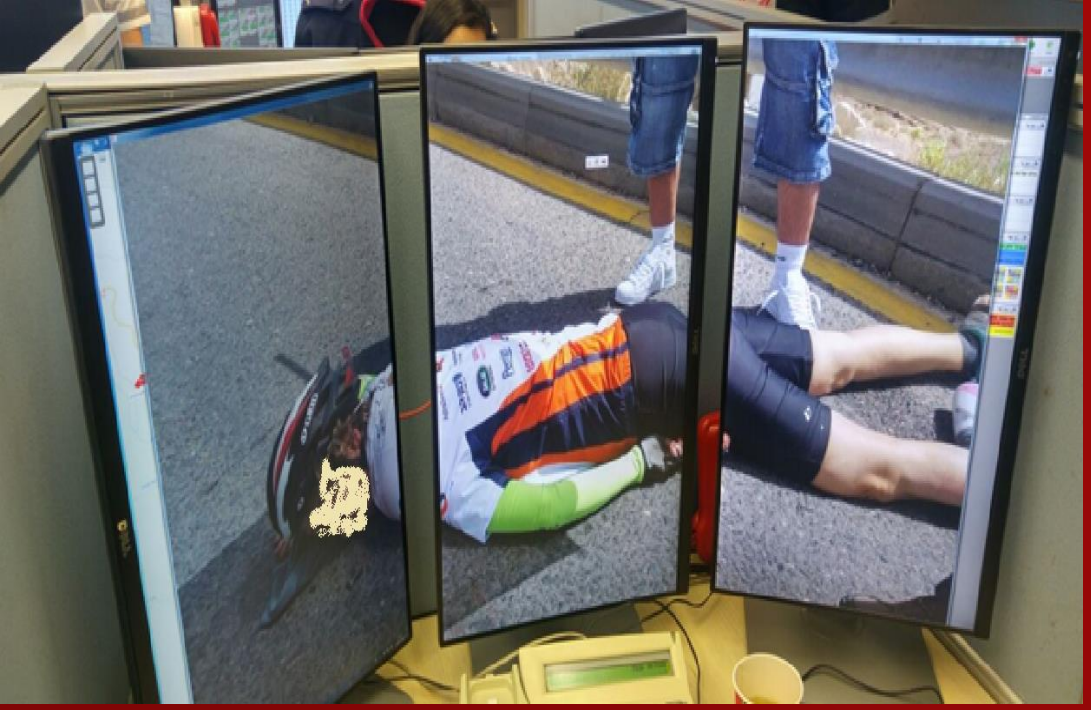

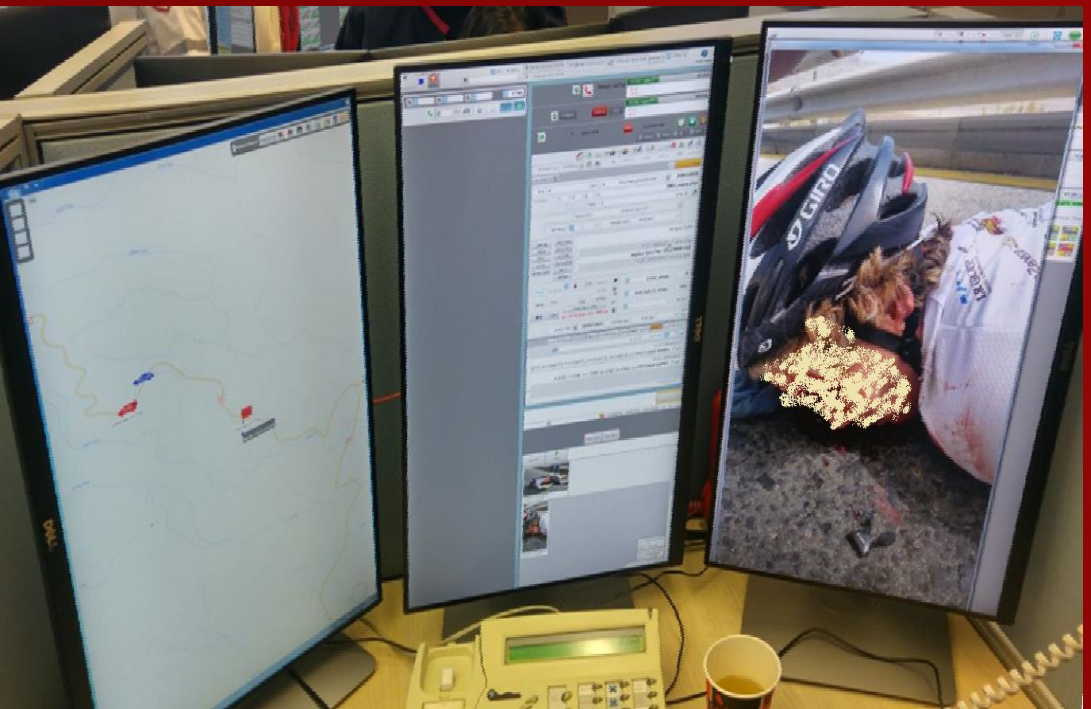


שלח
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My MDA


זמן שיחה
01:43
רמקול מופעל
סיום תקשורת
הוסף תמונה
הפסק וידאו
בדרך אליך...
00:00:11
מגן דוד אדום שלום
כיצד אוכל לעזור לך
שלום
אני צריך אמבולנס
הקלד הודעתך כאן
101 חייג
המשפחה שלי
תיק רפואי
Медицинская история
Подробная, жизненно важная информация для
Чувствительность к препаратам
Чувствительность к продуктам
דגים, פול, סויה, שמרים
История болезни – кардиологическая
אוטם בעבר, אי ספיקת לב
История болезни – органы дыхания
Asthma, Previously, מחלת ריאות כרונ
История болезни – неврологическая
Проблемы со слухом
Проблемы с речью
Имеется ЭпиПен
Имеется ингалятор
Электрокардиограмма
Прикрепите медицинские документы /п о болезни
Личные данные
Главный экран
המשפחה שלי
תיק רפואי
Who is the call for?
For me
Friend
Other
תיק רפואי
פירוט מידע רפואי חיוני עבור הצוות הרפואי בעת קבלת
רגישות לתרופות
רגישות למוצרים
הסטוריה רפואית - קרדיאלי
הסטוריה רפואית - נשימתי
הסטוריה רפואית - נוירולוגית
כבד דיבור
כבד שמיעה
נושא משאף אינהלציה
נושא אפיפן
צרף צילום א.ק.ג
צרף מסמך רפואי סיכום מחלות
פרטים אישיים
מסך הבית

54% 15:12

Call time
04:24

Speaker is on

End communications

Add photo

Transmit video

On the way...

Ho bisogno di aiuto

Messaggio originale: מה קרה ?
messaggio tradotto: Che cosa è successo?

location
מיקום מדוייק - GPS
32.05641872147901,34.866179341596 95

Ho un infarto in corso

Messaggio originale: את חולה לבבית ?
messaggio tradotto: Il paziente cardiaco?

Messaggio originale: היה לך התקף לב בעבר ? messaggio tradotto: Hai avuto un attacco di cuore?

location
מיקום מדוייק - GPS
32.056501731066795,34.866126283506 29

Type your message here

61% 15:45

Call time
06:08

Speaker is on

End communications

Add photo

Transmit video

On the way...

