


**Road Traffic Injury**

**A Public Health Problem**

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**M. K. Gandhi**

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

## Public Health

### Problem?

- ❖ Large number of cases
- ❖ Any one can become a victim
- ❖ Can be affected in the course of doing daily activity
- ❖ The activity is almost compulsory

Control and solutions at  
societal/government level  
- not individuals



## Pioneers

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”

*‘Normal Accidents’*

William J. Haddon (1960s ....)

- “accident” vs “injury control”

- “accident prevention” too limiting

- “injury” a disease public health approach




## Experience

- Highly motorized country (HMC) success in controlling RTIs - post 1970s
- No less motorized country (LMC) particularly successful in controlling RTIs
- 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
- Theoretical base of RTC control in HMCs not widely understood or appreciated

## Ethics, philosophy and moral responsibility

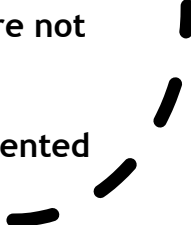
Products, environment and regulations should be designed such that:

- People on their own find it convenient to behave in a safe manner
- People should be able to behave safely without harming their basic needs to earn a living
- Safe behaviour should not prevent people from fulfilling societal obligations
- Road safety is a fundamental human right



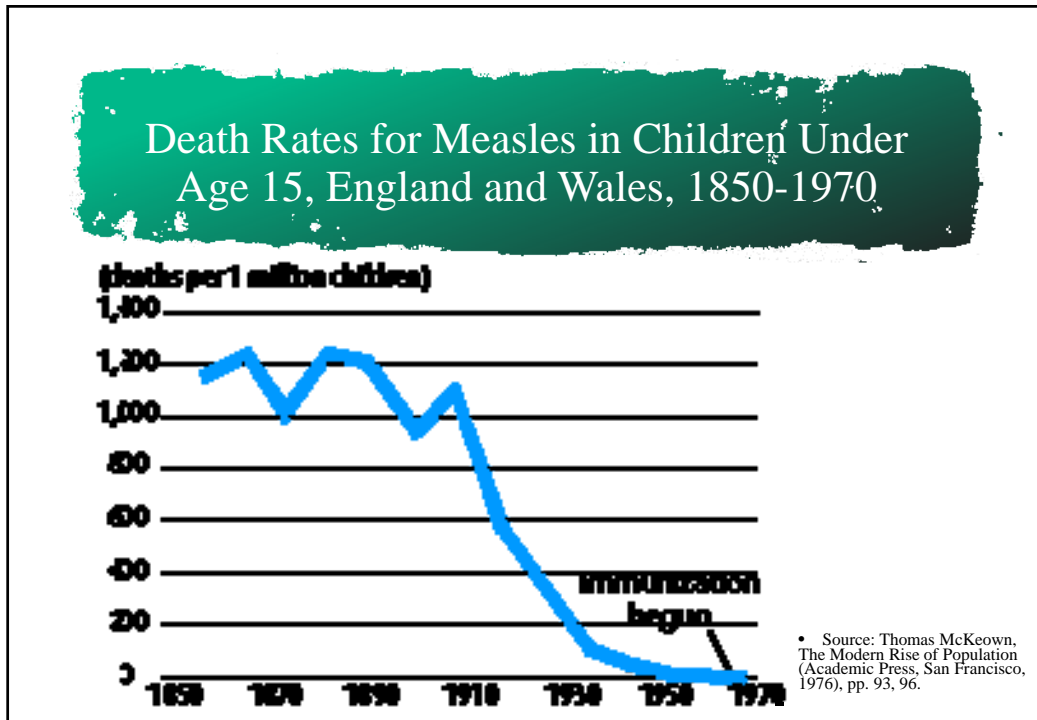
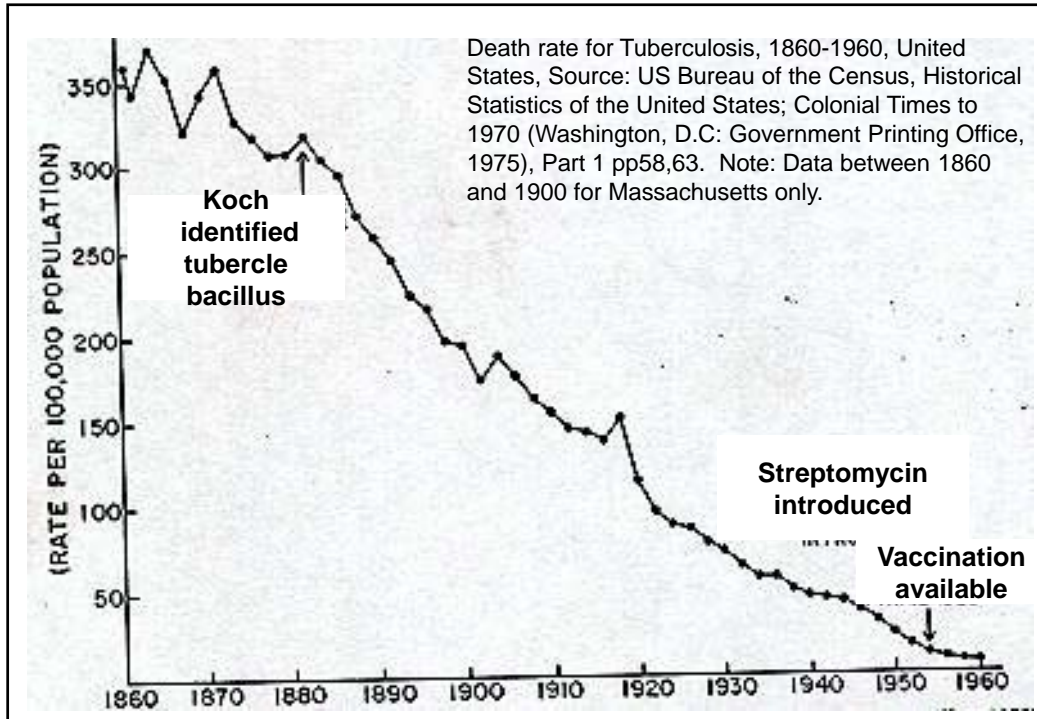
**THEORY**

