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Increasing survival among civilian victims of explosive weapons:

Linking humanitarian mine action and trauma care in low-resource settings

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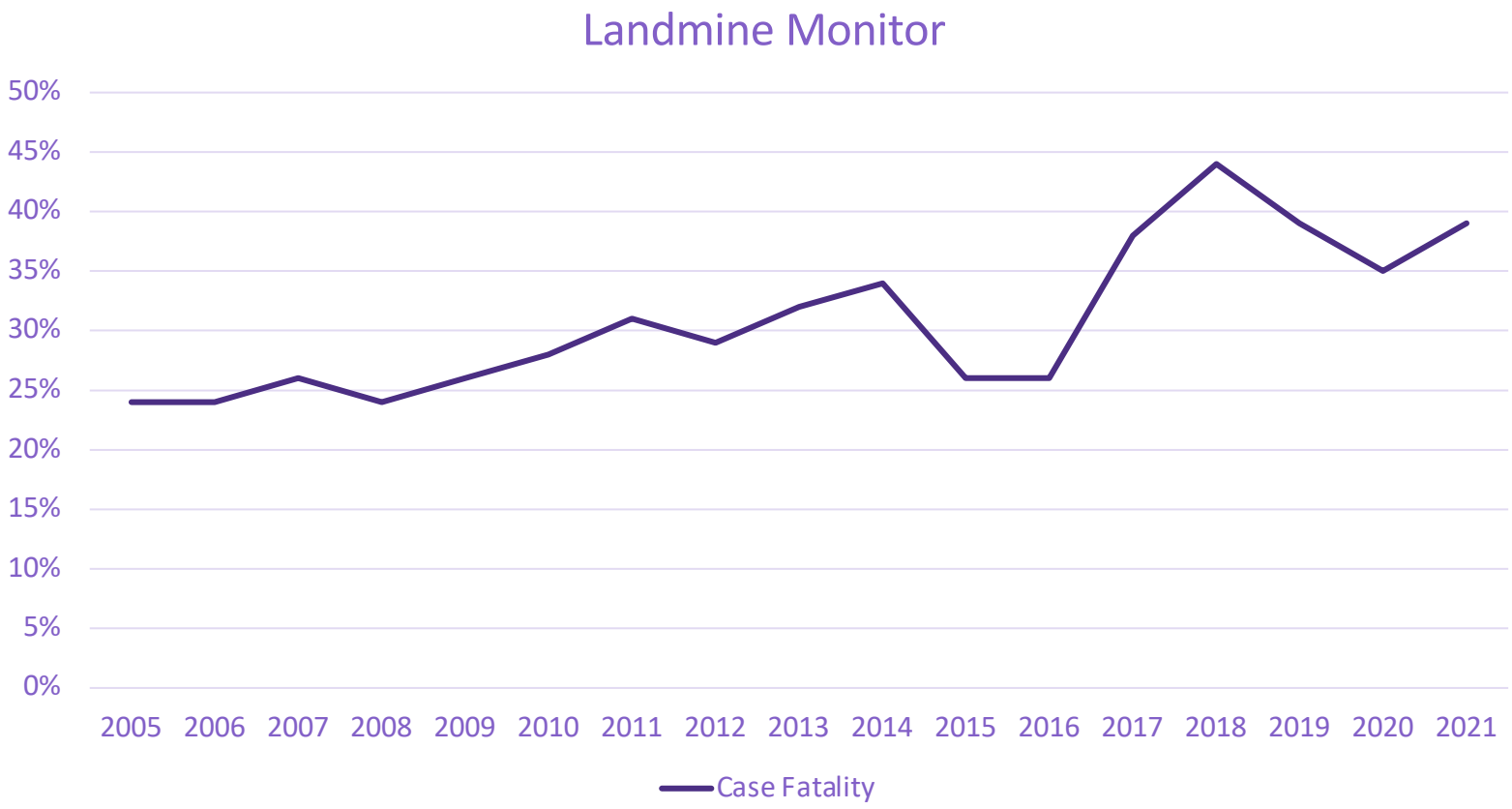
Figure Credit: Stacey Pizzino, University of Queensland

The Problem



In the current state, greater than 1 in 3 casualties of explosive ordnance (EO) die of their injuries.

The Question

What affordable, effective and feasible interventions could increase survival among civilian casualties of explosive ordnance (EO) to 1 in 10 and be supported by mine action services in low-resource settings?

The Partnership:

Synergy with Mine Action Area of Responsibility

UNMAS

UW Medicine
DEPARTMENT OF SURGERY

Mine Action AoR
Global Protection Cluster

Goal 4: *Leverage new partnerships*

Utilize academic research capacity and expertise in injury prevention and trauma care in low-resource settings to maximize impact of UNMAS field operations and advocacy efforts

HARBORVIEW
INJURY PREVENTION
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The Partnership:

Synergy with Policy Frameworks and Advocacy Initiatives

World Health Organization

EXECUTIVE BOARD
152nd session
Agenda item 5

APLC/CONF/2019/5/Add.1

Oslo Action Plan

(as adopted at the final plenary meeting on 29 November 2019)

Action #36 Provide effective and efficient first aid to casualties in mine-affected communities, as well as other medical emergency services, and ongoing medical care.

Integrated emergency, critical and operative care for universal health coverage and protection from health emergencies[1]

IMAS 13.10

First Edition
September 2021

Victim Assistance in Mine Action

OCTOBER 2022 BRIEFING NOTE

Support for the Political Declaration on Strengthening the Protection of Civilians from the use of Explosive Weapons in Populated Areas