מגן דוד אדום שלום

כיצד אוכל לעזור לך

你好

原始信息：אתה צריך סיוע . גם לך ? תרגום
译的消息：即使你。您需要帮助吗 ？

也 I need an ambulance

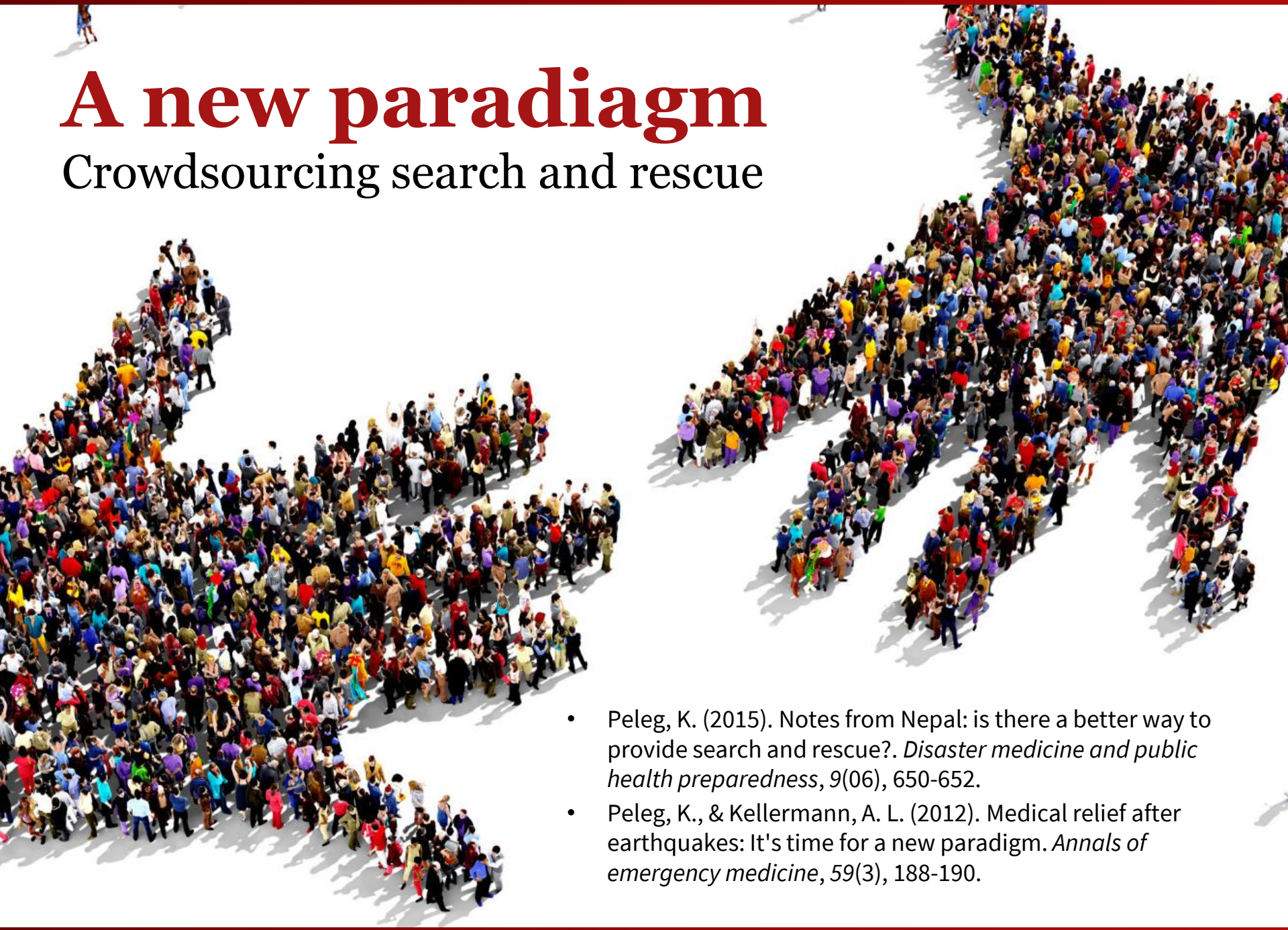
Original message: איפה אתה נמצא ?
Translated message: where are you ?

Type your message here


MAYBE IF WE TELL PEOPLE
THE BRAIN IS AN APP
THEY'LL START USING IT

A new paradiagm

Crowdsourcing search and rescue



- Peleg, K. (2015). Notes from Nepal: is there a better way to provide search and rescue?. *Disaster medicine and public health preparedness*, *9*(06), 650-652.
- Peleg, K., & Kellermann, A. L. (2012). Medical relief after earthquakes: It's time for a new paradigm. *Annals of emergency medicine*, *59*(3), 188-190.

