



THE GEORGE INSTITUTE
for International Health



Principles of Evaluation of Interventions

Robyn Norton,
Principal Director, The George Institute
Professor of Public Health and Associate Dean (International),
Faculties of Health, University of Sydney

**Principles of evaluation of
interventions -
Evaluating road safety
interventions for health
outcomes**

Presentation Framework

- > **Definitions**
- > **Why evaluate road safety interventions for health outcomes?**
- > **How best should we evaluate road safety interventions for health outcomes?**
- > **Summary and concluding remarks**



Presentation Framework

- > **Definitions**
- > **Why evaluate road safety interventions for health outcomes?**
- > **How best should we evaluate road safety interventions for health outcomes?**
- > **Summary and concluding remarks**



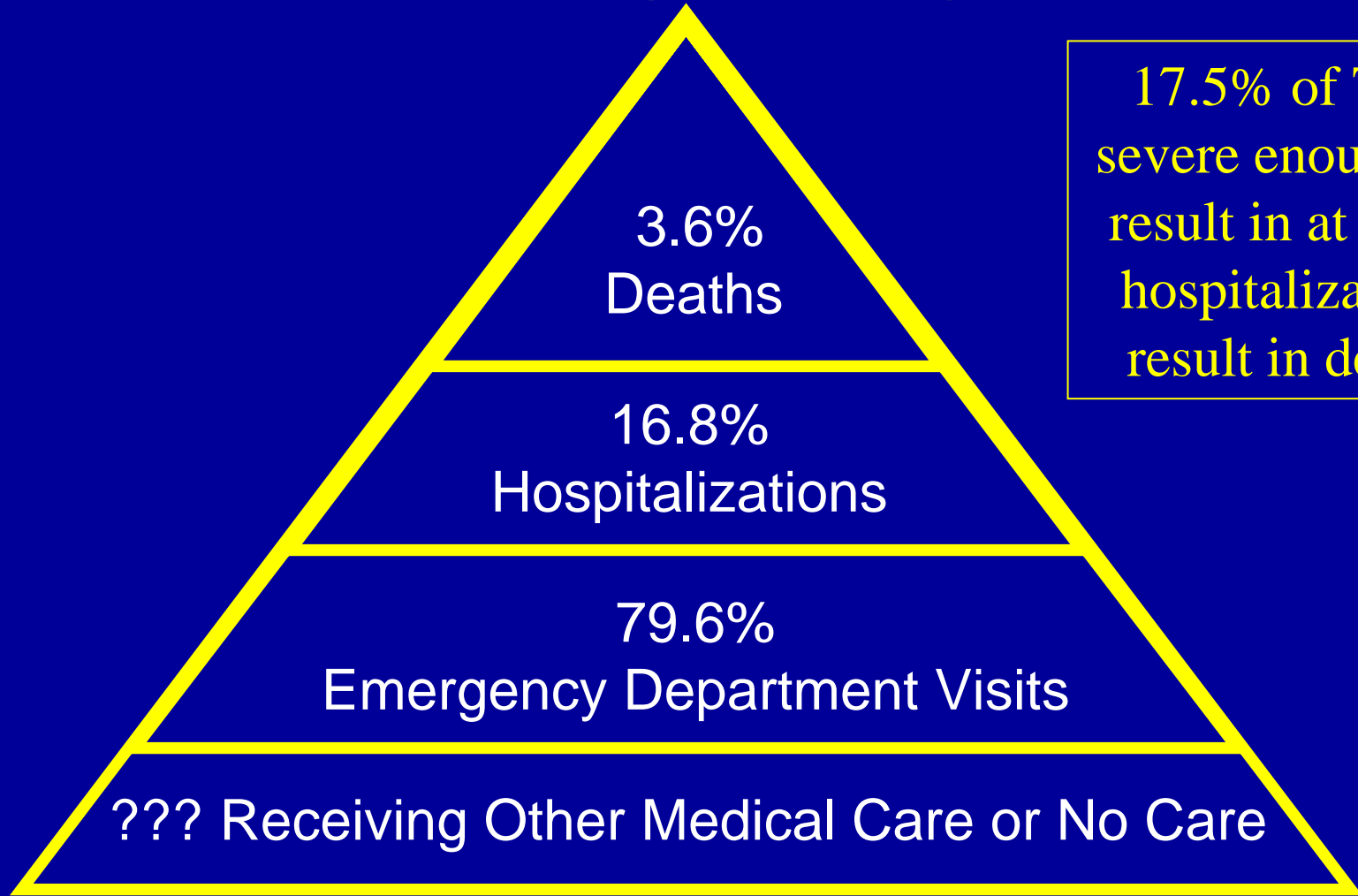
Definitions

Health outcomes:

- > **Severity (Death => minor)**
- > **Acute vs long-term (disability)**
- > **Specific types of injuries, e.g.**
 - > **Fractures**
 - > **Traumatic brain injury**



TBI in the United States



17.5% of TBI severe enough to result in at least hospitalization result in death

* Average annual numbers, 1995-2001

From the 2004 CDC Report: TBI in the United States: ED Visits, Hospitalizations, and Deaths

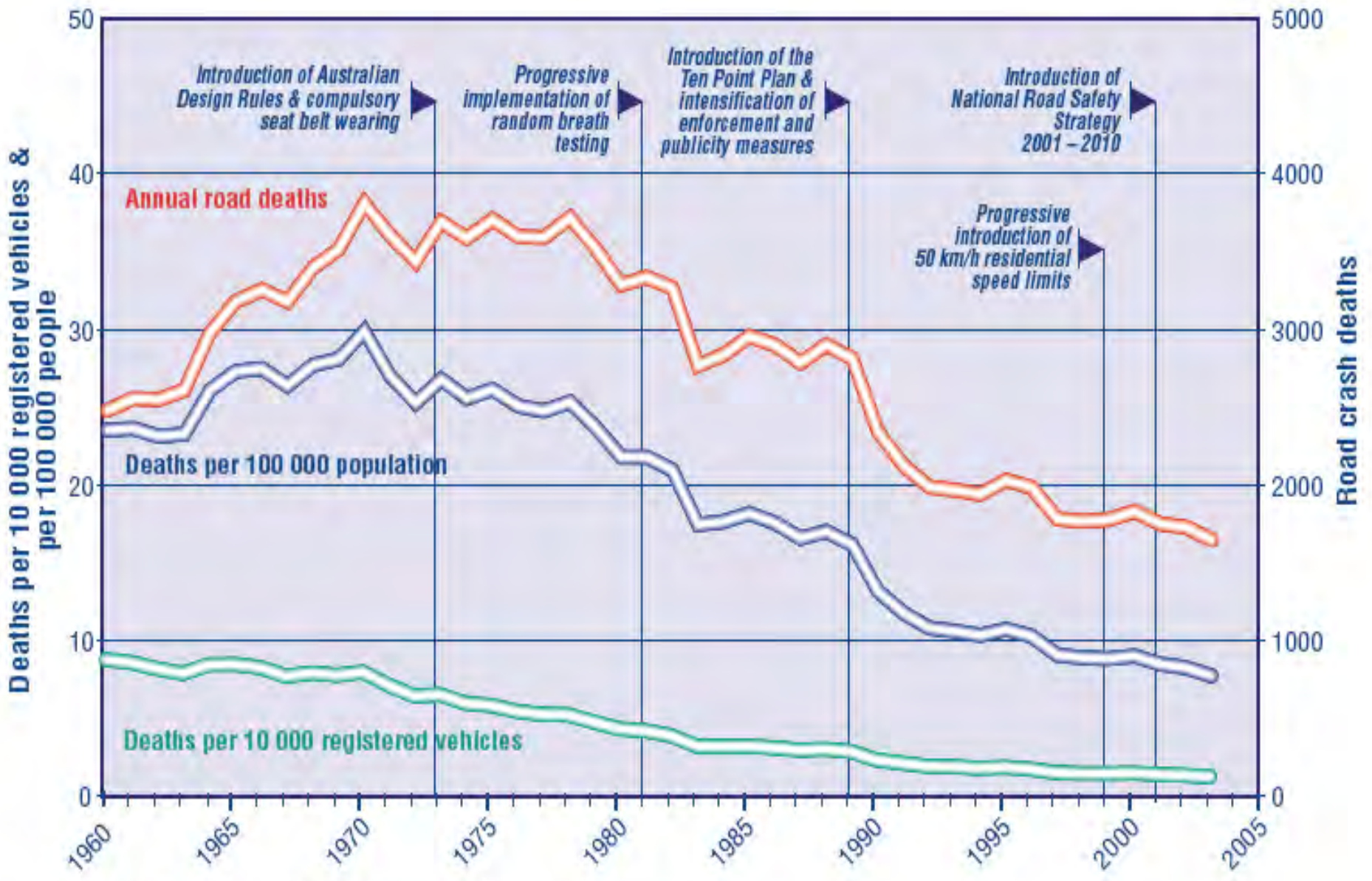
Definitions

***Road safety interventions:
focusing on -***

- > Vehicles**
- > Road users**
- > Roads**
- > Systems issues**



Trends in road deaths and major road safety initiatives, 1960 to 2003



Source: Australian Transport Safety Bureau

Definitions

Evaluating/evaluation:

- > **Will (or has) the introduction of a *defined* road safety intervention lead to a reduction in a *defined* health outcome/s?**



Presentation Framework

- > **Definitions**
- > **Why evaluate road safety interventions for health outcomes?**
- > **How best should we evaluate road safety interventions for health outcomes?**
- > **Summary and concluding remarks**



Why evaluate for health outcomes?

Why evaluate?

*Why evaluate...
for health outcomes?*



THE GEORGE INSTITUTE
for International Health

Why evaluate?

> **Effect of intervention is unknown**



Why evaluate?

- > **Effect of intervention is unknown**
 - > **Intervention may have no effect**
 - > **Waste of resources**



The SAFE study

“a landmark trial”

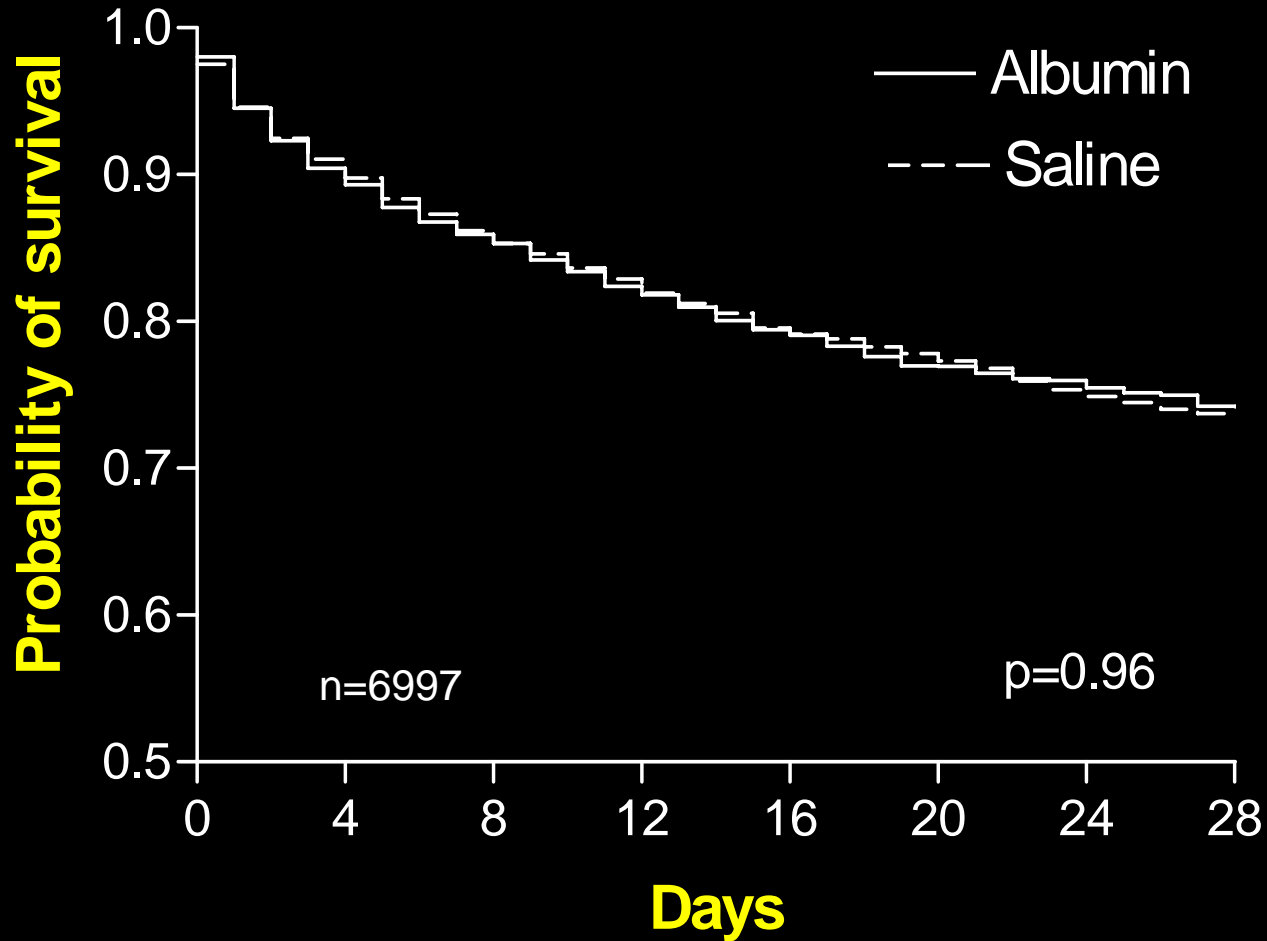
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