INEW

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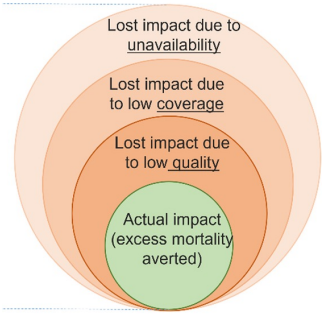
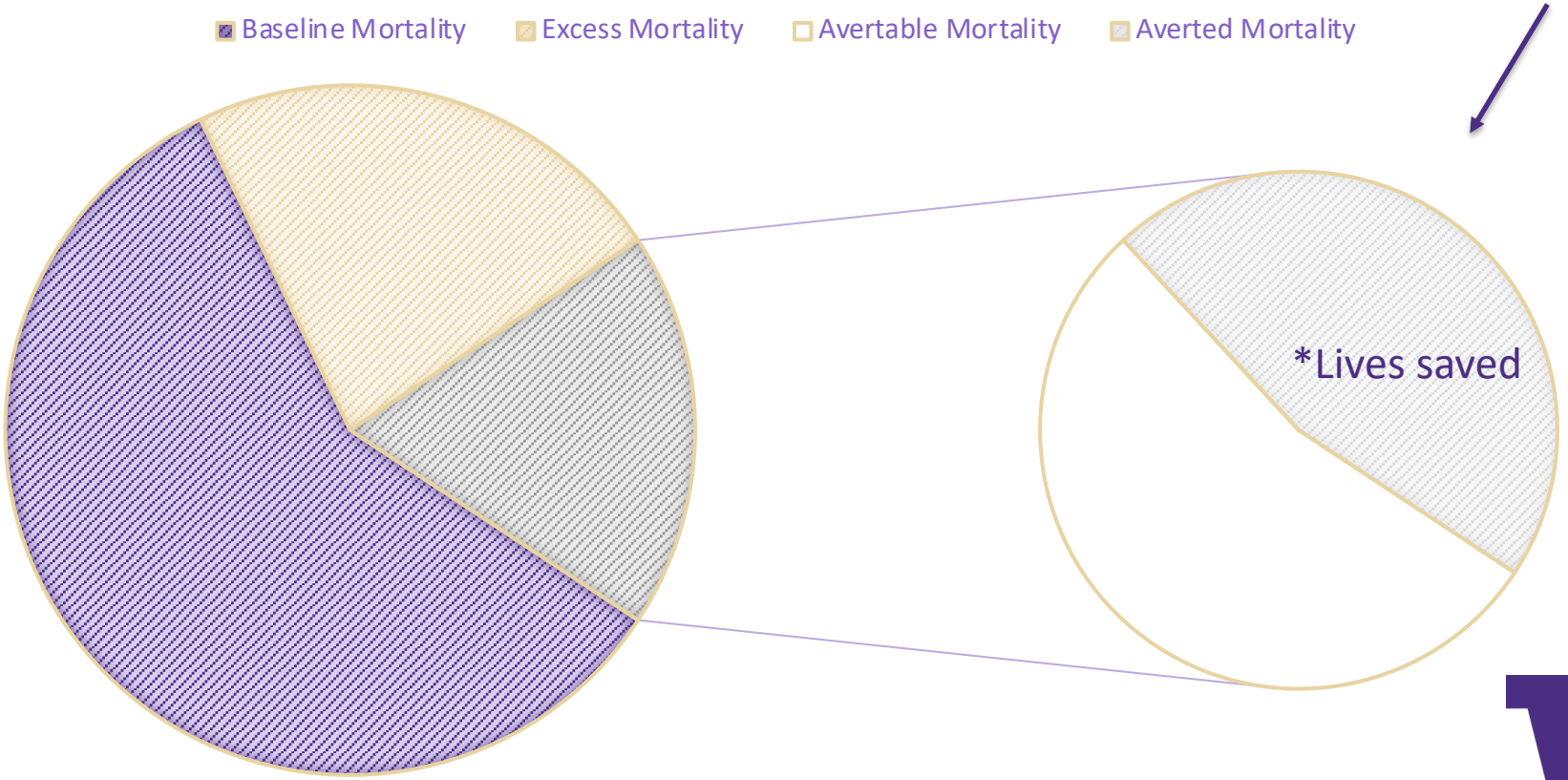
How can the emergency health response to civilian casualties of explosive weapons be adapted to 21st-century conflict?

Saving Lives in Conflict: Reducing Avertable Mortality



BASELINE, EXCESS, AND AVERTABLE MORTALITY



Checchi F. Inferring the impact of humanitarian responses on population mortality: methodological problems and proposals. Conflict and Health. 2023

Reducing Avertable Mortality

1. Bring care forward to the patient

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2. Bring the patient to care more quickly

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3. Bring better care to the patient

The Rationale:

Military Approach to Revolutionizing Casualty Care

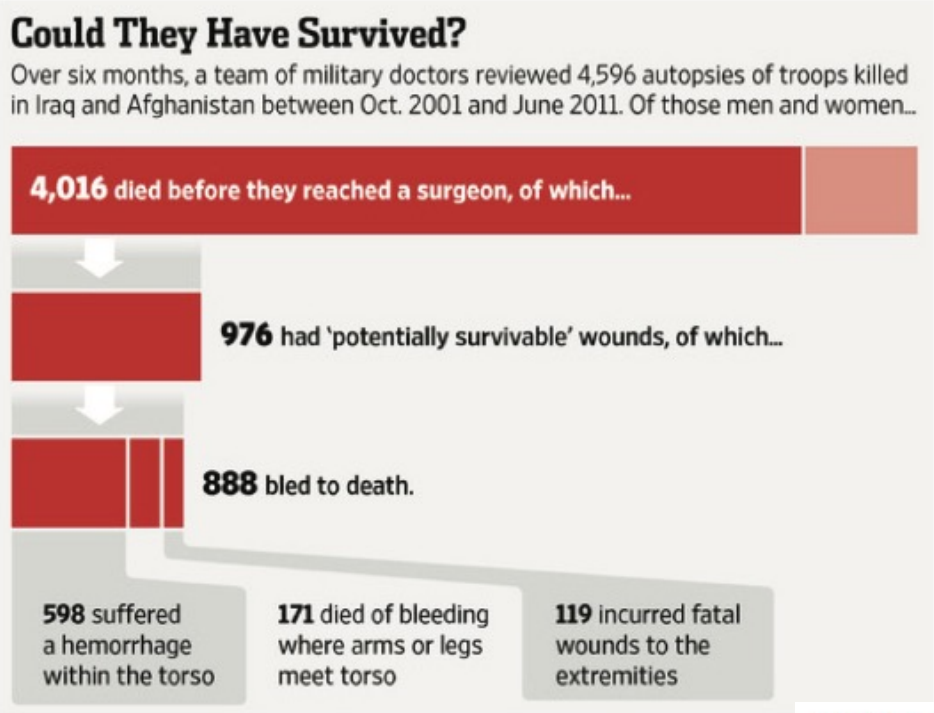


FIGURE 1-4 Military preventable deaths in the prehospital setting.