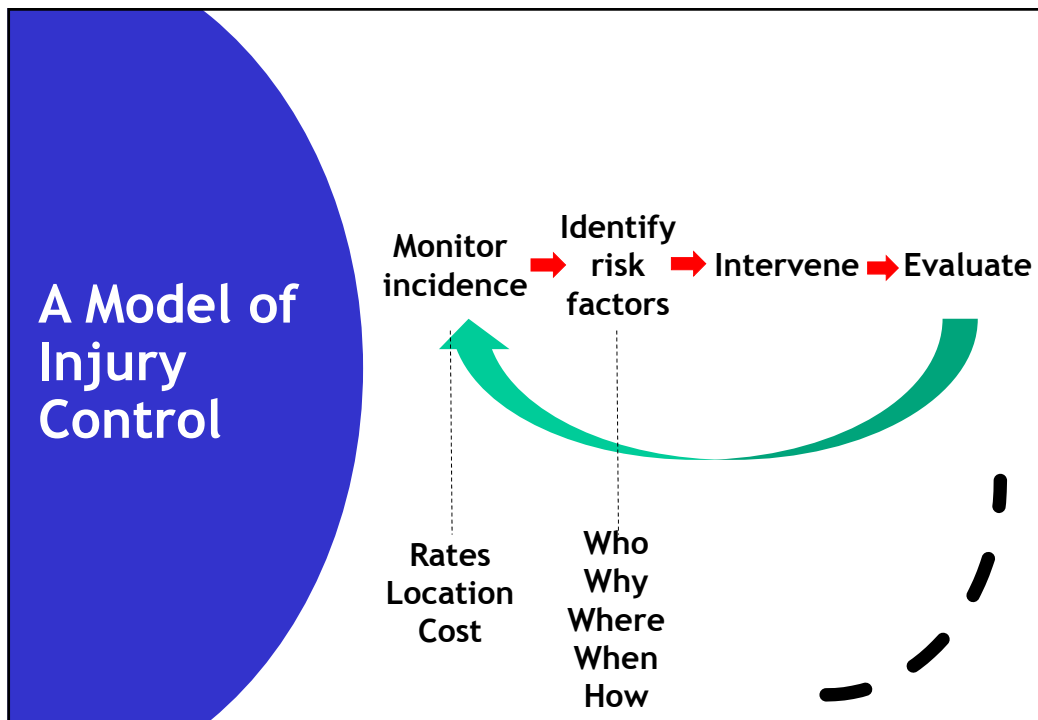
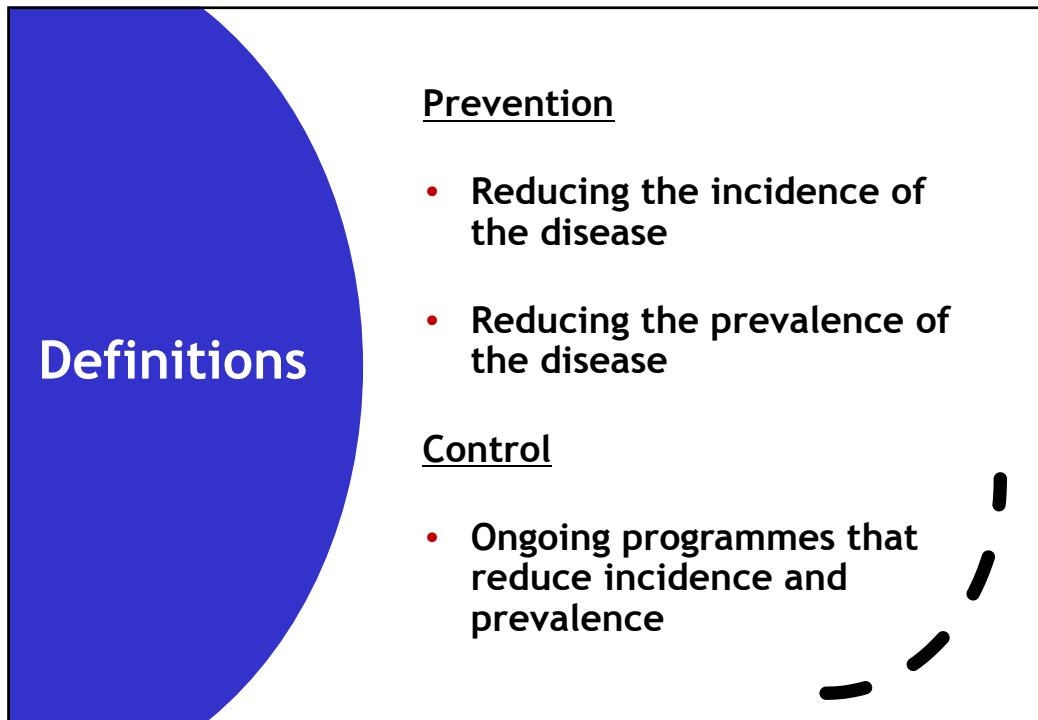
- There is no fundamental difference between injuries and the occurrence of any other disease.
- Injury can be defined as a disease that results from an acute exposure of the human body to transfer of energy from the environment around it
- “Accidents” and injuries are not acts of God
- All injuries cannot be prevented