A Comparison of Albumin and Saline for Fluid Resuscitation in the Intensive Care Unit

The SAFE Study Investigators*

SAFE

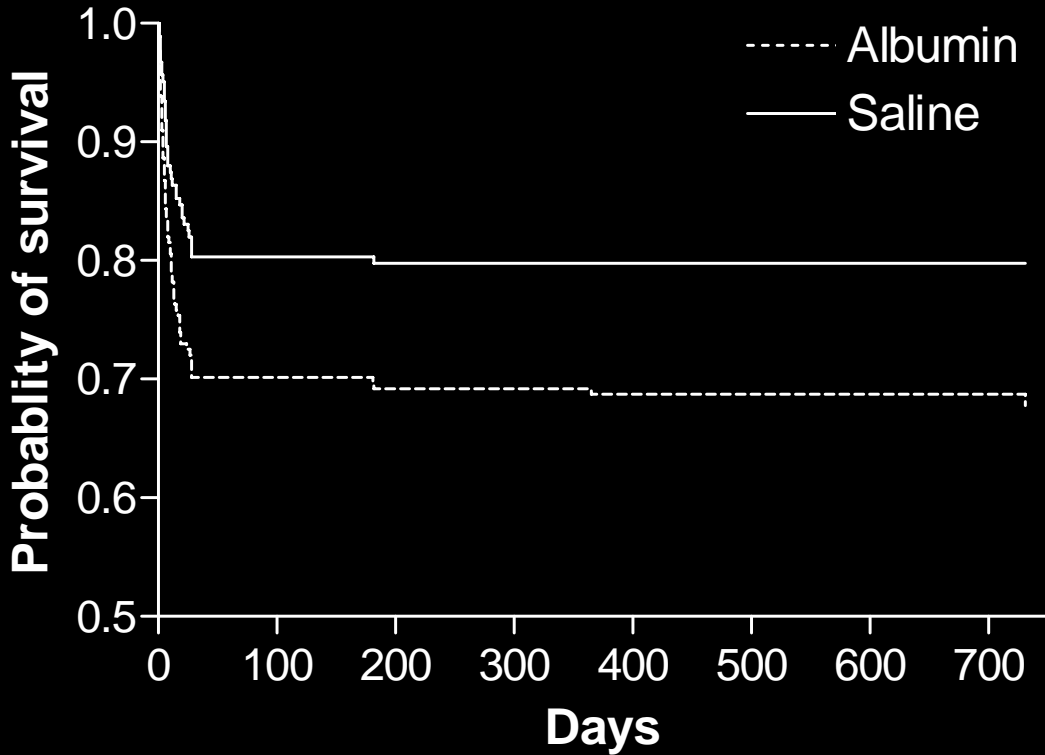


Why evaluate?

- > **Effect of intervention is unknown**
 - > **Intervention may have no effect**
 - > **Waste of resources**
 - > **Intervention may have detrimental effect**
 - > **Increase not reduction in defined outcomes**



SAFE-TBI





Cochrane Injuries Group



WELCOME TO THE COCHRANE INJURIES GROUP

Preparing, maintaining and promoting the accessibility of systematic reviews in the prevention, treatment and rehabilitation of traumatic injury

Seventy-nine systematic reviews now published!
See [What's new?](#)

Want to be
Involved?

The Cochrane Injuries Group editorial base is located at
the London School of Hygiene & Tropical Medicine



[What's new?](#)

[Home](#)

[What is the Injuries Group?](#)

[What is the Cochrane Collaboration?](#)

[CIG Reviews](#)

[Want to be involved?](#)

[Newsletters](#)

[FAQs](#)

[Resources](#)

[Contacts](#)

Why evaluate for health outcomes?