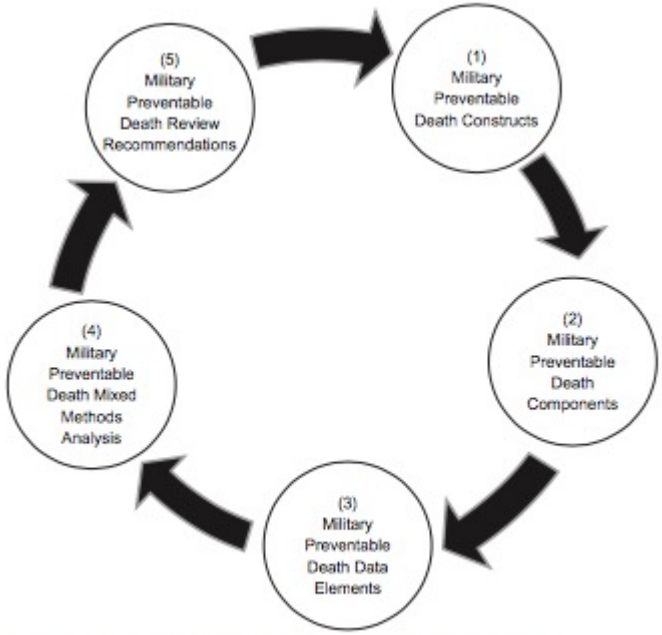


FIGURE 1. Military preventable death conceptual framework.

ONLINE FIRST

Eliminating Preventable Death on the Battlefield

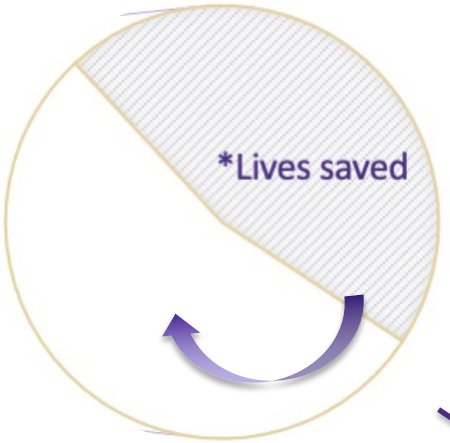
Russ S. Kotwal, MD, MPH; Harold R. Montgomery, NREMT; Bari M. Kotwal, MS; Howard R. Champion, FRCS;

- Janak, Jud, et al. "Military preventable death conceptual framework: a systematic approach for reducing battlefield mortality." *Military medicine* 183.suppl_2 (2018): 15-23.

DoD Trauma Registry Data Dictionary

The Rationale:

Military Approach to Revolutionizing Casualty Care



Death on the battlefield (2001–2011): Implications for the future of combat casualty care

Brian J. Eastridge, MD, Robert L. Mabry, MD, Peter Seguin, MD, Joyce Cantrell, MD, Terrill Tops, MD, Paul Uribe, MD, Olga Mallett, Tamara Zubko, Lynne Oetjen-Gerdes, Todd E. Rasmussen, MD, Frank K. Butler, MD, Russell S. Kotwal, MD, John B. Holcomb, MD, Charles Wade, PhD, Howard Champion, MD, Mimi Lawnick, Leon Moores, MD, *and* Lorne H. Blackbourne, MD

1. Bring care forward to the patient

- Tactical Combat Casualty Care (TCCC)

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- Role 2 Forward Surgical Teams

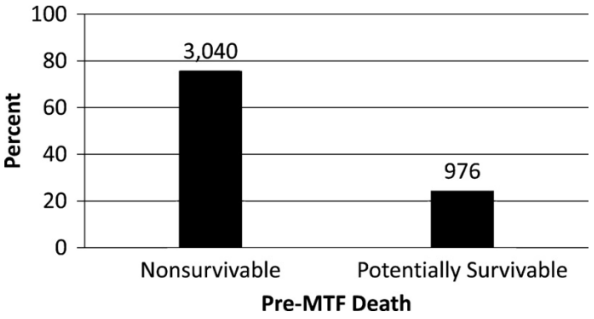

Figure 2. Survivability pre-MTF casualties.

2. Bring the patient to care more quickly

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- Evacuation out-of-theater to Role 3 facilities

3. Bring better care to the patient

- Advances in control of junctional hemorrhage and hemostatic agents, tranexamic acid
- Use of whole blood

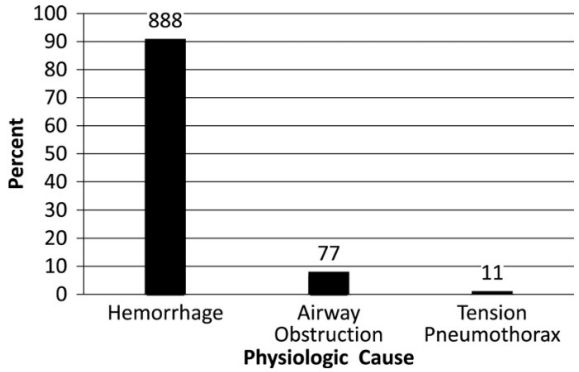
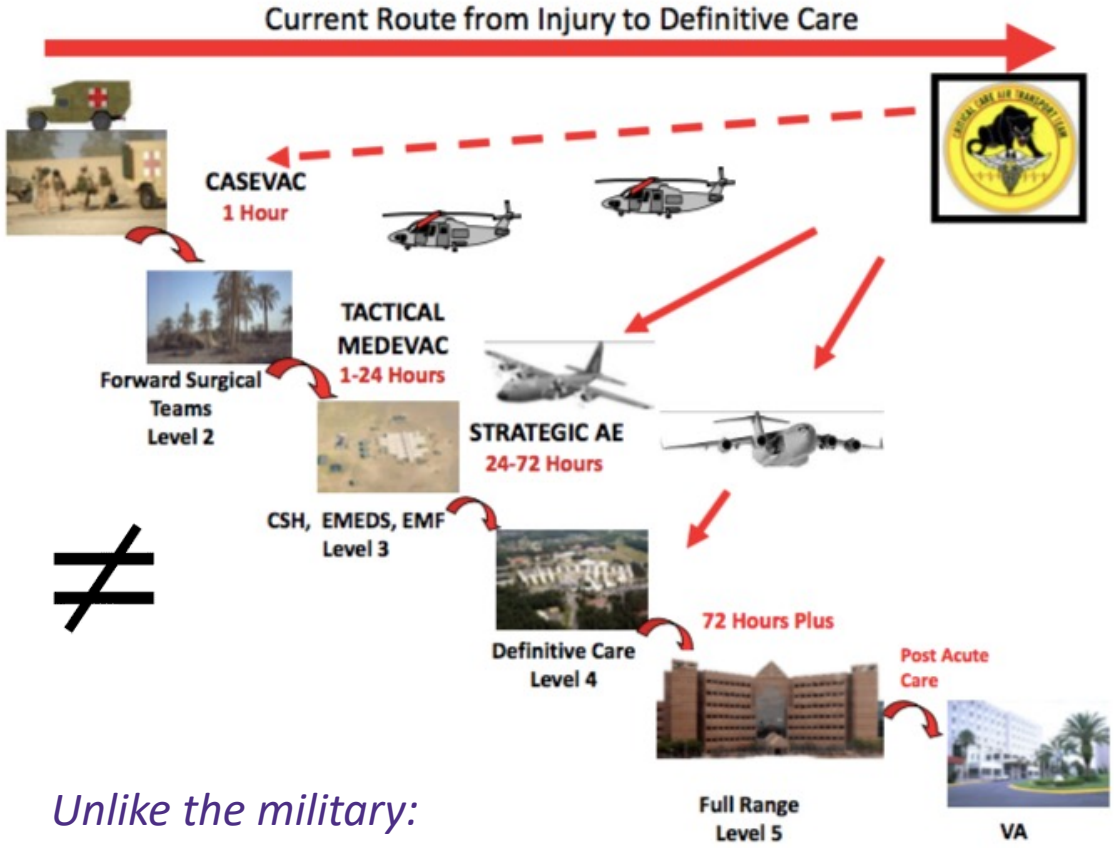