**STRATEGY**

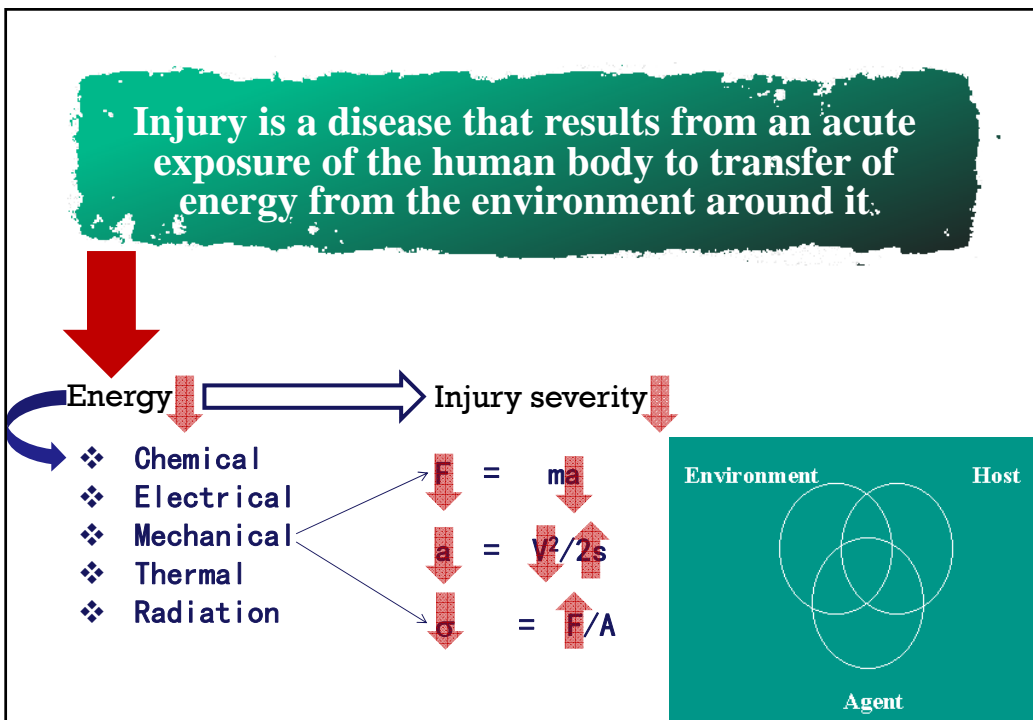
- Do not focus on determining a single “cause” - Injuries are caused by a number of events taking place together
- Prevention is not the only thing, we need a comprehensive control strategy
- Best is when people are safe automatically and don't need to take protective measures actively. More true for low income communities
- The situation in LICs is much more complex socially and technologically than that in the HICs





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

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



## Ten Strategies for Reducing Energy Transfer\*

1. **Prevent the marshalling of the form of energy in the first place:**  
Manufacture of gunpowder, raising of babies above the floor on chairs, prevent movement, of vehicles....
2. **Reduce the amount of energy marshalled:**  
Reducing size of bombs or firecrackers, height of divers above swimming pools, speed of vehicles...
3. **Prevent the release of the energy:**  
Preventing the discharge of nuclear devices, fall of elevators, the undermining of cliffs, automatic emergency braking...

Contd.

\* William H. Haddon (1970) *On the escape of tigers. Technology Review, Vol. 72, No. 7.*

## Ten Strategies for Reducing Energy Transfer\* (contd)

4. **Modify the rate or spatial distribution of release of the energy from its source:**  
Reducing the slope of ski trails for beginners, modern petrol tanks, pressure cooker...
5. **Separate, in space or time, the energy being released from the susceptible structure:**  
Use of footpaths, medians; not allowing trucks in cities in daytime, placing of electric power lines out of reach...
6. **Separation by interposition of a material "barrier":**  
Electrical and thermal insulation, shoes, safety glasses, helmets, shields, lead aprons for people working with Xray unit...,

Contd.

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## Ten Strategies for Reducing Energy Transfer\* (contd.)

