

Road Traffic Crashes, Injuries and Public Health

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**“Action in the absence of
knowledge can be dangerous and
worse than no action at all”**

M. K. Gandhi

Ideology

- **William J. Haddon, Jr. and others (1960s**
 - **“accident” vs “injury control”**
 - **“accident prevention” too limiting**
 - **“injury” a disease > public health approach**

- **Charles Perrow (1980s...)**
 - “...what is attributed to operator error stems primarily from the structure they operate in, and thus, stems from the actions of elites”**

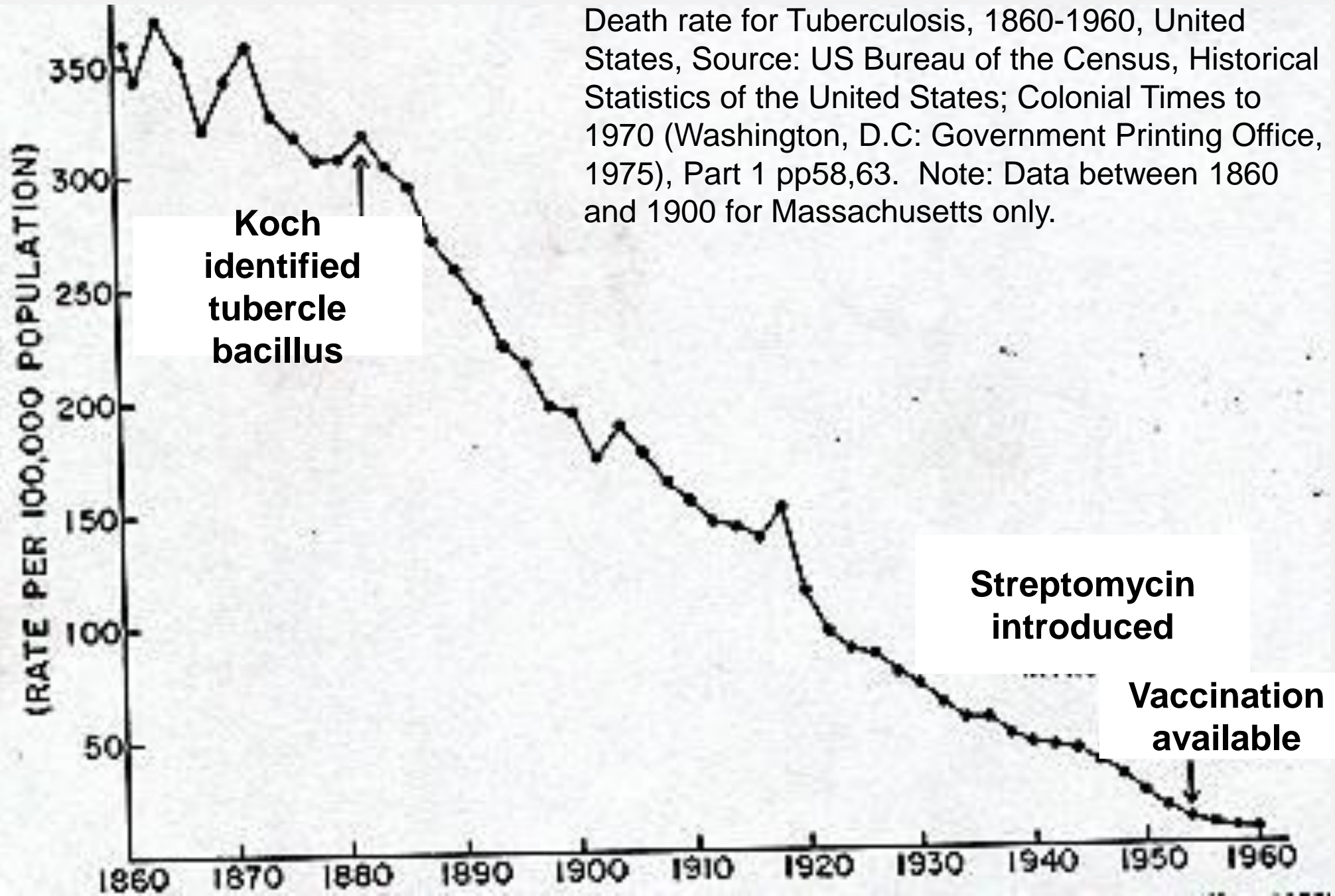
Experience

- **Policy makers in every country find it very difficult to institute changes which reduce road traffic injuries**
- **Individuals do not follow all the instructions given to them**
- **Propaganda and “education” not very successful**
- **HMC success in controlling RTCs - post 1970s**
- **No LMC particularly successful in controlling RTCs**
- **Theoretical base of RTC control in HMCs not widely understood or appreciated**