Figure 4. Injury/physiologic focus PS acute mortality (n = 976).

Eastridge, Brian J., et al. "Death on the battlefield (2001–2011): implications for the future of combat casualty care." *Journal of trauma and acute care surgery* 73.6 (2012): S431-S437.

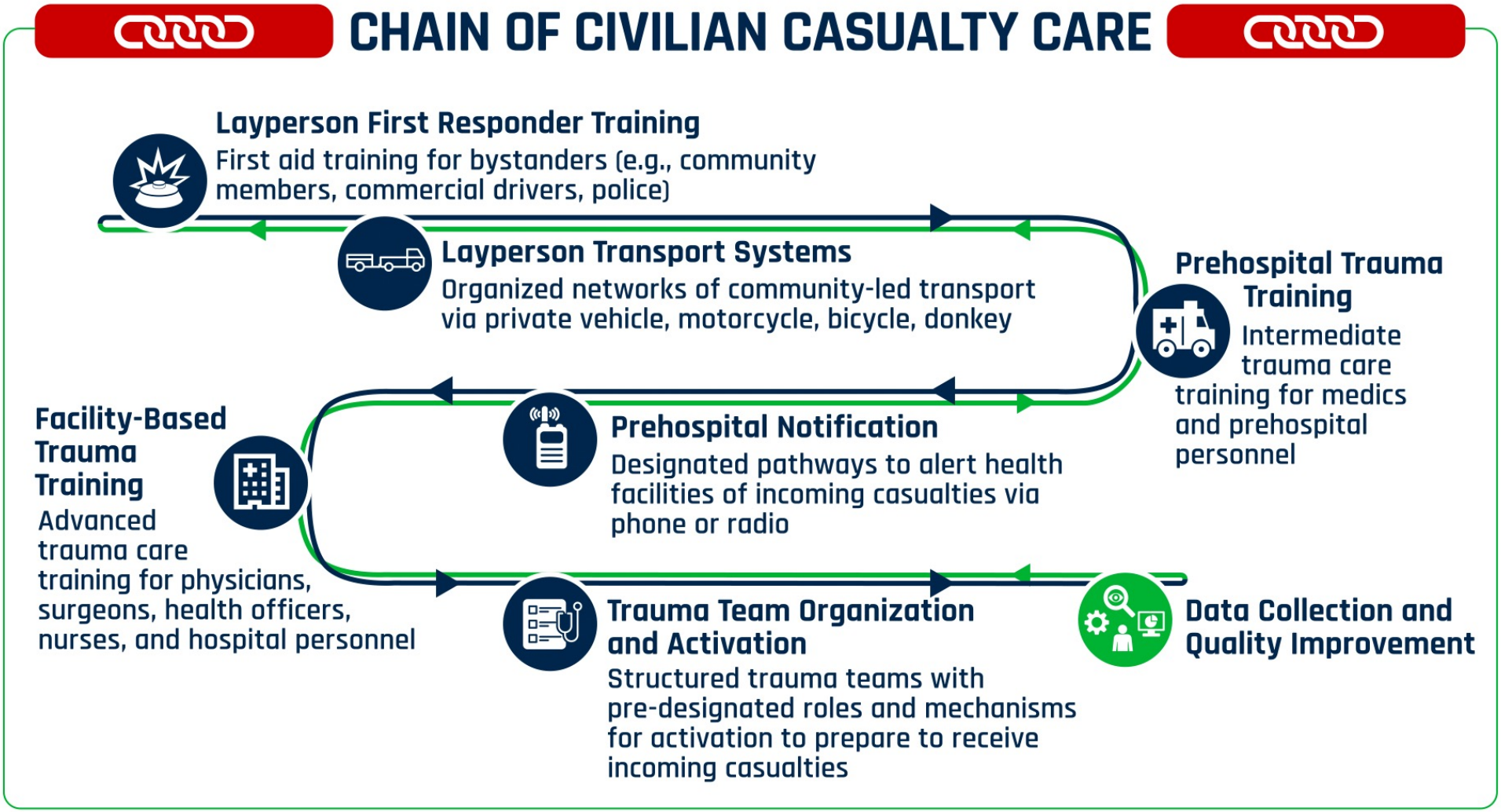
Adapting a Military Approach to Casualty Care for Low-Resource Settings



Unlike the military:

- *Limited prehospital transport*
- *Limited resources*
- *Limited or absent evacuation*

The Framework:
Chain of Civilian Casualty Care (CCCC)