1.
Background

Here’s what we know…

The mission

of delegations to disaster stricken areas is to **SAVE AS MANY LIVES AS POSSIBLE**

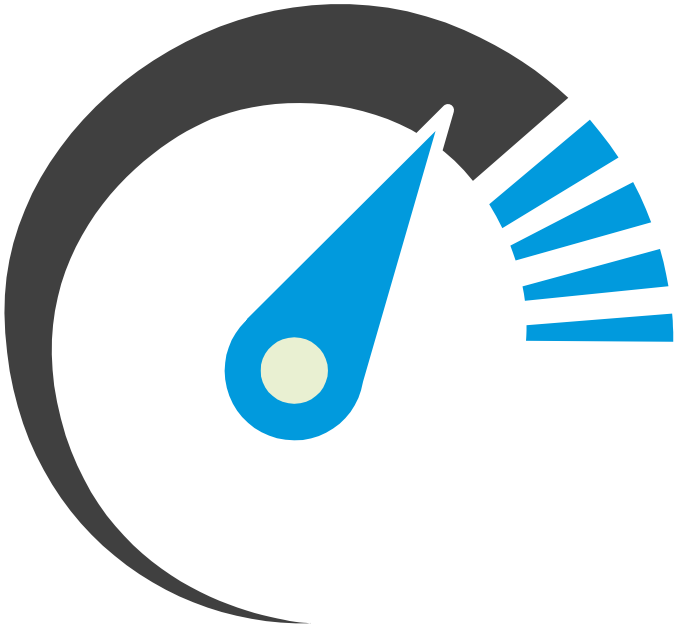
Are we on the right path to achieving this goal?

Some facts about earthquakes

The first days after a disaster are the most crucial in saving lives among trauma casualties

The Urban Search And Rescue teams (USAR) and medical teams are the most important in saving lives