Why evaluate?

*Why evaluate...
for health outcomes?*



● Prevention of road traffic injuries

Alcohol and drug screening of occupational drivers for preventing injury (C Cashman)

Alcohol-ignition interlock programmes for reducing drink driving recidivism (C Willis)

Bicycle helmet legislation for the uptake of helmet use and prevention of head injuries (A Macpherson)

Bicycle skills training programs for preventing injuries in child bicyclists (C MacArthur)

Graduated driver licensing for reducing motor vehicle crashes among young drivers (L Hartling)

Helmets for preventing head and facial injuries in bicyclists (D Thompson)

Helmets for preventing injury in motorcycle riders (B Liu)

Increased police patrols for preventing alcohol-impaired driving (L Van Bramer)

Increasing motorcycle and rider conspicuity for preventing death and injury in motorcyclists (R Ivers)

Interventions for increasing pedestrian and cyclist visibility for the prevention of death and injuries (I Kwan)

Interventions for promoting booster seat use in four to eight year olds traveling in cars (J Ehiri)

Motorcycle helmet legislation for preventing injuries in motorcyclists (R Ivers)

Motorcycle rider training for preventing road traffic crashes (R Ivers)

Non-legislative interventions for the promotion of cycle helmet wearing in children (S Royal)

Organisational travel plans for improving health (J Hosking)

Post-licence driver education programmes for the prevention of road traffic crashes (K Ker)

Red-light cameras for the prevention of road traffic crashes (A Aeron-Thomas)

Safety education of pedestrians for injury prevention (O Duperrex)

School-based driver education for the prevention of traffic crashes (I Roberts)

Speed enforcement detection devices for preventing road traffic injuries (C Wilson)

Street lighting for the prevention of road traffic crashes (F Beyer)

Vision screening of older drivers for preventing road traffic injuries and fatalities (S Subzwari)

Why evaluate for health outcomes?

Ultimately the goal of those of us interested in road safety ... must be maximising the safety of individuals, i.e. their health outcomes



Why evaluate for health outcomes?

“... you used a a surrogate outcome: seatbelt use, rather than injuries/fatalities....”

Senior Editor, Lancet - 2007



Presentation Framework

- > **Definitions**
- > **Why evaluate road safety interventions for health outcomes?**
- > **How best should we evaluate road safety interventions for health outcomes?**
- > **Summary and concluding remarks**



Best practice

Key issues: study design

- > Do those who “receive” an intervention have better health outcomes than those who don’t?
- > Requires random allocation of individuals (or groups or communities) to the receipt or the intervention or not



Best practice

An example: motorcycle helmets:

- > A comparison of the health outcomes, say previous injuries, for motorcyclists wearing helmets compared with those not wearing helmets, would likely reveal the following:
 - > Those not wearing helmets would likely have a higher incidence of previous injuries
 - > Those not wearing helmets would more likely be male, young, and more likely to drink and drive



Best practice

An example: motorcycle helmets:

- > Higher incidence of previous injuries in those wearing not helmets may be related to other factors not the non-wearing of helmets
- > With random allocation of individuals to wearing helmets or not would, health outcomes can be ascribed to the use of helmets as proportions of males, younger people and drink-drivers will be equal



Best practice

Key issues: health outcomes

- > Identification and measurement of health outcomes requires careful consideration
- > Will there be sufficient numbers of outcomes to examine intervention effects?