CCCC:
Methodology

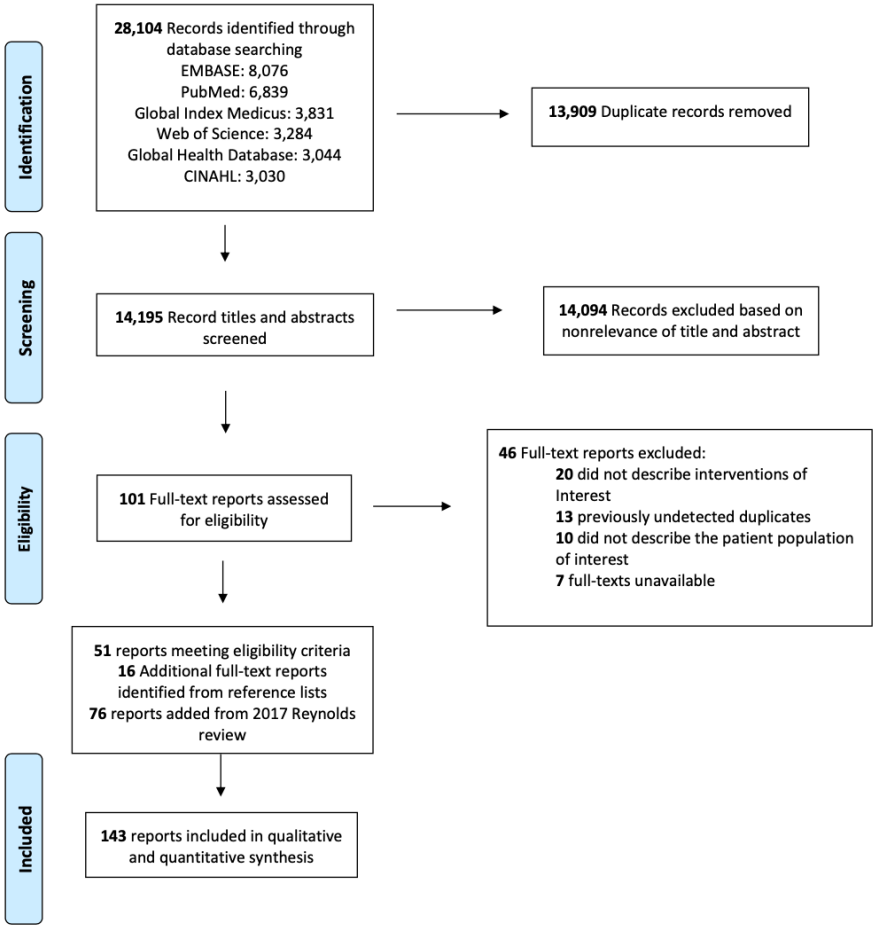
1. **Identify** evidence-based trauma care interventions that reduce injury-related mortality in low-resource settings relevant to mine action
2. **Evaluate** barriers and facilitators to implementation through key informant interviews with sector experts
3. **Model** the potential cumulative mortality reduction of the combined interventions
4. **Create** an integrated chain of post-blast care from point of injury to definitive treatment at health facility

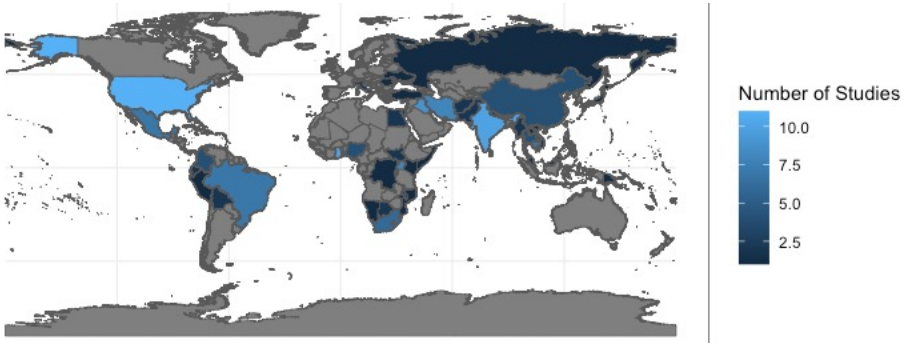
CCCC Methodology:
Systematic Review

What trauma interventions work in low-resource settings?

1. Identify *evidence-based trauma care interventions that reduce injury-related mortality in low-resource settings relevant to mine action*