In most incidents, during the first days…



Many USAR teams

Shortage of medical teams

It's time for a new paradigm

Peleg and Kellermann.
Ann Emerg Med, 2011
Aug 18

Picture: **FEMA.gov**

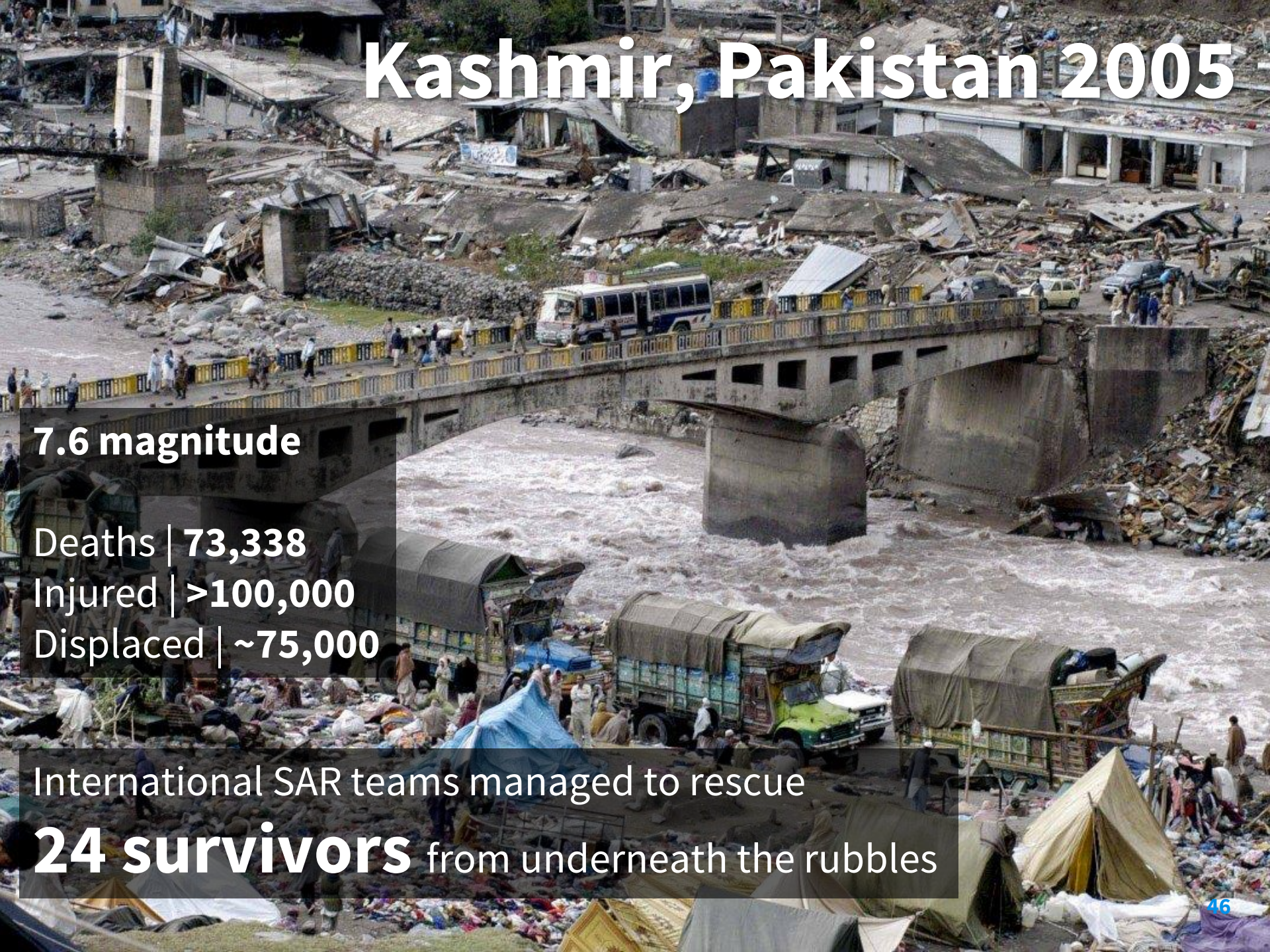
Bam, Iran 2003

6.5 magnitude

Population | **240,000**
Deaths | **40,000**
Injured | **>30,000**
Displaced | **~75,000**

34 rescue teams comprising of 1,345 rescuers

No one extracted alive beyond those rescued by laypersons



Kashmir, Pakistan 2005

7.6 magnitude

Deaths | **73,338**
Injured | **>100,000**
Displaced | **~75,000**

International SAR teams managed to rescue
24 survivors from underneath the rubbles