### 7. Modify appropriately the contact surface, subsurface, or basic structure:

Eliminating, rounding, and softening corners, edges; sand or foam in broad jump pits, cushioned dashboards, crashworthiness of cars...

### 8. Strengthen the structure, living or nonliving:

Earthquake resistant buildings, training of athletes, medicines to reduce osteoporosis...

### 9. Counter the continuation and extension of damage started::

Firedoors, MAYDA and SOS calls, fire alarms, emergency, medical care, emergency transport, automatic switch off of vehicles after crash...,

Contd.

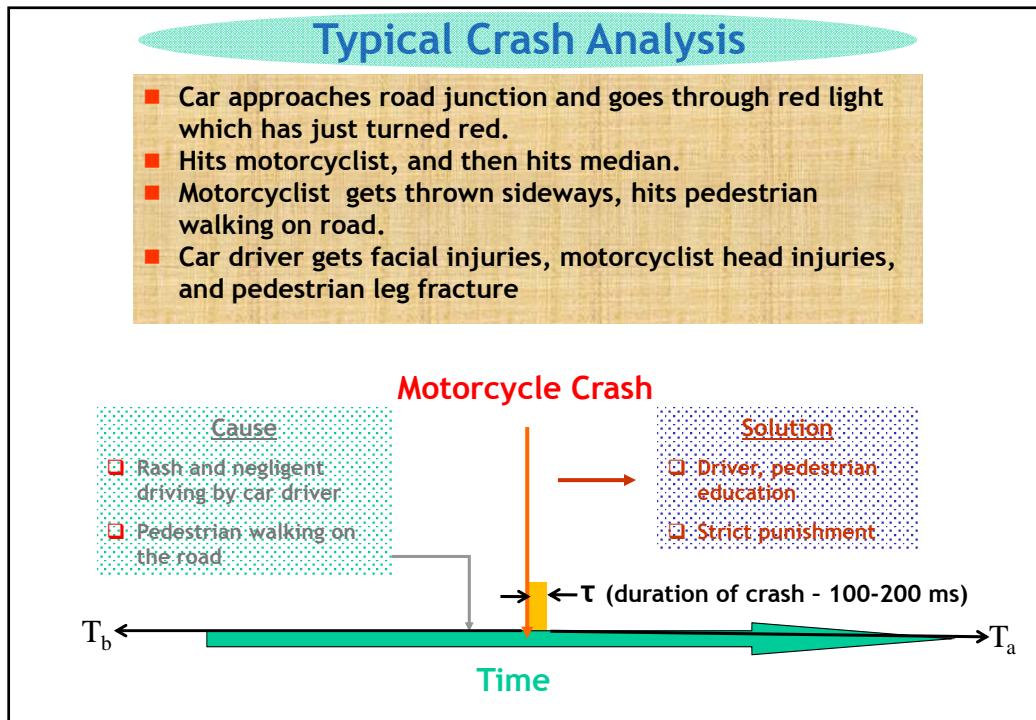
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## Ten Strategies for Reducing Energy Transfer\* (contd.)

### 10. All the measures between the emergency period following the damaging energy exchange and the final stabilization of the process:

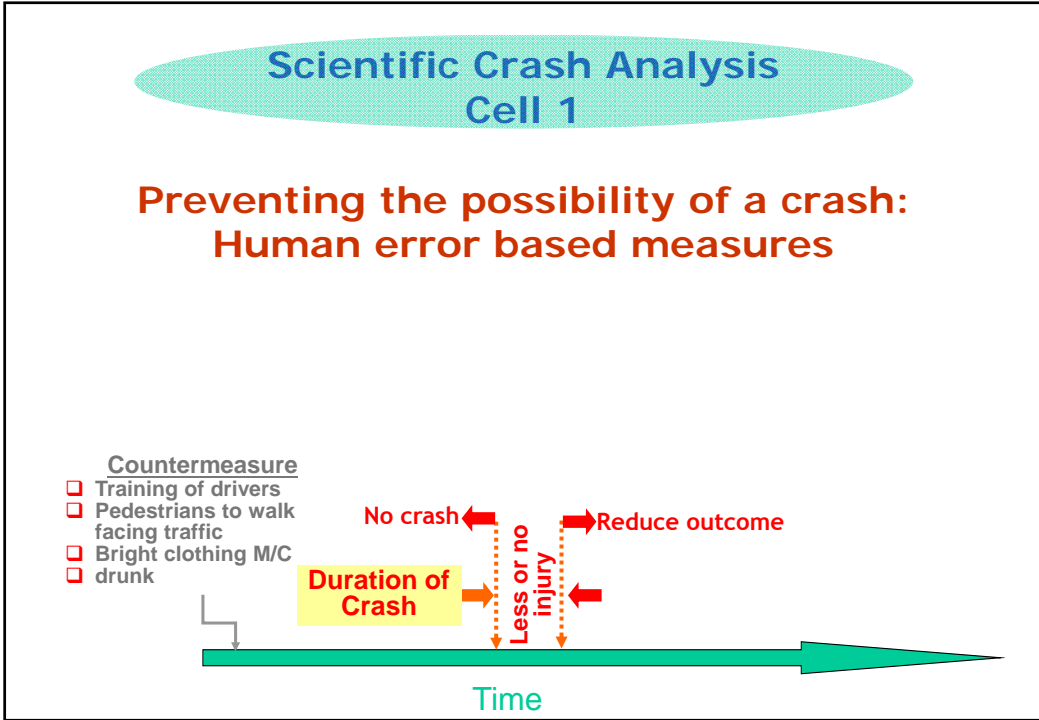
Safe extrication, emergency care and transport, treatment in hospital, rehabilitation, income assurance...