Figure 1. PRISMA Diagram of Report Selection

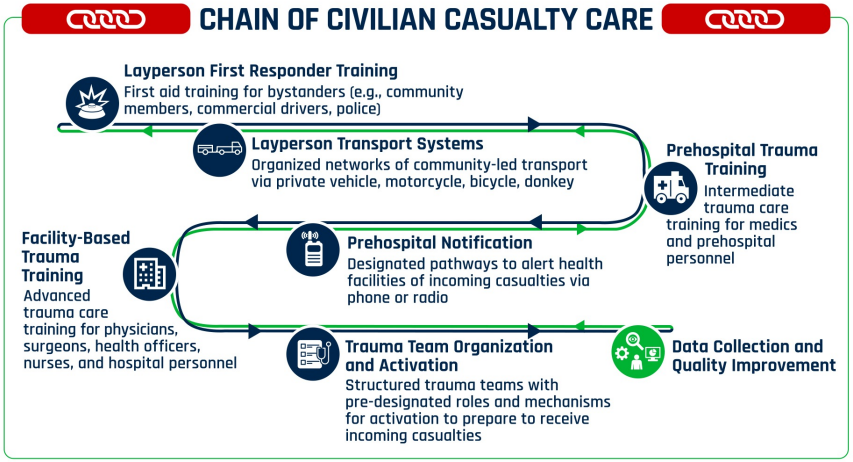


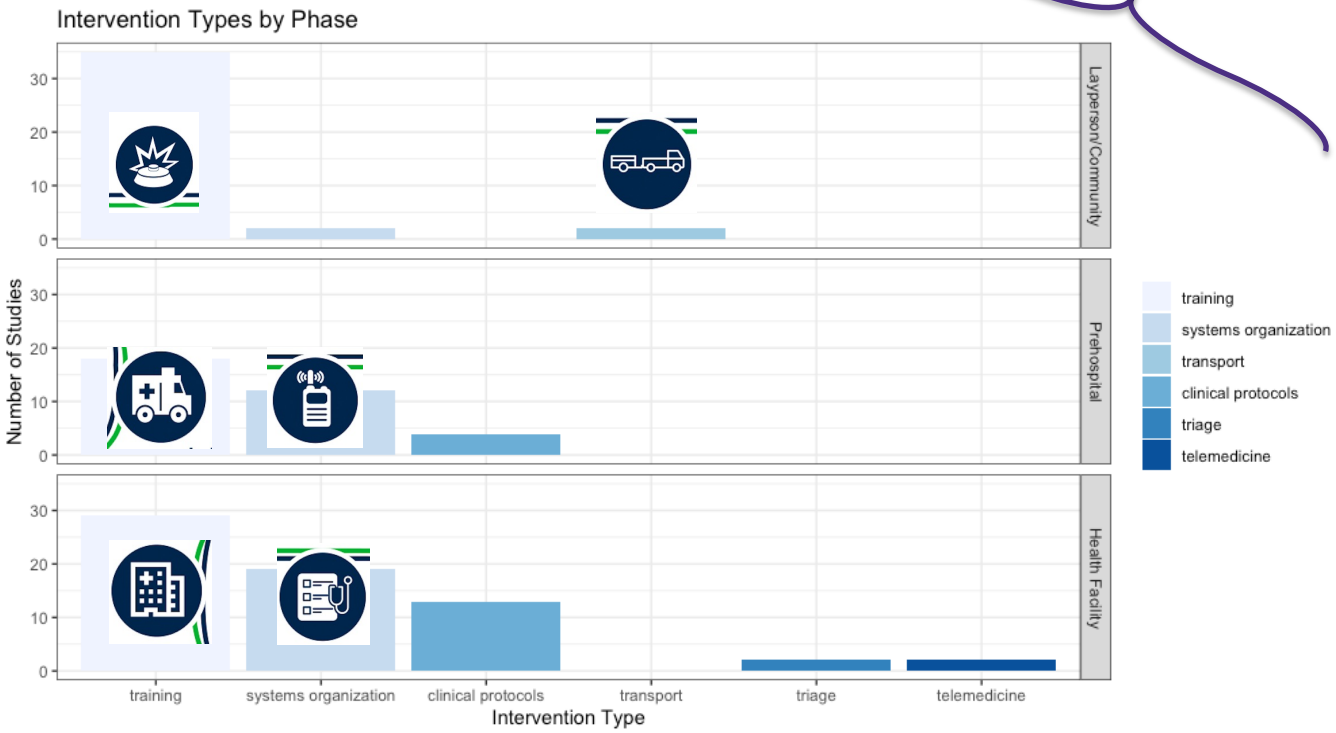


*Reynolds, T. A., Stewart, B., Drewett, I., Salerno, S., Sawe, H. R., Toroyan, T., & Mock, C. (2017). The impact of trauma care systems in low-and middle-income countries. *Annual review of public health*, *38*, 507-532.

CCCC Methodology:
Systematic Review

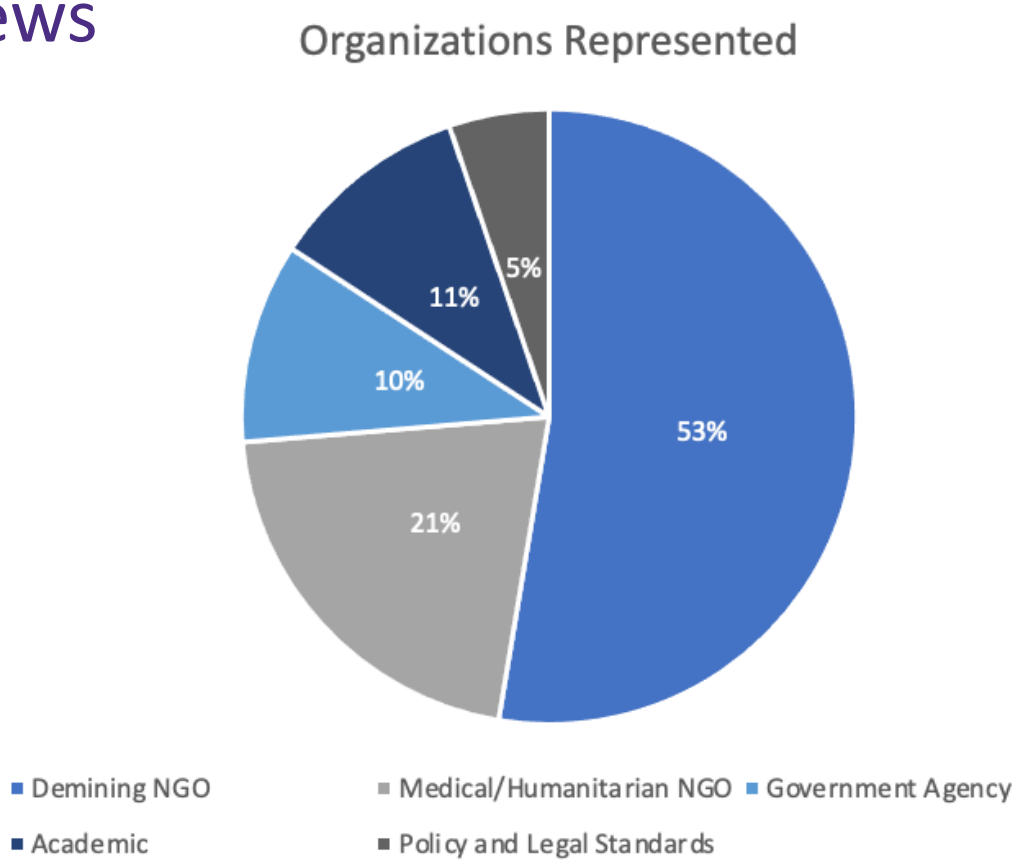
What trauma interventions work in low-resource settings?





CCCC Methodology:
Key Informant Interviews

2. Evaluate *barriers and facilitators to implementation through key informant interviews with sector experts*



"Better trauma care to our own mine action personnel could mean better trauma care to communities around where they're working as well…"

"This is pushing at an open door at the moment…"

What opportunities and barriers exist to implement these interventions?

CCCC Methodology:
Key Informant Interviews

What opportunities and barriers exist to implement these interventions?