Padang, Indonesia 2009

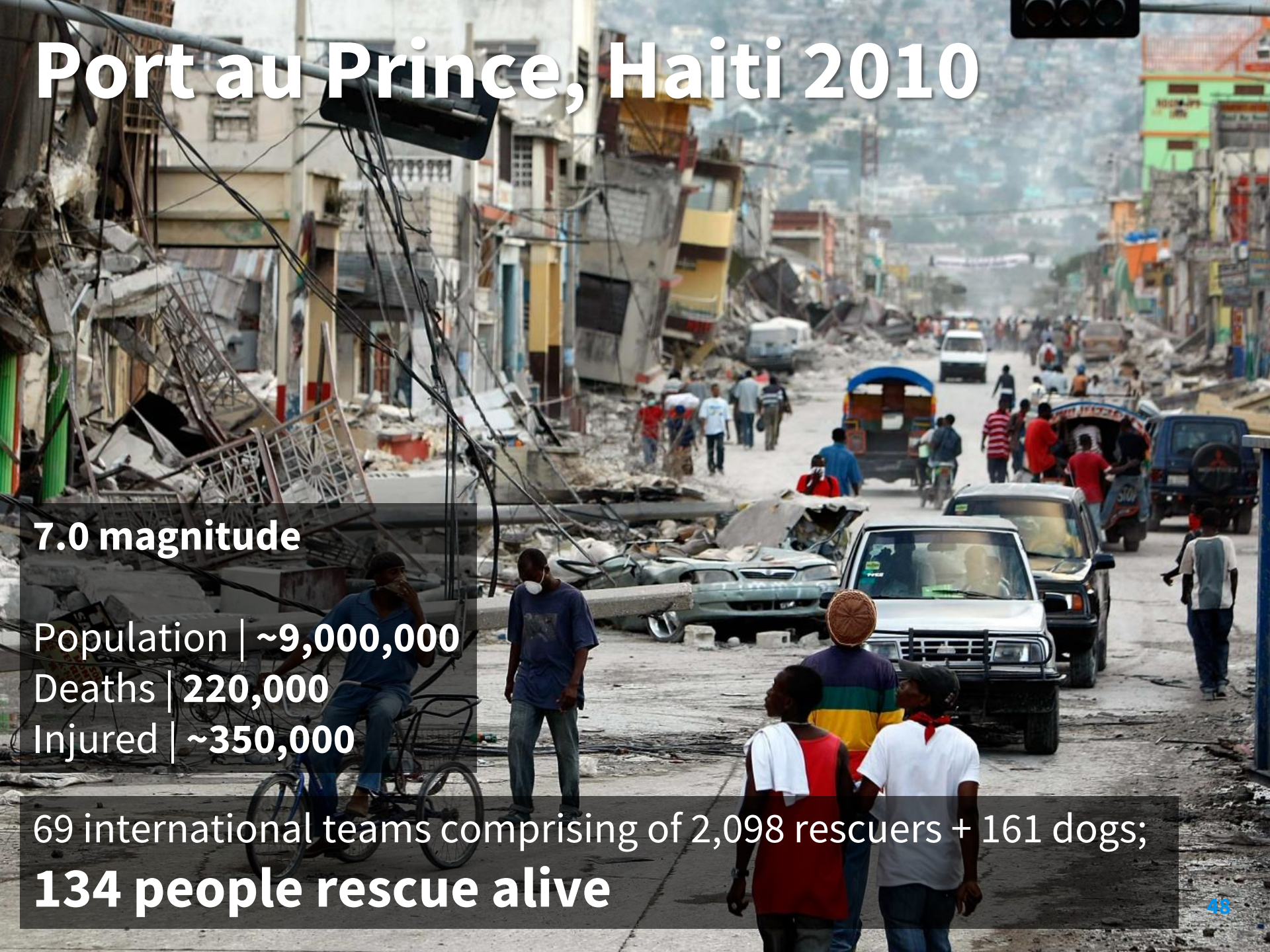
7.6 magnitude

Population | **900,000**
Deaths | **1,117**
Injured | **3,000**
Affected | **2,500,000**

21 international rescue teams comprising of 688 rescuers & 67 dogs;
All buildings scanned for potential survivors within 48 hours!

No one extracted alive by SAR teams

Port au Prince, Haiti 2010



7.0 magnitude

Population | **~9,000,000**
Deaths | **220,000**
Injured | **~350,000**

69 international teams comprising of 2,098 rescuers + 161 dogs;
134 people rescue alive

Christchurch, New-Zealand 2011

6.3 magnitude

Deaths | **~350**
Injured | **~700**

600 SAR team members rescued

1-3 people alive

Nepal 2015

7.8 magnitude

Deaths | **~9,000**
Injured | **~23,500**

76 international teams comprising of 2,450 rescuers

16 people rescued alive - 13 in the first couple of days by the Indians (11) and the Chinese (2)

USAR teams versus survivors

	DEAD	INJURED	USAR teams	SURVIVORS
Bam, Iran (2003)	**~40,000**	**+30,000**	**34 (1,345 personnel)**	**0**
Kashmir, Pakistan (2005)	**73,338**	**+100,000**	**UNDAC + USAR teams (?)**	**24**
West Sumatra, Indonesia (2009)	**1,117**	**3,000**	**21 (688 personnel + 67 dogs)**	**0**
Haiti (2010)	**~220,000**	**~350,000**	**2,098 personnel + 161 dogs**	**134**
Christchurch, New-Zealand (2011)	**~350**	**~700**	**~600 personnel**	**1-3**
Nepal (2015)	**8,964**	**23,447**	**76 (2,242 personnel)**	**16**

*Those who do not learn from the past are **condemned** to repeat it.*

George Santayana, The Life of Reason

3.

A new paradiagm

Crowdsourcing search and rescue

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Basic assumptions

- USAR teams take time to arrive
  - by the time they reach the scene of a distant disaster, most trapped victims have either been rescued by the local population or had died
- The cost of deploying a medium-sized USAR mission is roughly equivalent to that of a small field hospital
- In Haiti and elsewhere, field hospitals and medical teams had far greater influence

“…What is invariably lost in the press coverage is the far larger number of victims rescued by family members, neighbors, and other local citizens. Several studies have determined that these anonymous individuals account for 50% to 95% of survivors following major earthquakes.”