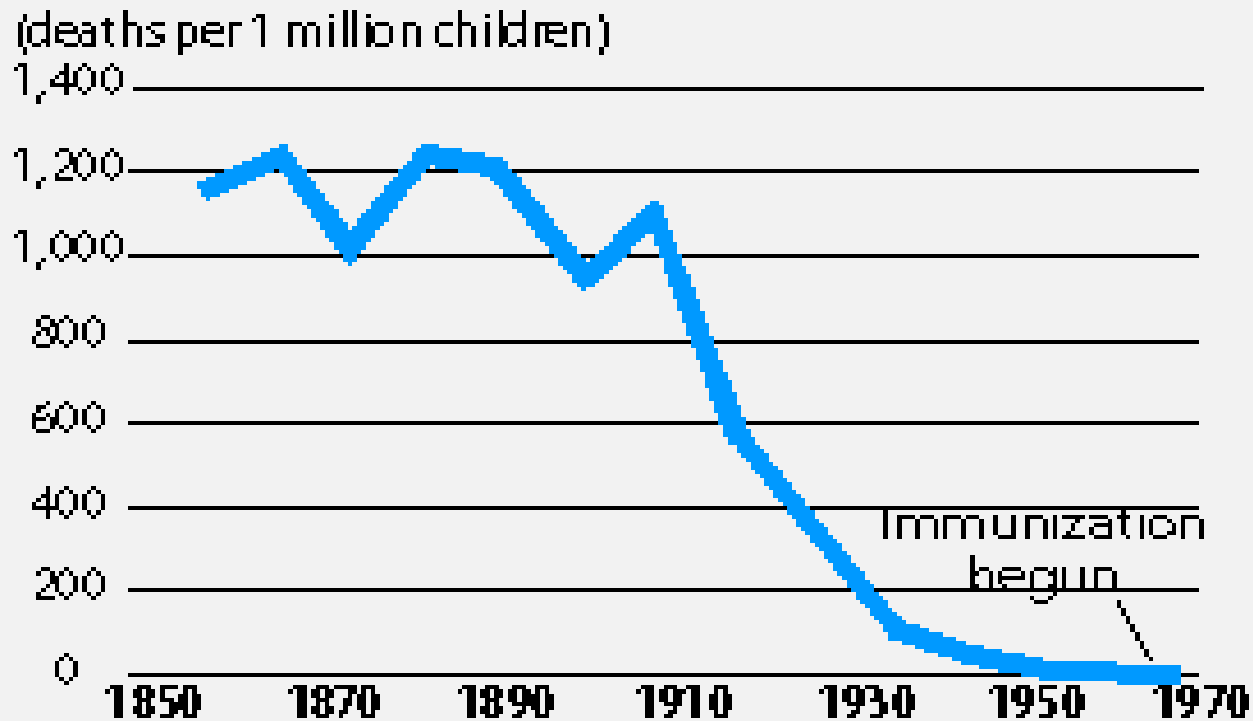
ETHICS OF INJURY CONTROL

We have a societal and moral responsibility to design products, environment and laws so that people on their own find it easy and convenient to behave in a safe manner without sacrificing their needs to earn a living and fulfill their other societal obligations - safety is a fundamental human right

Death rate for Tuberculosis, 1860-1960, United States, Source: US Bureau of the Census, Historical Statistics of the United States; Colonial Times to 1970 (Washington, D.C: Government Printing Office, 1975), Part 1 pp58,63. Note: Data between 1860 and 1900 for Massachusetts only.

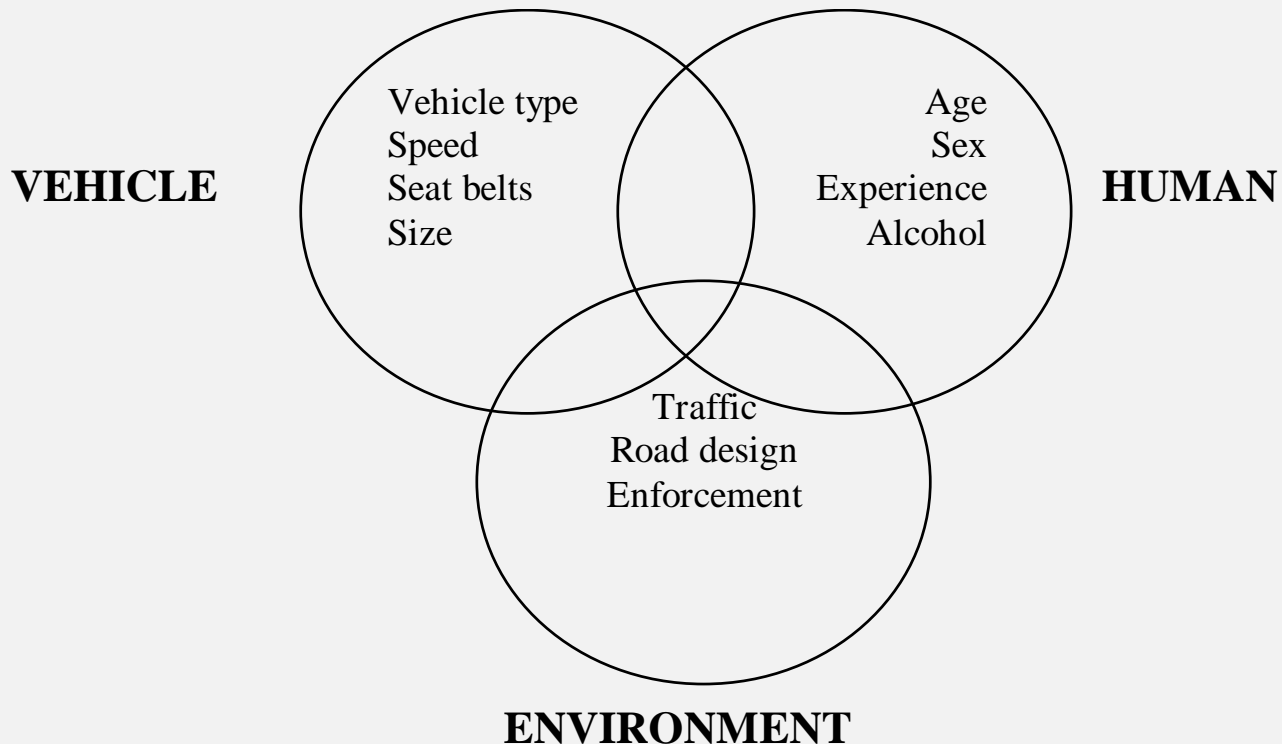
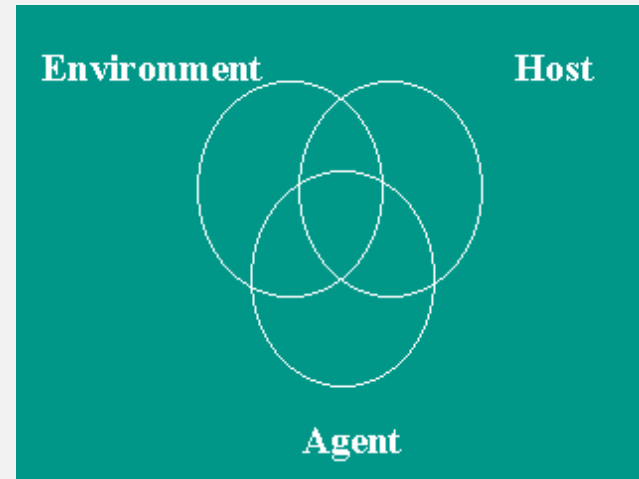


Death Rates for Measles in Children Under Age 15, England and Wales, 1850-1970



Source: Thomas McKeown, *The Modern Rise of Population* (Academic Press, San Francisco, 1976), pp. 93, 96.

