

## Railway suicide analysis and prevention in a Swedish context

By Helena Rådbo, Ragnar Andersson, Inge Svedung

Karlstad University Sweden

In collaboration with The Swedish National Rail Administration: Banverket



#### List of studies

- Suicide and other fatalities from train-person collision on Swedish railroads: A descriptive epidemiologic analysis as basis for systemsoriented prevention
- Suicide Prevention in Railway Systems:
   Application of a barrier approach
- Suicide and potentials for suicide prevention on the Swedish Rail Network; a qualitative multiple case study
- Feasibility of railway suicide prevention strategies; a focus group study



#### Background

Suicide is a major public health problem More than 75 % of all fatal train – person collisions are suicides The dominating cause of fatal injuries in the Swedish railway system

#### Aim of study 1

To give an epidemiologic description of the railway suicide problem in Sweden
To compare similarities and differences between suicidal and accidental train – person collisions

#### Materials and methods

 Reports on fatal incidents available at the Swedish National Railway Administration, Banverket

Includes all fatal railway incidents in three years 2000-2002

### Sex of victim



### Age



#### Daytime vs. night time



#### Urban vs. rural areas



#### Activity and movement pattern



#### Conclusion

 Victims normally trespass track area a good while before train arrives

- Incidents are highly concentrated to densely populated areas
- Suicidal and accidental incidents show many similarities (from a preventive point of view)

#### Aim and Method study 2

•To theoretically derive and categorise a set of railway suicide prevention strategies

•Methodologically, generic accident and suicide prevention models were synthesized

#### Suicidal process model



#### Modified from Beskow (1979)

## Fault tree analysis: Two basic conditions for critical impact





After William Haddon

### A combined list with barriers from both FTA and Haddon's 10 strategies

- Abolish rail transportation
- Reduce frequency and mass (regarding speed, se below)
- Increase individual and public knowledge on existing barrier functions, survival rate, etc.)
- Reduce spatial and temporal availability
- Physical barriers: fences, bars, etc.
- Spatial barriers : tunnels, elevated tracks
- Electronic barriers: detection and alarm functions
- Human barriers: professional or public surveillance
- Repulsive functions

- Removal functions
- Speed limits
- Braking capacity
- Driver alerting (visibility, signals, etc.)
- Rail and surrounding structure design
- Front design
- Deflecting devices
- Wheel design
- First aid
- Health care
- Rehabilitation (physical and mental)

#### Aim and Method study 3

To evaluate existing police and rail administration reports on railway suicide incidents
To identify and categorize additional preventive-oriented information
Method: Multiple Case-study

#### Results

 Police and Railway administration usually collect adequate background information on train, place and victim

Missing details of relevance for the prevention:

Victims behaviour before collision

Circumstances preceding the collision

Characteristics of the location

### Feasibility of railway suicide prevention strategies; a focus group study

#### Aim and Method study 4

To analyse the acceptance of proposed preventative strategies among relevant professional groups To validate and further develop these strategies

**Focus Group interviews** 



#### Results Theme 1, Category 1-3

 Measures reducing the attractiveness of railway as a means of suicide

The expected level of violence
 Compensation
 Availability

#### Results cont. Theme 2, Category 4-5

 Measures obstructing the accessibility to the track area

4 Noise barriers5 Fences

#### Results cont. Theme 3, Category 6-8

• Measures influencing the victim's determination while awaiting train

6 Information about the unlawfulness7 Warning signals8 Information posted at hot spots

#### Results cont. Theme 4, Category 9-13

- Early warning systems, enabling the train to brake sufficiently or the victim to be removed before collision
  - 9 Camera surveillance
    10 Patrolling
    11 Public alertness
    12 Calls from other train drivers
    13 IR technology

#### Results cont. Theme 5, Category 14-16

- Measures to make the collision less violent and thereby less fatal and injurious
  - 14 Speed
    15 Braking capacity
    16 Design
    Front, Axel box damper, Airbags

## Practical implications, measures available today;

- Informing the public on trespass prohibition
- Patrolling/surveillance at critical sites (potential hot-spots)
- Promoting public awareness and emergency calls
- Facilitating warning feedback from train drivers, when they observe trespassers

Practical implications, measures available today; (cont.)

- Maintenance and improvement of existing fences and noise barriers
- Proper fencing (when lacking) in densely populated areas

## Practical implications, measures available in the longer term

- Air bag (external)
- Redesigning level crossings
- Improving visibility with the aid of IR-technology
- Redesigning platforms
- Redesigning axel box dampers
- Warning alarm, triggered by the presence of the victim
- Improved train front design
- Magnetic brakes on more trains

### Conclusion

- There is a general acceptance and understanding of preventative principles
- The results support the validity of the proposed model for railway suicide prevention
- No major additional categories were identified, not covered by the model

# Thank you for your attention

#### Helena.radbo@kau.se