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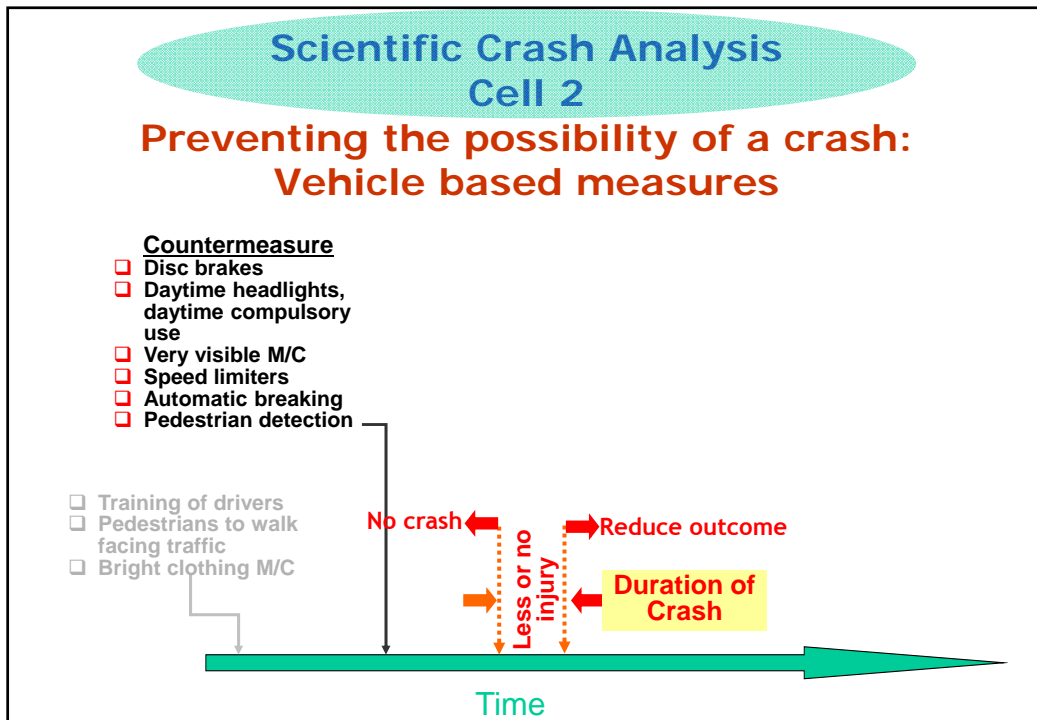
### Scientific Crash Analysis Haddon's Matrix

Time \ Space	Human (Victim)	Products	Environment
<b>Crash Prevention (<math>T_b</math>)</b>	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
<b>Injury Prevention during crash (<math>\tau</math>)</b>	Role, changes in victim in minimizing injury during crash	Design changes in product to minimize injury during crash	Changes in laws, policing, & environment
<b>Injury Management after crash (<math>T_a</math>)</b>	Management of victim to minimize effect of injury	Design changes in product to minimize after effects	Societal and environmental arrangements