Road traffic injury can be defined as a disease that results from an acute exposure of the human body to transfer of energy from the environment around it



Comparative Epidemiology of Malaria and Skull Fracture (as sustained by an unhelmeted motorcyclist crashing into a tree)

Pathological Condition	Host	Agent	Vector/Vehicle	Interaction
Malaria	Man	Plasmodium sp.	Mosquito	Mosquito bite
Skull Fracture	Man	Mechanical energy	Motorcycle	Crash with tree

10 methods for limiting physical energy transfer

1. Prevent the development of energy form
1. Reduce the amount of energy
2. Prevent the energy release
3. Alter the rate of energy release from it's source or it's spatial distribution
4. Separate structures from the energy release by space or time

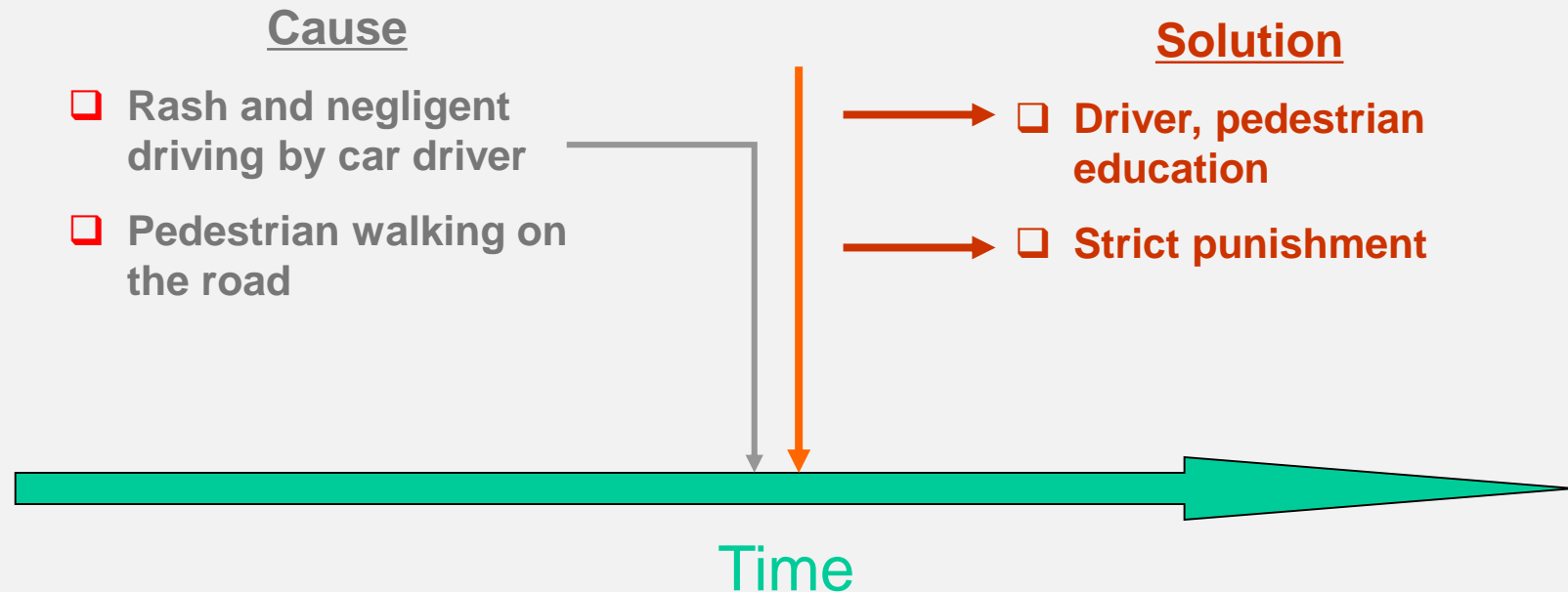
10 methods for limiting physical energy transfer

6. Place a barrier between the released energy and susceptible structures
7. Modifier surfaces that can be impacted
8. Strengthen structures susceptible to damage from energy transfer
9. Prevent the extension of existing damage
10. Carryout intermediate and long-term repair and rehabilitation

Traditional Crash Analysis

- Car approaches road junction and goes through red light which has just turned red.
- Hits motorcyclist, and then hits median.
- Motorcyclist gets thrown sideways, hits pedestrian walking on road.
- Car driver gets facial injuries, motorcyclist head injuries, and pedestrian leg fracture

Motorcycle Crash



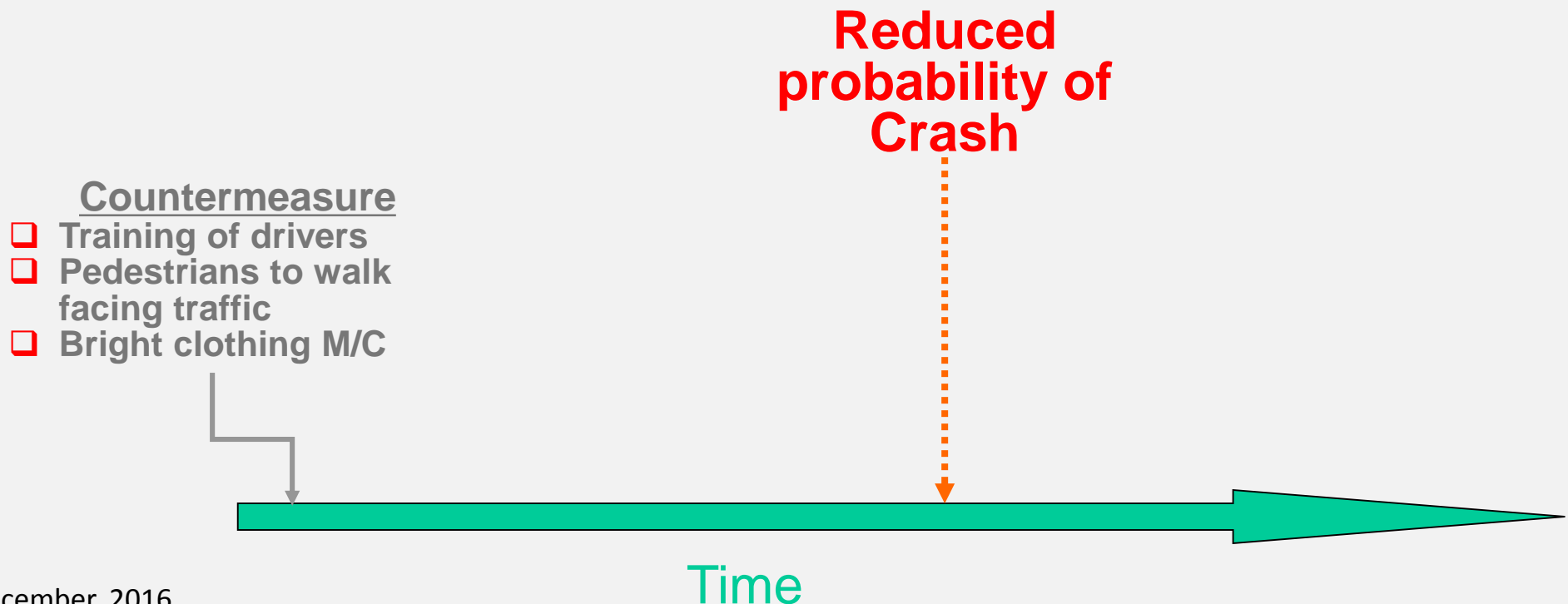
Scientific Crash Analysis

Time \ Space	Human (Victim)	Products	Environment
Crash Prevention	Role of the human beings in preventing the event	Role of the product in preventing the event	Role of laws, policing, & environment in preventing the event
Injury Prevention during crash	Role, changes in victim in minimizing injury during crash	Design changes in product to minimize injury during crash	Changes in laws, policing, & environment
Injury Management after crash	Management of victim to minimize effect of injury	Design changes in product to minimize after effects	Societal and environmental arrangements