- Engagement of communities by mine action medics
- Leverage existing community initiatives
- Insufficient understanding of community-specific needs

Layperson First Response

Prehospital

- Engagement and training by mine action medics
- Mapping of prehospital routes/facilities
- Remote locations with prolonged prehospital transport times

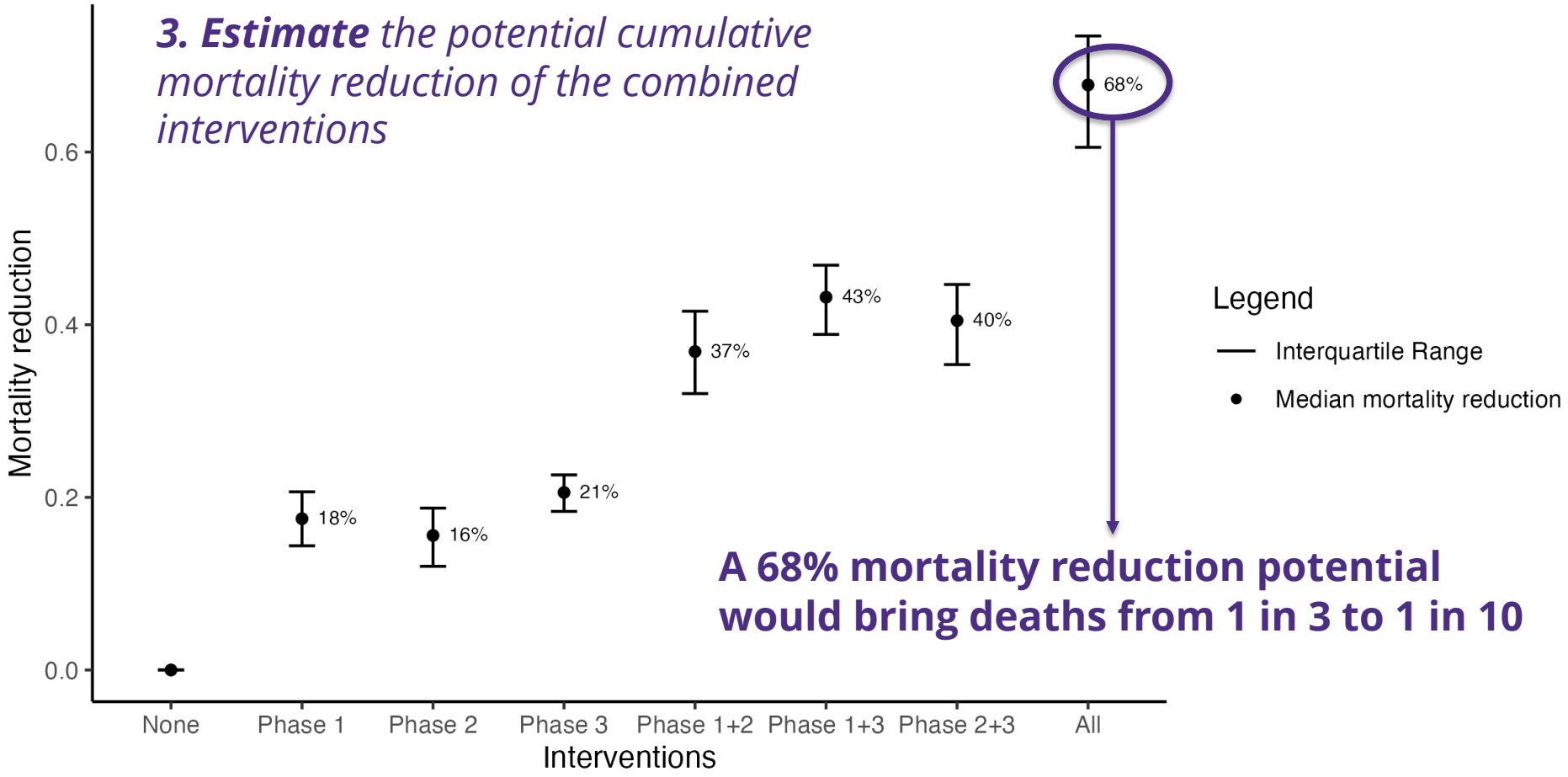
- Partnerships and coordination of health capacity mapping
- Integration with Ministries of Health/local health authorities
- Lack of human and material resources

Health Facility

CCCC Methodology: Modeling

By how much can these interventions reduce mortality?

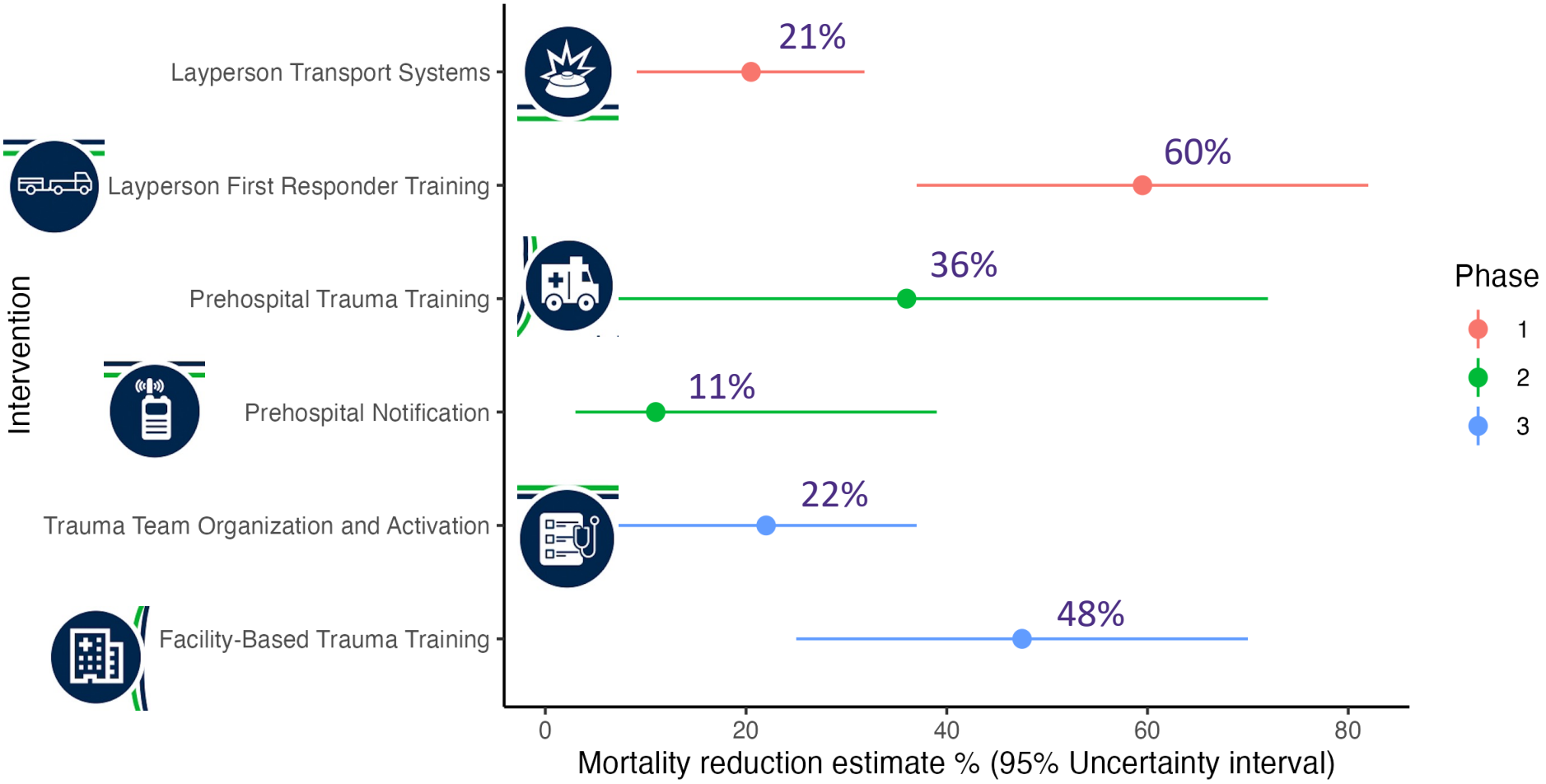
***3. Estimate** the potential cumulative mortality reduction of the combined interventions*