Uscher-Pines L, Chandra A, Acosta J, et al. (2012). Citizen preparedness for disasters: are current assumptions valid? *Disaster Med Public Health Prep. 6(2),* 170-173.

Peleg K, Reuveni H, Stein M. (2002). Earthquake disasters–lessons to be learned. *Isr Med Assoc J. 2002;4(5),* 361-365.

Armenia, 1988: “Among persons found alive, 89% were rescued during the first 24 hours, mostly without the use of heavy equipment”

Noji, E. K., Kelen, G. D., Armenian, H. K., Oganessian, A., Jones, N. P., & Sivertson, K. T. (1990). The 1988 earthquake in Soviet Armenia: a case study. *Annals of emergency medicine, 19(8),* 891-897

“…the majority of survivors from earthquake … are rescued within the first 24 hours ... Examples include the 1980 earthquake in southern Italy, where 94% of people were rescued during the first 24 hours”

McGuigan, D. M., Deam, B. L., & Bull, D. K. (2002). *Urban Search and Rescue and the Role of the Engineer. Masters of Engineering Project Report.*

"…85 to 95 percent of the victims who survived being trapped in damaged buildings were extricated within 24 hours"

Schultz, C. H., Koenig, K. L., & Noji, E. K. (1996). A medical disaster response to reduce immediate mortality after an earthquake. *New England Journal of Medicine, 334(7),* 438-444.

“…after a total collapse of a multistory building … approximately 80% of the victims die instantly, whereas 20% may be rescued if they are extricated within the first 24 hours”

Better, O. S. (1999). Rescue and salvage of casualties suffering from the crush syndrome after mass disasters. *Military medicine, 164(5),* 366.

The conclusion

WISDOM OF THE CROWDS

We should prefer the dissemination of **light** search and rescue skills to the public

Light Search & Rescue Training

- 1-3 day(s) course
- Teaches how to use ordinary equipment and laws of physics to perform rescue actions
- Best cost-effective solution
- Experience that lasts
- Build-up of responders

4.
A concept proved

Case study in Israel

- **Peleg, K., Bodas, M., Shenhar, G., & Adini, B. (2018). Wisdom of (using) the crowds: Enhancing disasters preparedness through public training in Light Search and Rescue. *International Journal of Disaster Risk Reduction, 31*, 750-757.**

LSAR Training in Israel

- During 2017-8, all 10th grader in Israel underwent a 2-day LSAR training
- More than 100,000 students trained
- The Dep. of Disaster Medicine & Injury Prevention (Tel-Aviv University) conducted a study to assess the contribution of these trainings to students' knowledge, resilience and self-efficacy