Scientific Crash Analysis

Cell 1

Preventing the possibility of a crash: Human error based measures



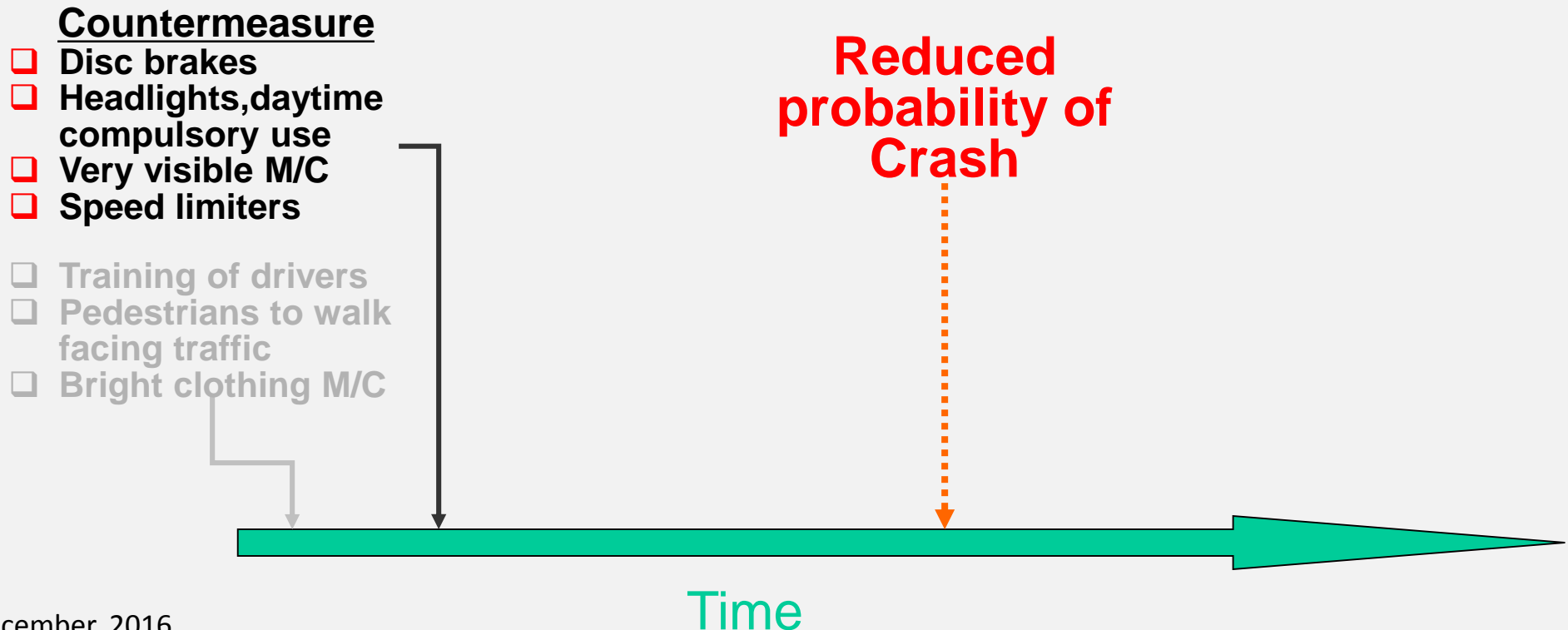
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Scientific Crash Analysis

Cell 2

Preventing the possibility of a crash: Vehicle based measures



Scientific Crash Analysis

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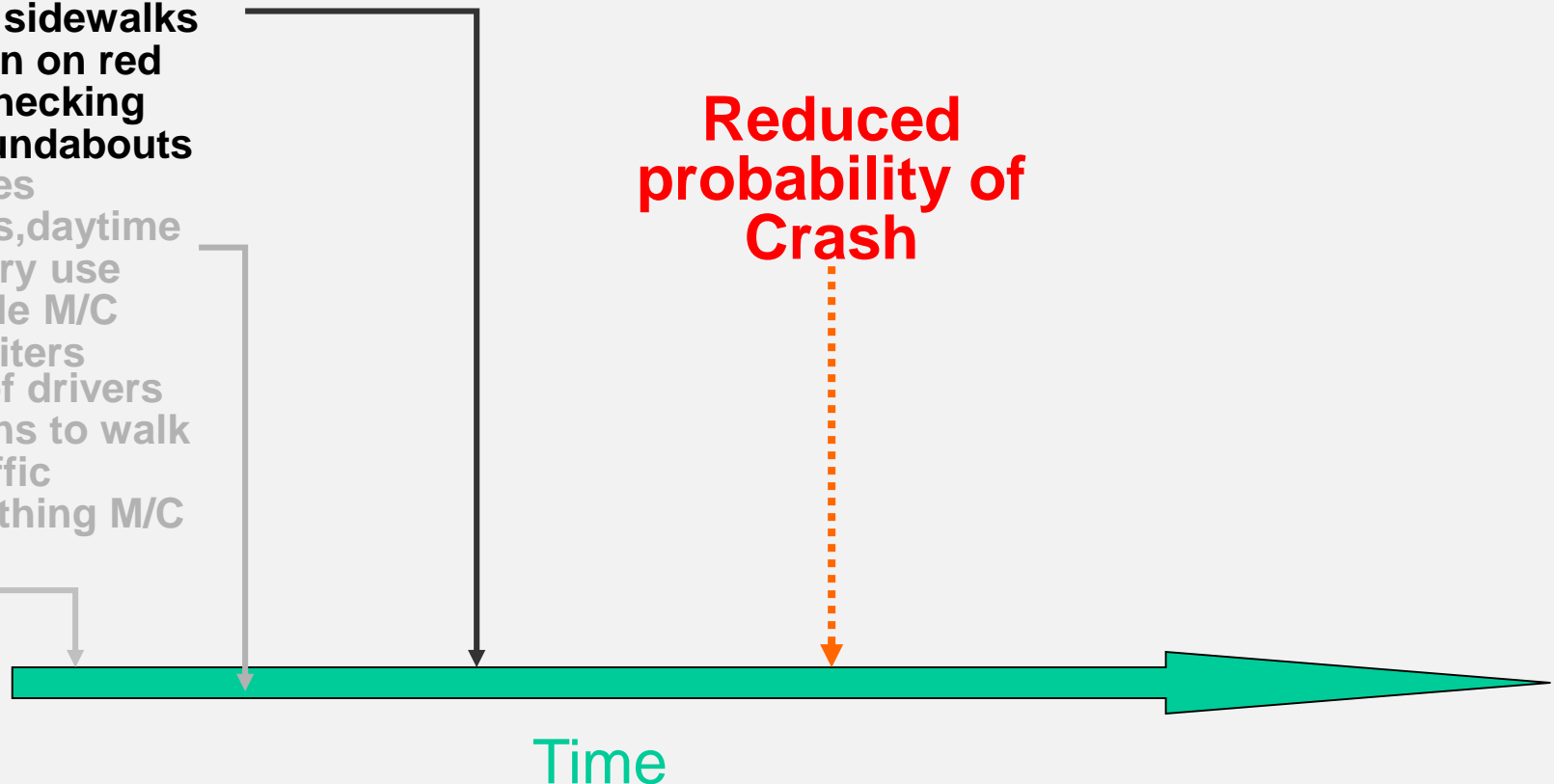
Scientific Crash Analysis