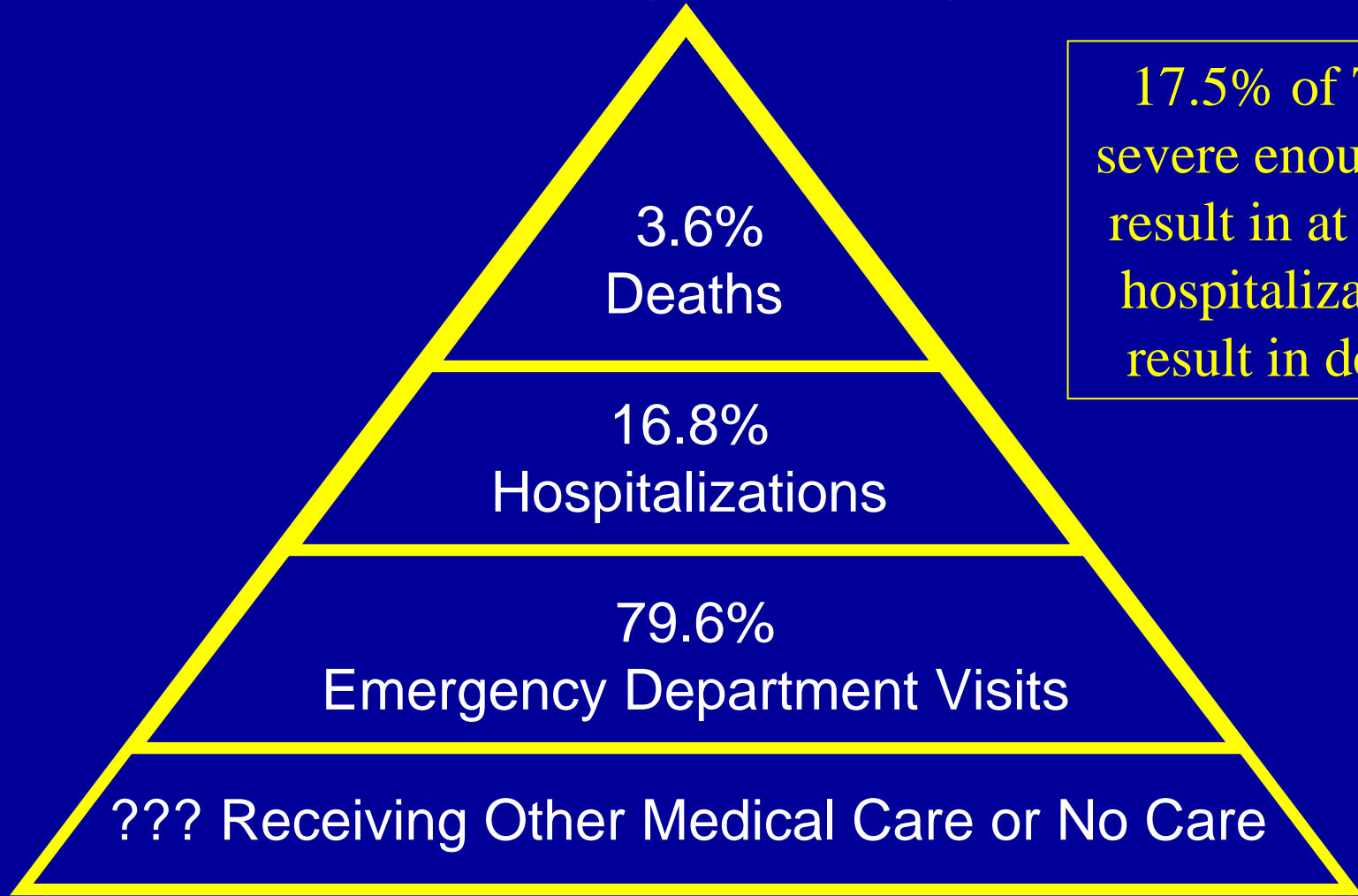


ROAD CRASH CASUALTIES AND RATES, AUSTRALIA, 2000-2005

Year	Road deaths	Persons seriously injured	Deaths per 10,000 vehicles	Seriously injured per 10,000 vehicles	Deaths per 100,000 population	Seriously injured per 100,000 population
2000	1,817	26,963	-	-	9.5	140.8
2001	1,737	27,471	1.4	22.0	8.9	141.5
2002	1,715	27,934	1.3	21.8	8.7	142.2
2003	1,621	28,422	1.2	21.6	8.2	143.0
2004	1,583	28,864	1.2	21.3	7.9	143.7
2005	1,627	30,574	1.2	22.0	8.0	150.3

Produced and published by the Australian Transport Safety Bureau, Canberra, 2007.

TBI in the United States



17.5% of TBI severe enough to result in at least hospitalization result in death

* Average annual numbers, 1995-2001

From the 2004 CDC Report: TBI in the United States: ED Visits, Hospitalizations, and Deaths

Best practice

Key issues: interventions effects

- > Will there be sufficient numbers of outcomes in both the intervention and non-intervention group?**
 - > How big an impact is the intervention likely to have on the health outcomes**
 - > 50% reduction in deaths?**





Study design and sample size

- Double blind, randomised controlled trial
- Powered to detect 3% difference in absolute mortality, from baseline of 15%, with 90% power
- 7,000 patients from 16 ICUs in Australia and New Zealand, recruited over 18 months