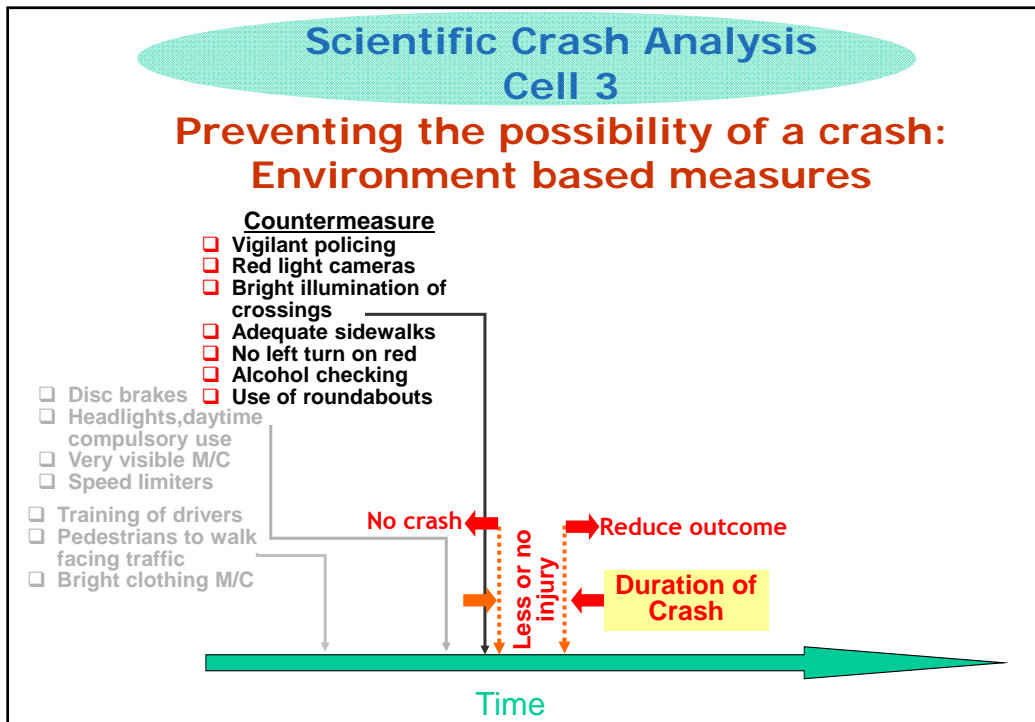
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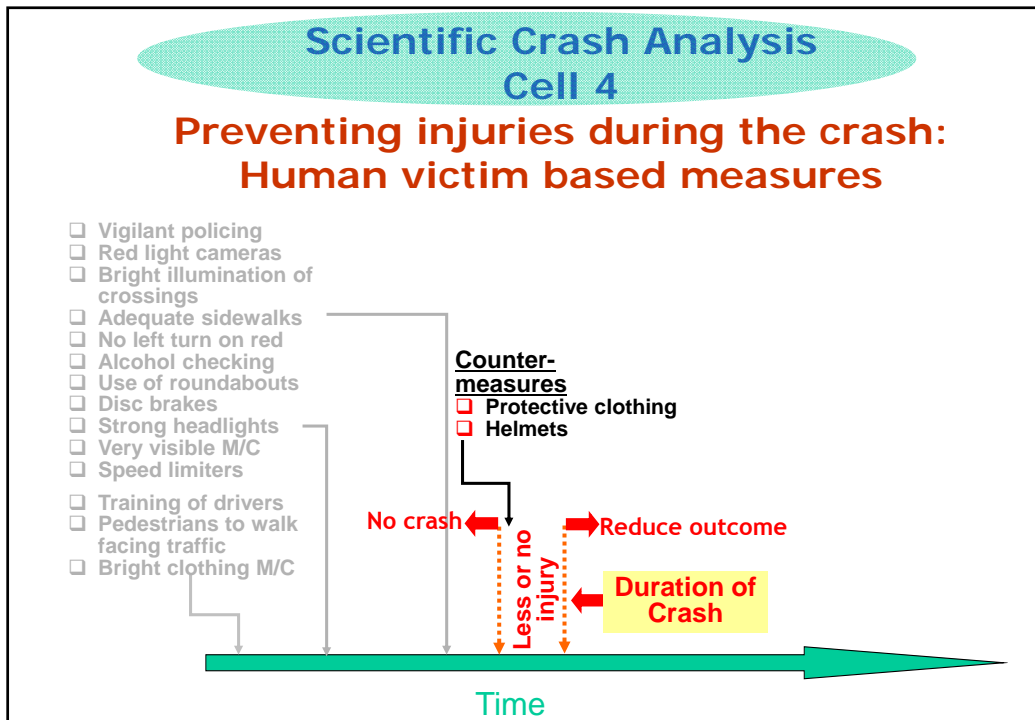
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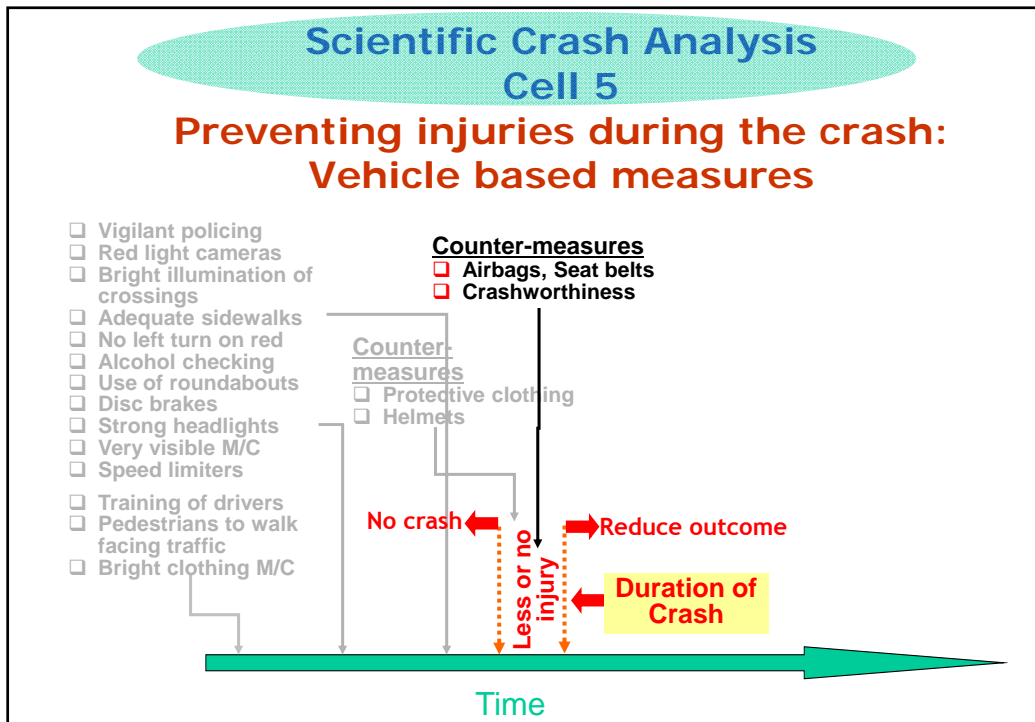