Cell 3

Preventing the possibility of a crash: Environment based measures

Countermeasure

- Vigilant policing
- Red light cameras
- Bright illumination of crossings
- Adequate sidewalks
- No left turn on red
- Alcohol checking
- Use of roundabouts
- Disc brakes
- Headlights, daytime compulsory use
- Very visible M/C
- Speed limiters
- Training of drivers
- Pedestrians to walk facing traffic
- Bright clothing M/C



Scientific Crash Analysis

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Scientific Crash Analysis

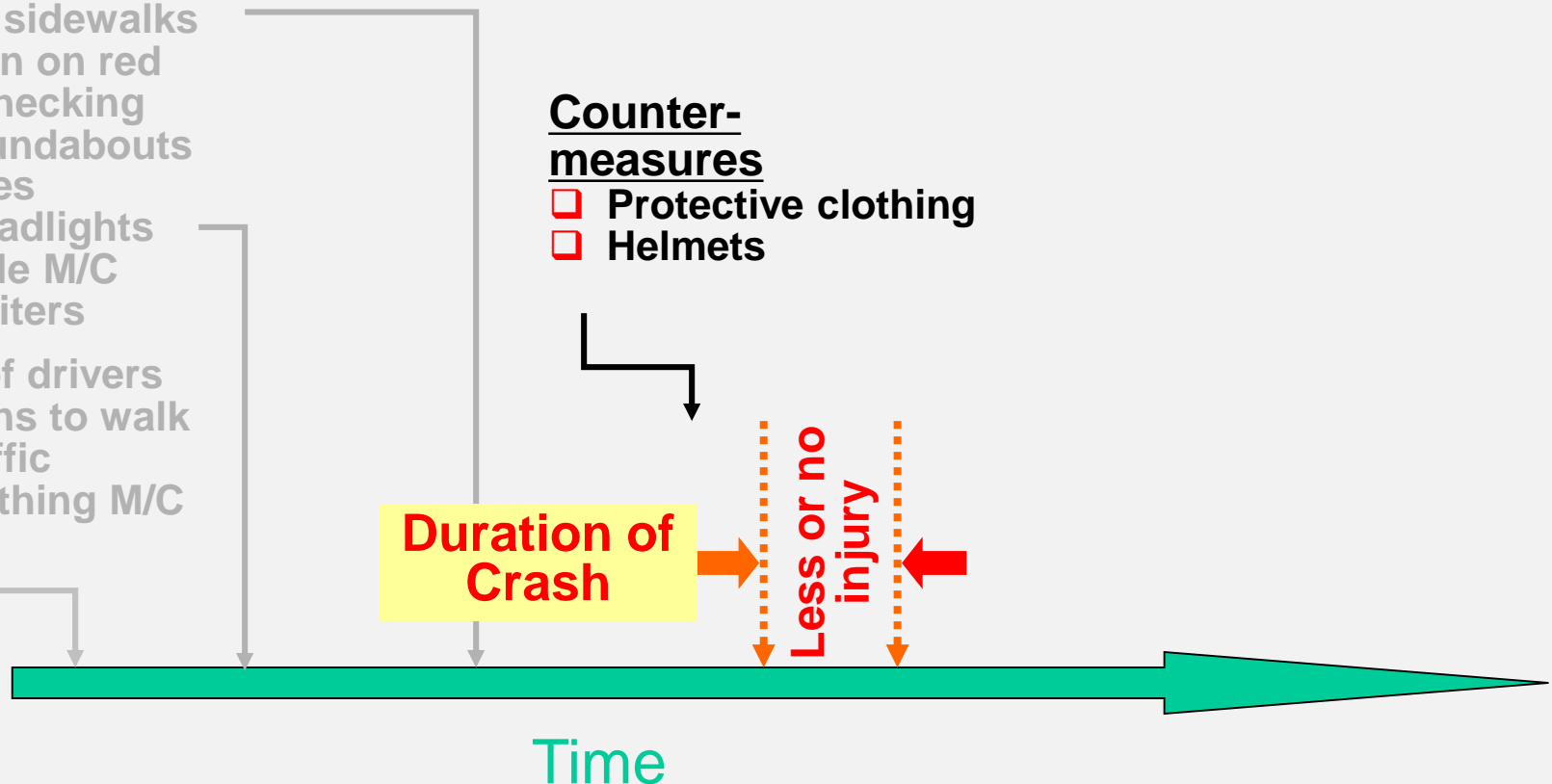
Cell 4

Preventing injuries during the crash: Human victim based measures

- Vigilant policing
- Red light cameras
- Bright illumination of crossings
- Adequate sidewalks
- No left turn on red
- Alcohol checking
- Use of roundabouts
- Disc brakes
- Strong headlights
- Very visible M/C
- Speed limiters
- Training of drivers
- Pedestrians to walk facing traffic
- Bright clothing M/C