Best practice

Key other issues:

- > **Clear articulation and management of intervention**
 - > **Quality control**
- > **Clear identification of process of randomisation**
- > **Appropriate, clearly defined data collection, data management and analysis**



Best practice

Key challenges:

- > **Best practice may not be easily undertaken in a real world environment**
 - > **Size and cost requirements**
- > **However, costs of not undertaking best practice need to be considered before embarking on a less ambitious evaluation!**

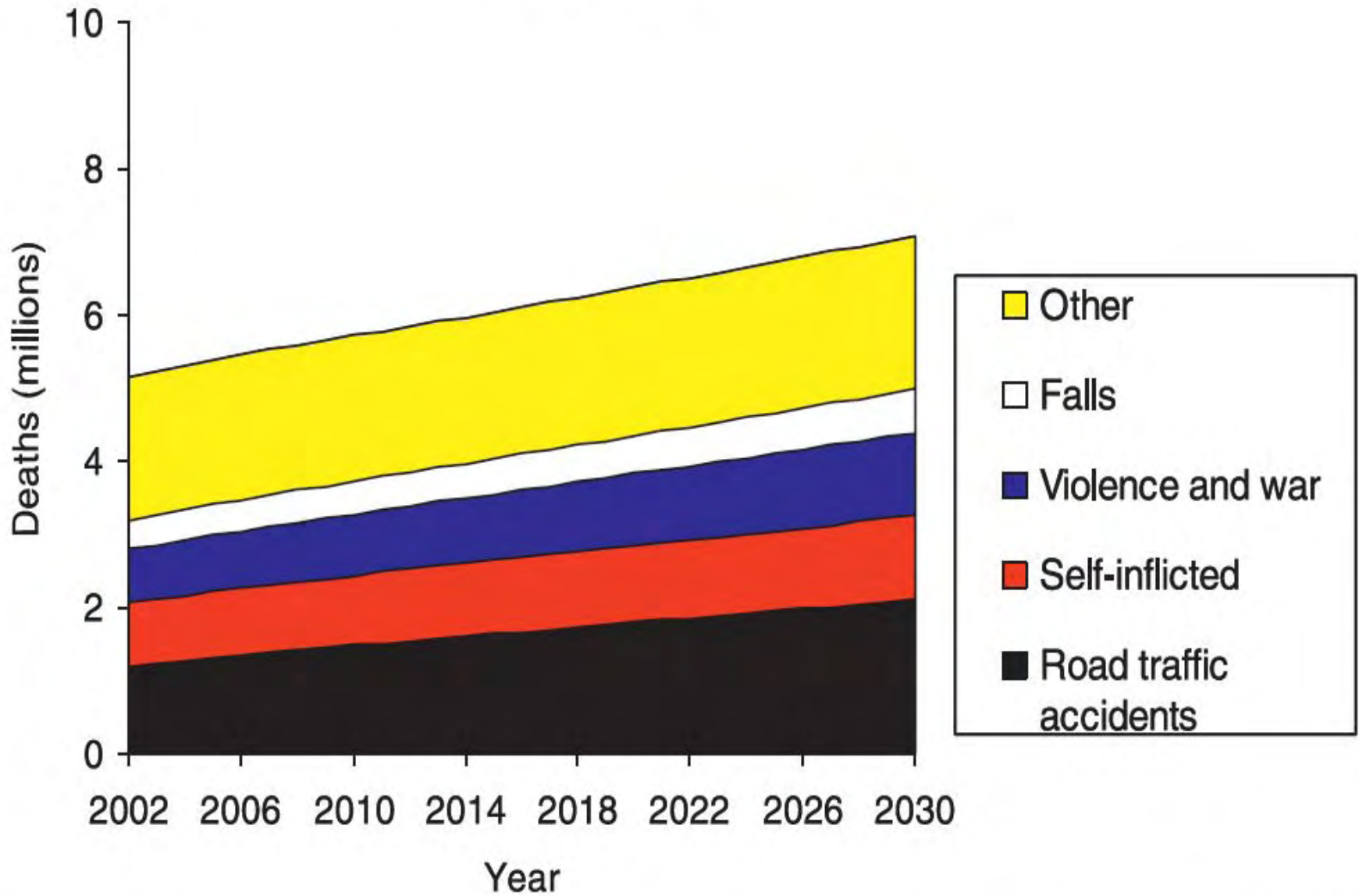


Presentation Framework

- > **Definitions**
- > **Why evaluate road safety interventions for health outcomes?**
- > **How best should we evaluate road safety interventions for health outcomes?**
- > **Summary and concluding remarks**