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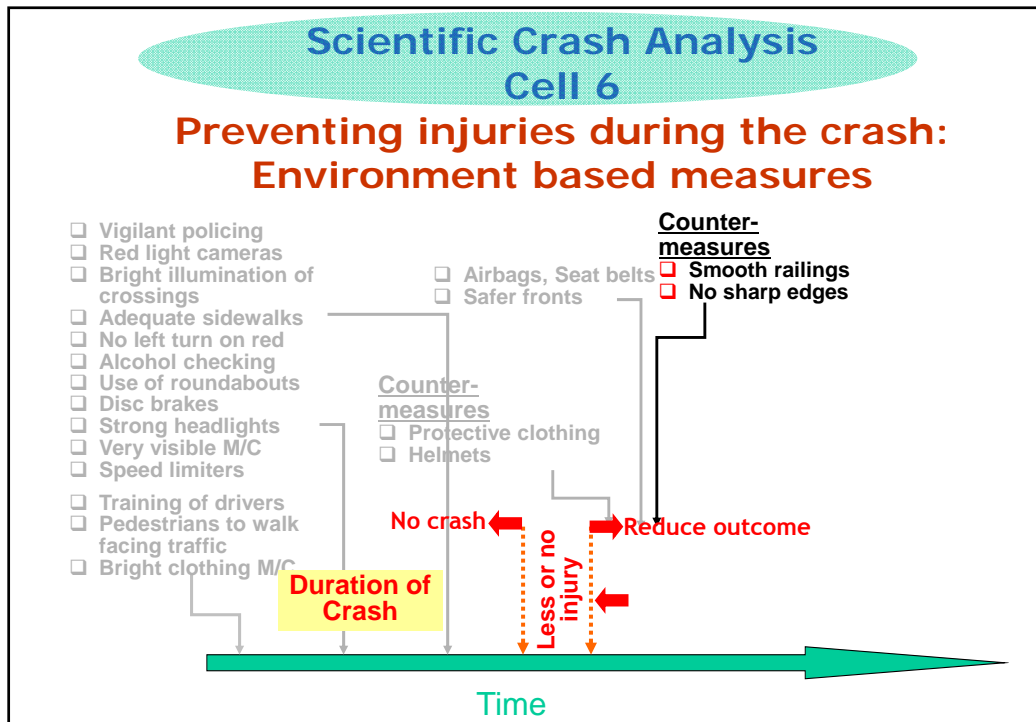
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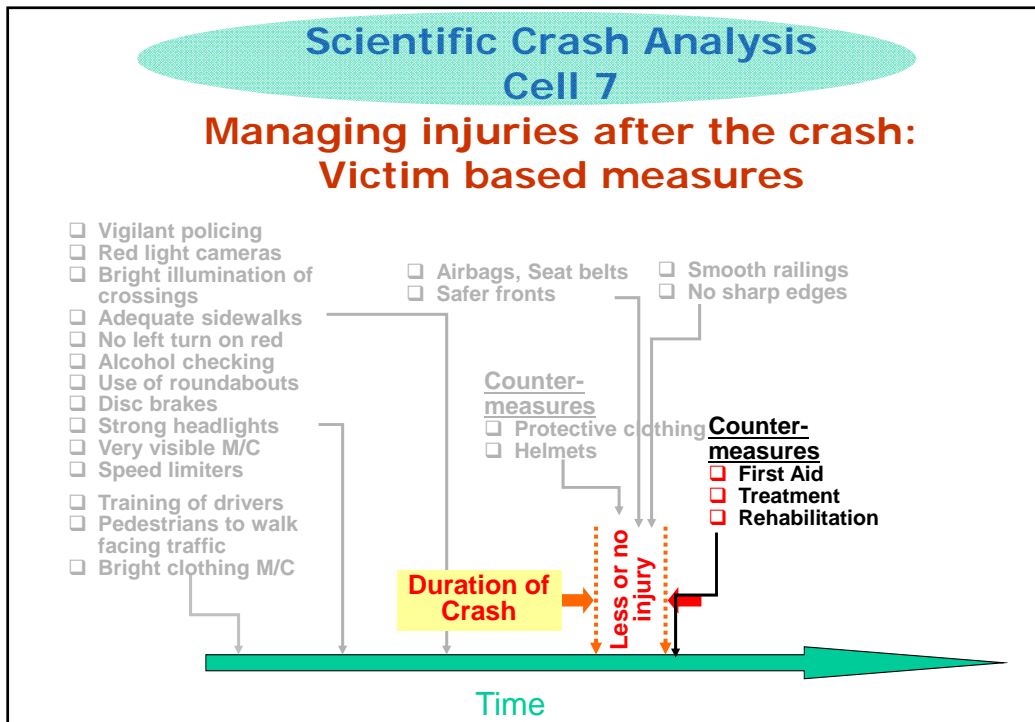
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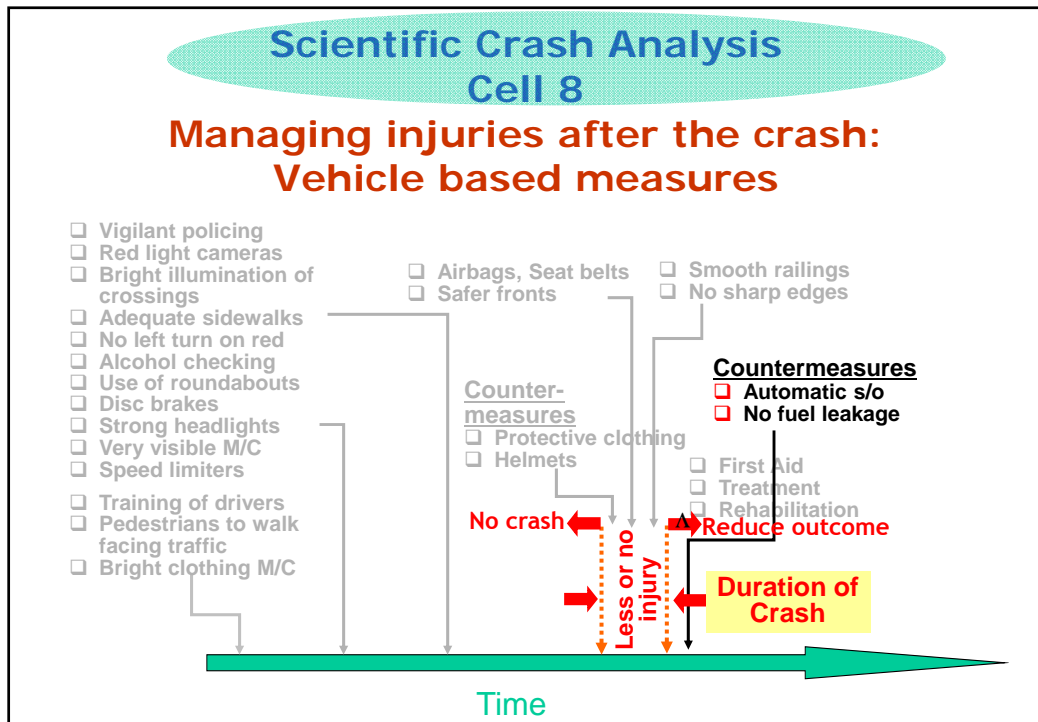