Counter-measures

- Protective clothing
- Helmets



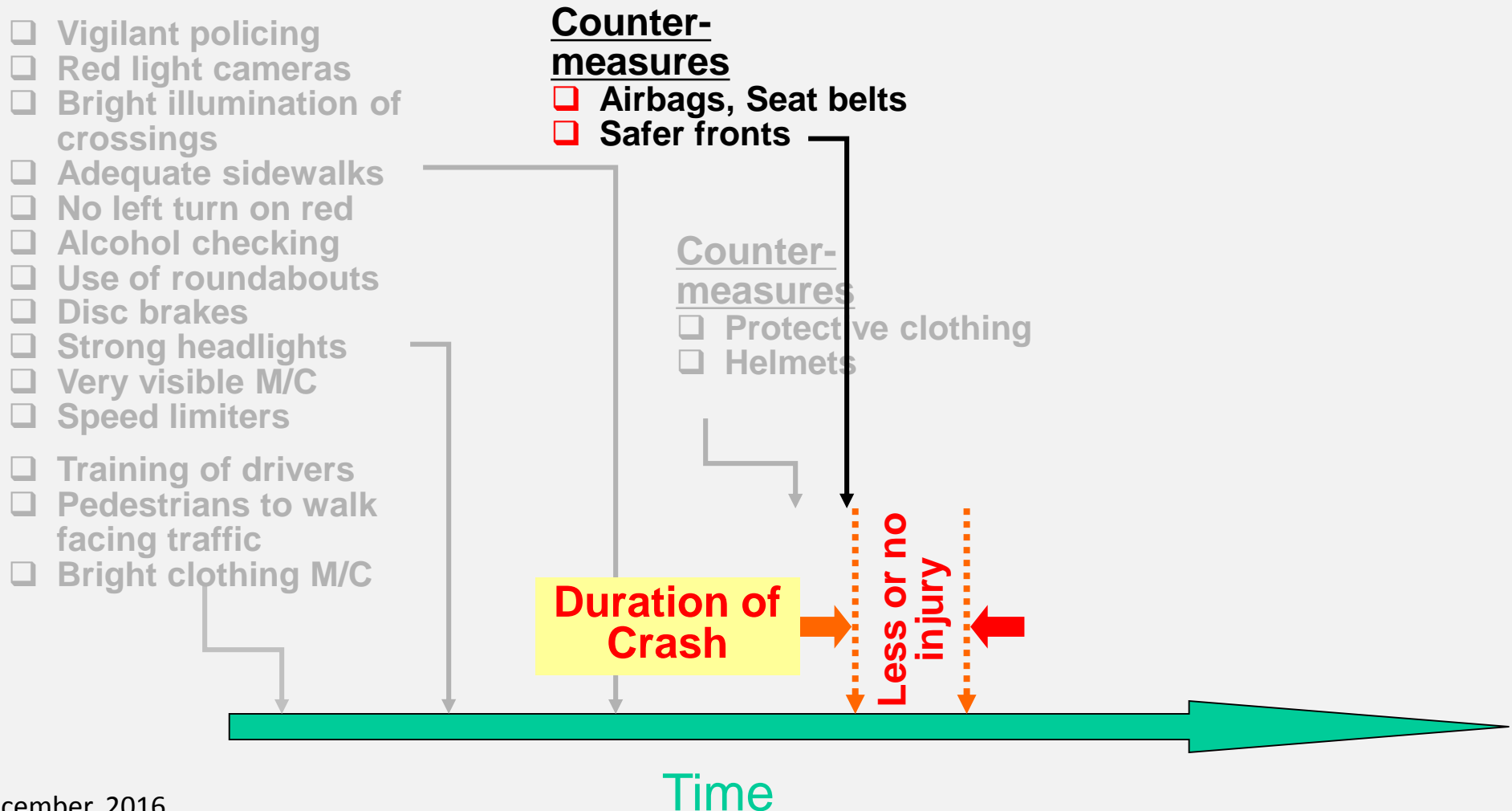
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Scientific Crash Analysis

Cell 5

Preventing injuries during the crash: Vehicle based measures



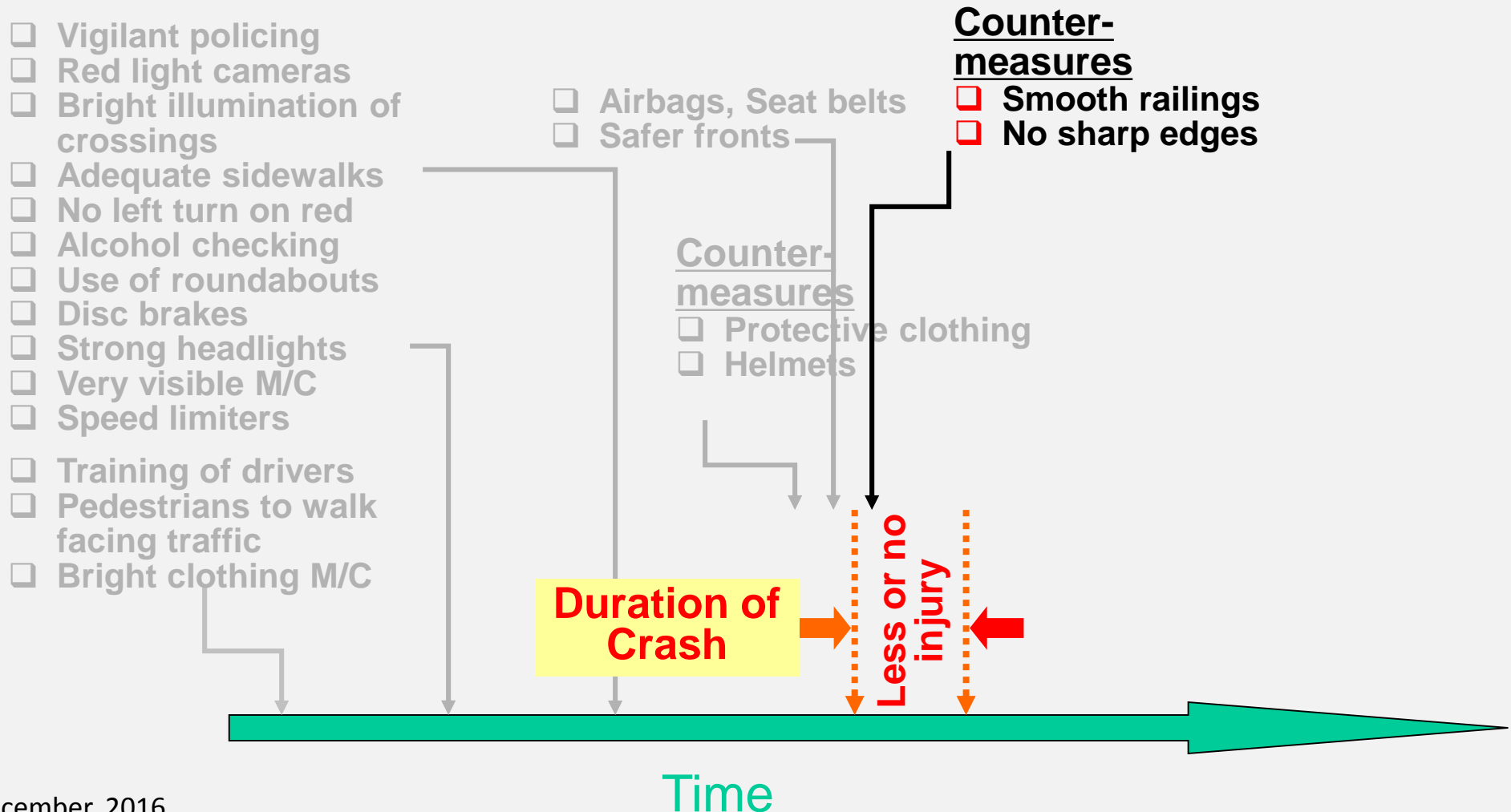
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Scientific Crash Analysis