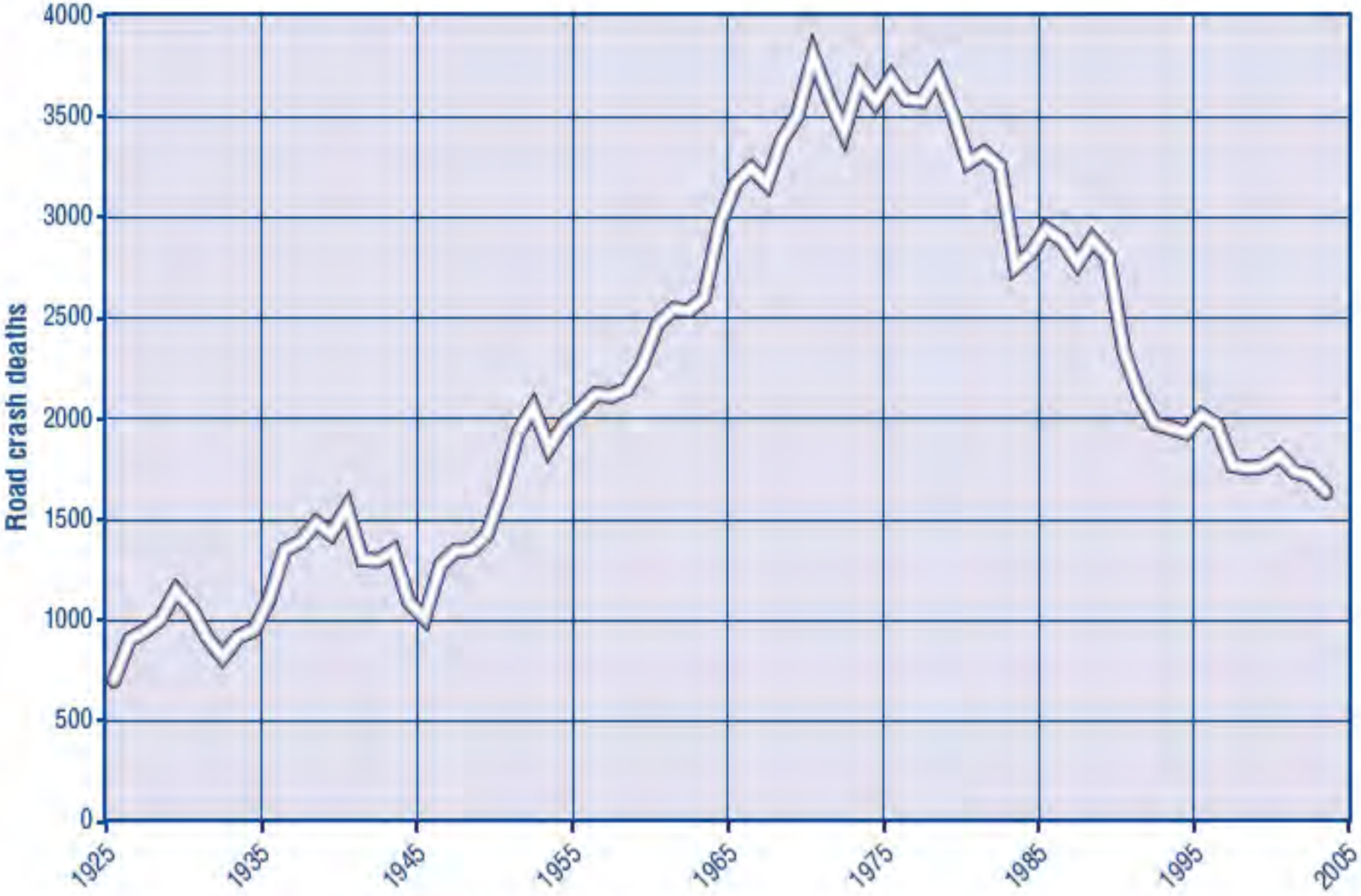


Group III deaths



Baseline Projections of Deaths from Group III Causes, World, 2002–2030

Road crash deaths, 1925 to 2003



Source: Australian Transport Safety Bureau



THE GEORGE INSTITUTE
for International Health



Reducing the Global Burden of Disease

www.thegeorgeinstitute.org