Study methodology

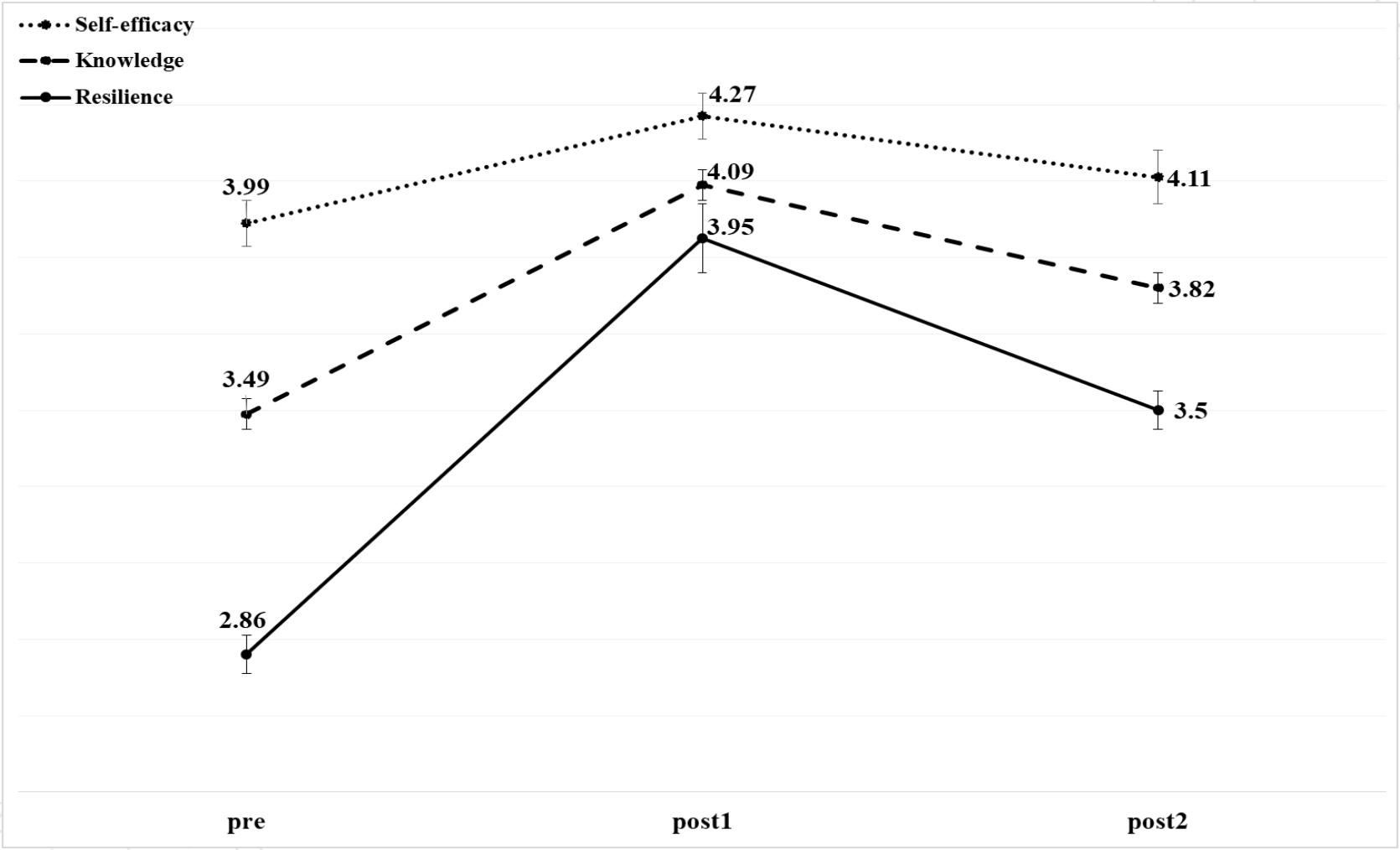
- A prospective, cluster randomized study involving 19 clusters of 35 schools
- 1,989 questionnaires were collected, of which 830 (~42%) were paired for all three time points: before, immediately after, and six month following the training
- Students were engaged in their schools by research assistants attending the trainings
- Ethical approval obtained from Ministry of Education

Results

A significant increase in all measurements was observed immediately post training.

This improvement was retained at significantly higher levels six month following the training compared to before training, despite an expected downwards trend in attitudes and skills retention

Results



Pre = before training; post1 = immediately after training; post2 = six months after training.
Error bars: 95% CI of the mean.

Results

- Gender. Boys report significantly higher levels of resilience at all time points, but girls register a higher increase (+44.6%) immediately post training and a higher level of retained increase at six months post training (+25.8%), compared to boys (+33.2% and +19.4%, respectively)
- Place. Students residing in the northern and southern parts of Israel register a higher increase (+40.4%) immediately post training and a higher level of retained increase at six months post training (+28.5%), compared to students from the central regions of the country (37.8% and 20.8%, respectively).

Results

- The findings of this study suggest that the LSR training have an equalizing effect on participants resulting in nullifying of pre-training differences following the training
  - For example, Arabs start off lower than Jews on the resilience and self efficacy scales but end up similarly high

Conclusions

- LSAR training could potentially benefit the public's readiness and resilience
- Empowering local communities to become more competent and self-reliant in saving lives following major disasters
- Not just a training session, a possible social phenomenon (promoting equality)
- Skills and attitudes retained for at least six months
- **Each year a growing cadre of rescuers at every street corner, across the country**

Thanks!

Any questions?

You can find me at:

kobi.peleg@gmail.com