Cell 6

Preventing injuries during the crash: Environment based measures



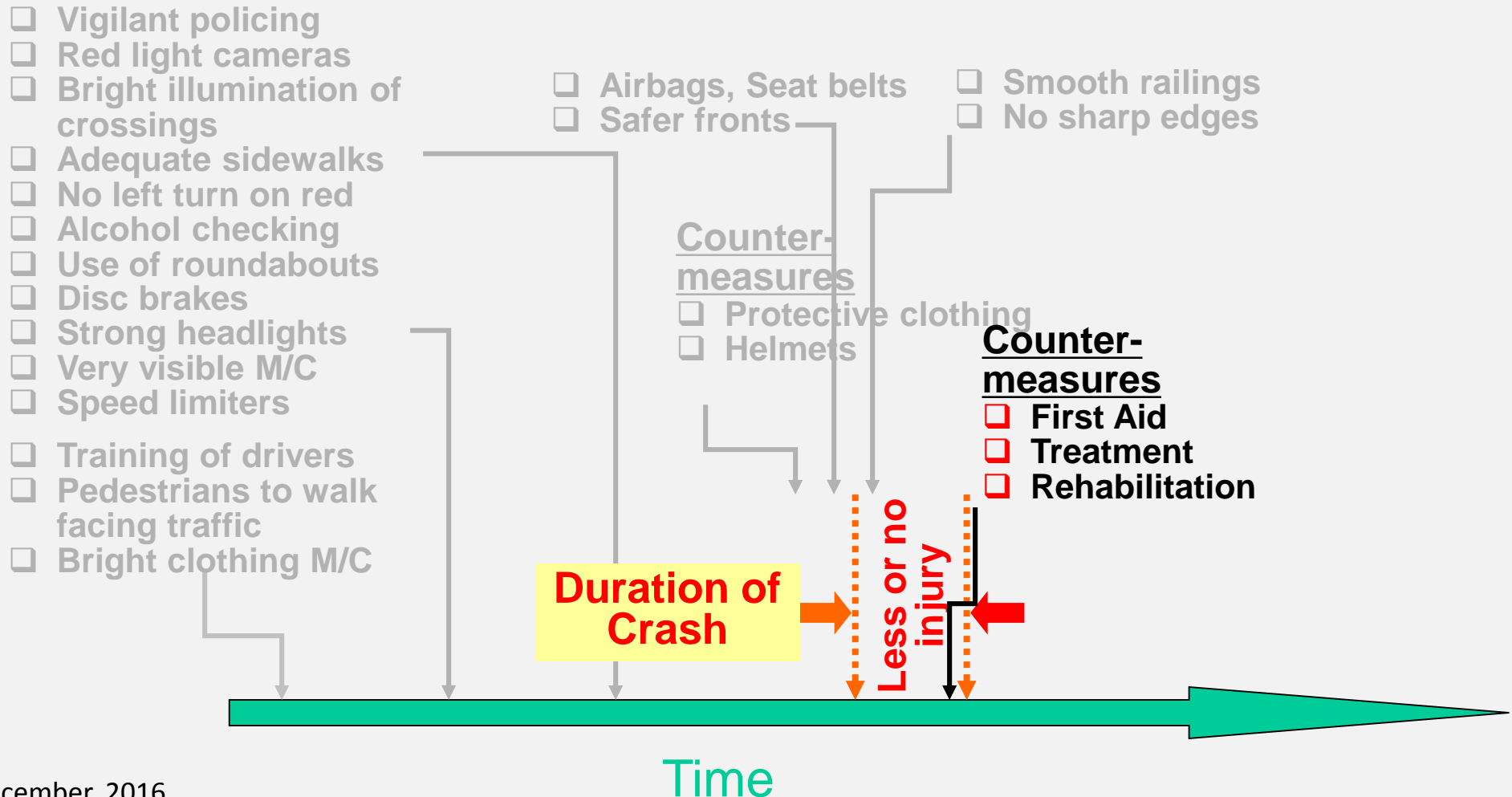
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Scientific Crash Analysis