A 68% mortality reduction potential would bring deaths from 1 in 3 to 1 in 10

CCCC Methodology:
Modeling

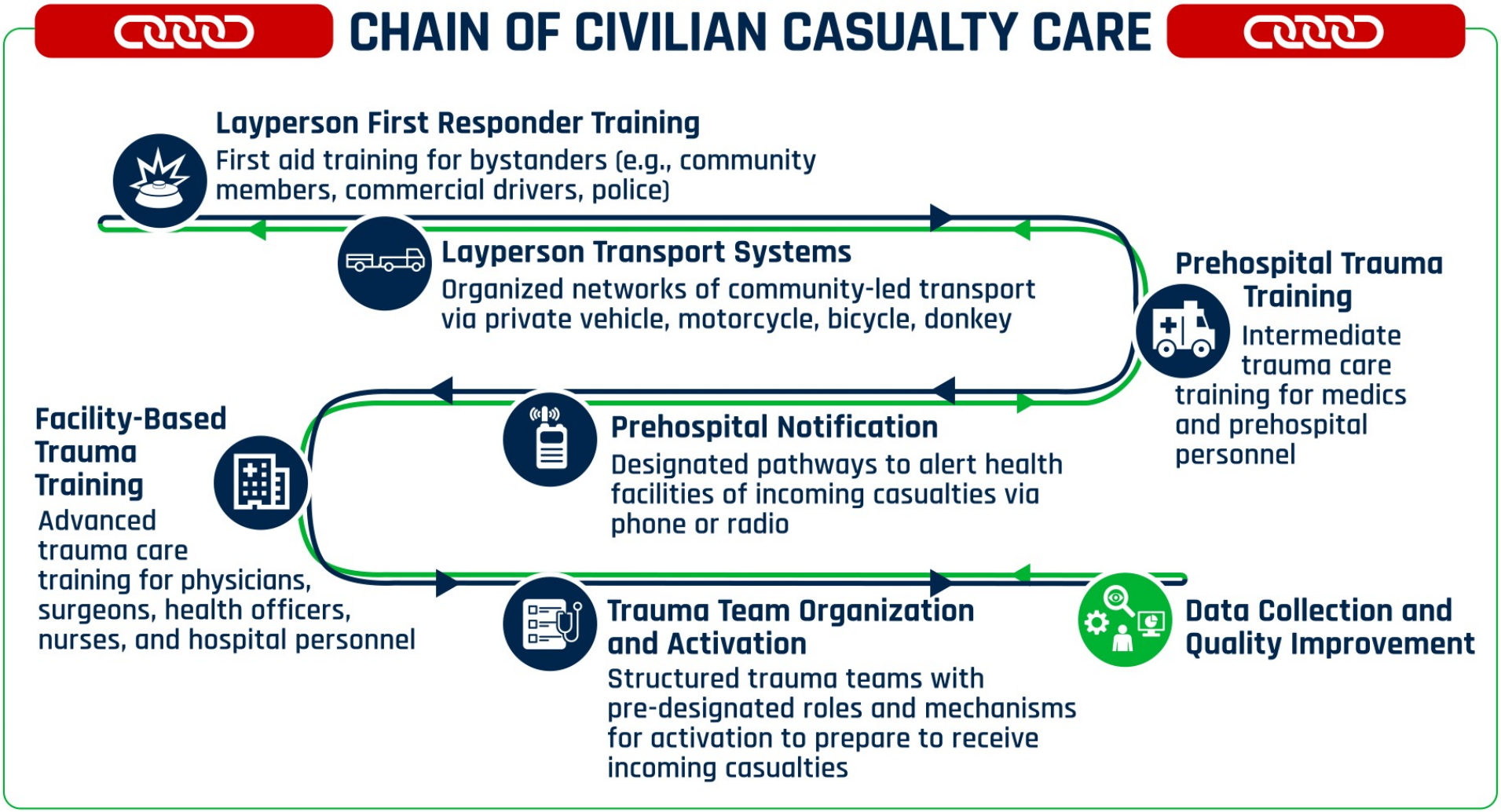
By how much can these interventions reduce mortality?



Research and Implementation Gaps

- Clinical controversies
  - Tourniquet Application
  - Spinal immobilization
- Resource harmonization
- Cost efficacy
- Monitoring and evaluation strategies
- Translation of advances in high-resource casualty care to low-resource settings

The Framework:
Chain of Civilian Casualty Care (CCCC)



CCCC Phase 1:

Implementation Strategy and Next Steps

World Health Organization

Layperson First Responder Training

First aid training for bystanders (e.g., community members, commercial drivers, police)

STOP THE BLEED

The mine action sector can partner with WHO's Community First Aid Responders Training (CFAR) and American College of Surgeons' Stop the Bleed to deliver Layperson First Responder Training in affected communities.

This programming can be delivered through EORE community liaisons and mine action medics in a train-the-trainer model.

Key Message No. 2:

In line with Action 36 in the Oslo Action Plan, the mine action sector can partner with trauma care providers to greatly reduce the mortality rate of EO victims by:

2. Strengthening the local capacity for trauma response:

- Train EORE community liaisons, deminers, and medics to train layperson first responders
- Act as implementing partners for WHO CFAR and Stop the Bleed trainings

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UW Medicine
DEPARTMENT OF SURGERY

IBRN
International Blast Injury Research Network

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