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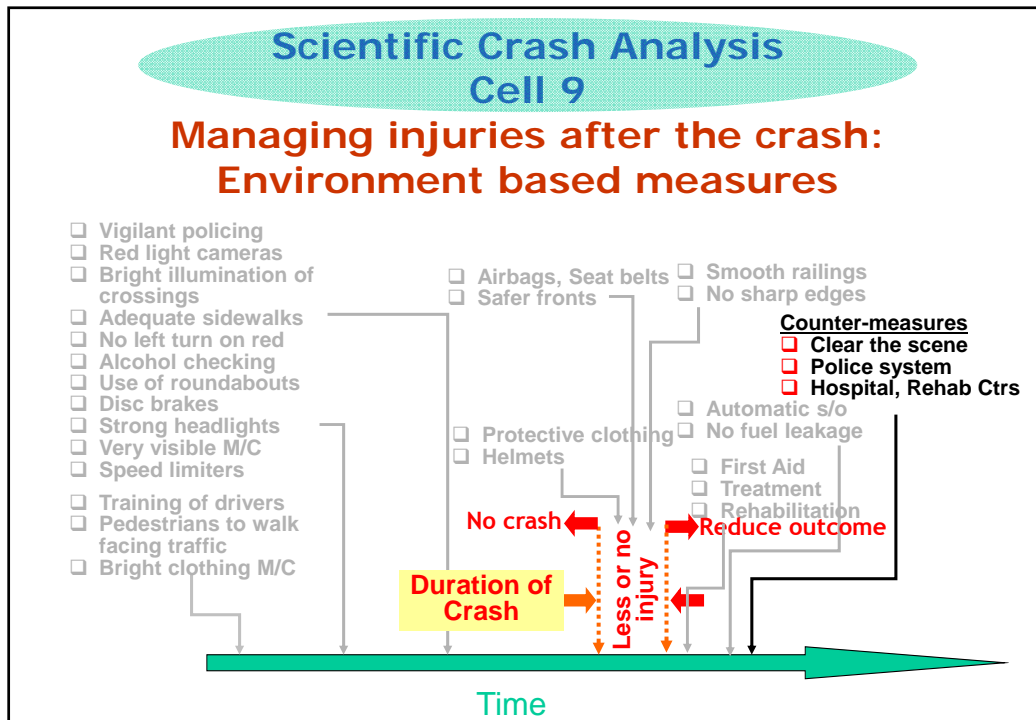
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**Epidemiology,  
need**

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