Cell 7

Managing injuries after the crash: Victim based measures



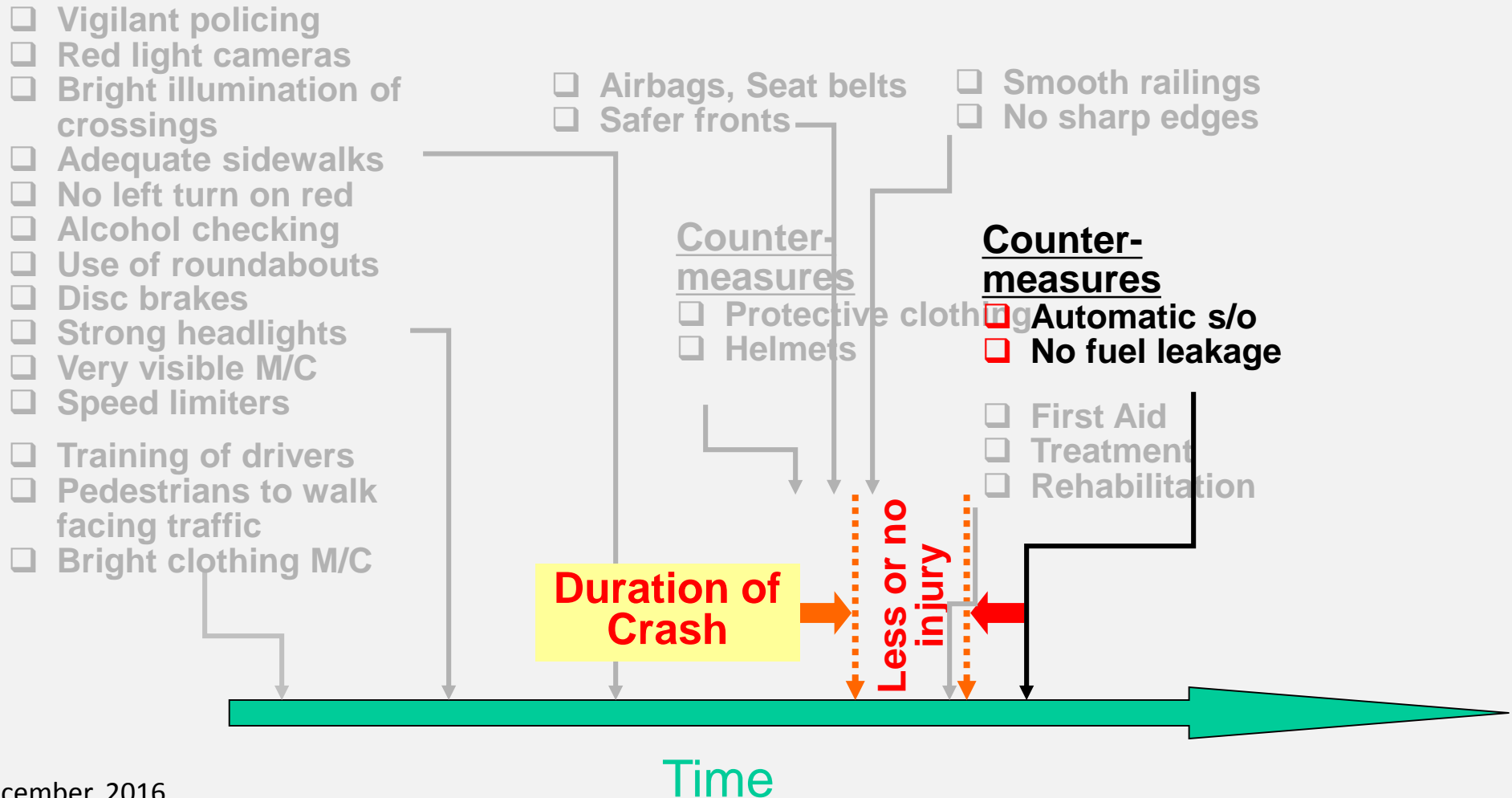
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Scientific Crash Analysis

Cell 8

Managing injuries after the crash: Vehicle based measures



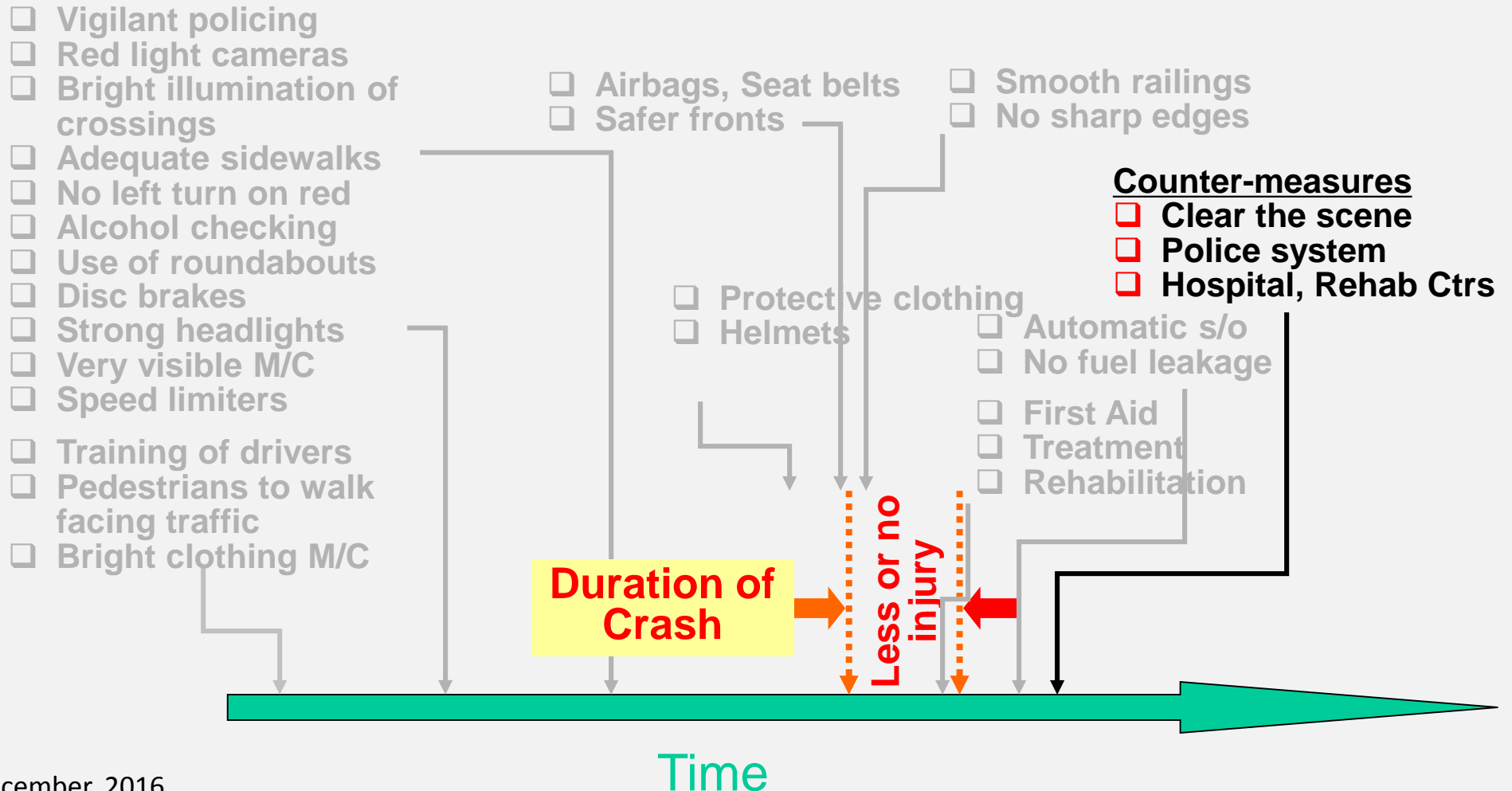
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Scientific Crash Analysis

Cell 9

Managing injuries after the crash: Environment based measures



Epidemiology: need

- **Rapid evaluation techniques**
- **Methodologies for short focused surveys**
- **Data collection systems related to possibility of determining countermeasures**
- **Guidelines for extrapolation/generalisation**