
Impacts of an automatic emergency call system on accident consequences

Niina Virtanen, Anna Schirokoff, Juha Luoma
VTT Technical Research Centre of Finland

The study was funded by the Ministry of Transport and Communications Finland
and the Ministry of the Interior



Introduction

- Aim of the study was to estimate
 - the number of the fatalities that could be avoided in Finland in 2001–2003 by the eCall system.
 - the effects of eCall on emergency response times.
- In Finland
 - In 2001–2003, on average 86 mobile phone subscriptions per 100 population
 - GSM network coverage in practice nearly 100%

Road Accident Investigation Teams

- In Finland all fatal accidents are investigated by Road Accident Investigation Teams.
 - In 2004 a total of 331 fatal accidents were investigated
- Teams consist of a police officer, a road specialist, a vehicle specialist, a physician, a psychologist and other experts.
- The teams investigate what happened, why the accident happened, which factors affected the risk of the accident and what were the reasons for the consequences of the accident.

Data

Case reports of the Road Accident Investigation Teams from years 2001–2003

- Total of 797 accidents involving a fatally injured motor-vehicle occupant (n=929)
- Total of 263 accidents involving a fatally injured unprotected road user (n=264)
- Data included accidents of all vehicle types, divided into
 - accidents, where there was at least one vehicle in which eCall system could be installed, and
 - accidents, where there were no vehicles in which the current eCall system could be installed (e.g. single motorcycle and snowmobile accidents).

Analyses of the delays

Emergency call delays

- Case reports of the Road Accident Investigation Teams
 - a police report of the accident, eye-witness interviews...
- Case study + phone log of the Emergency Response Centres
 - estimated time of the accident vs. time of the phone call

Rescue process delays

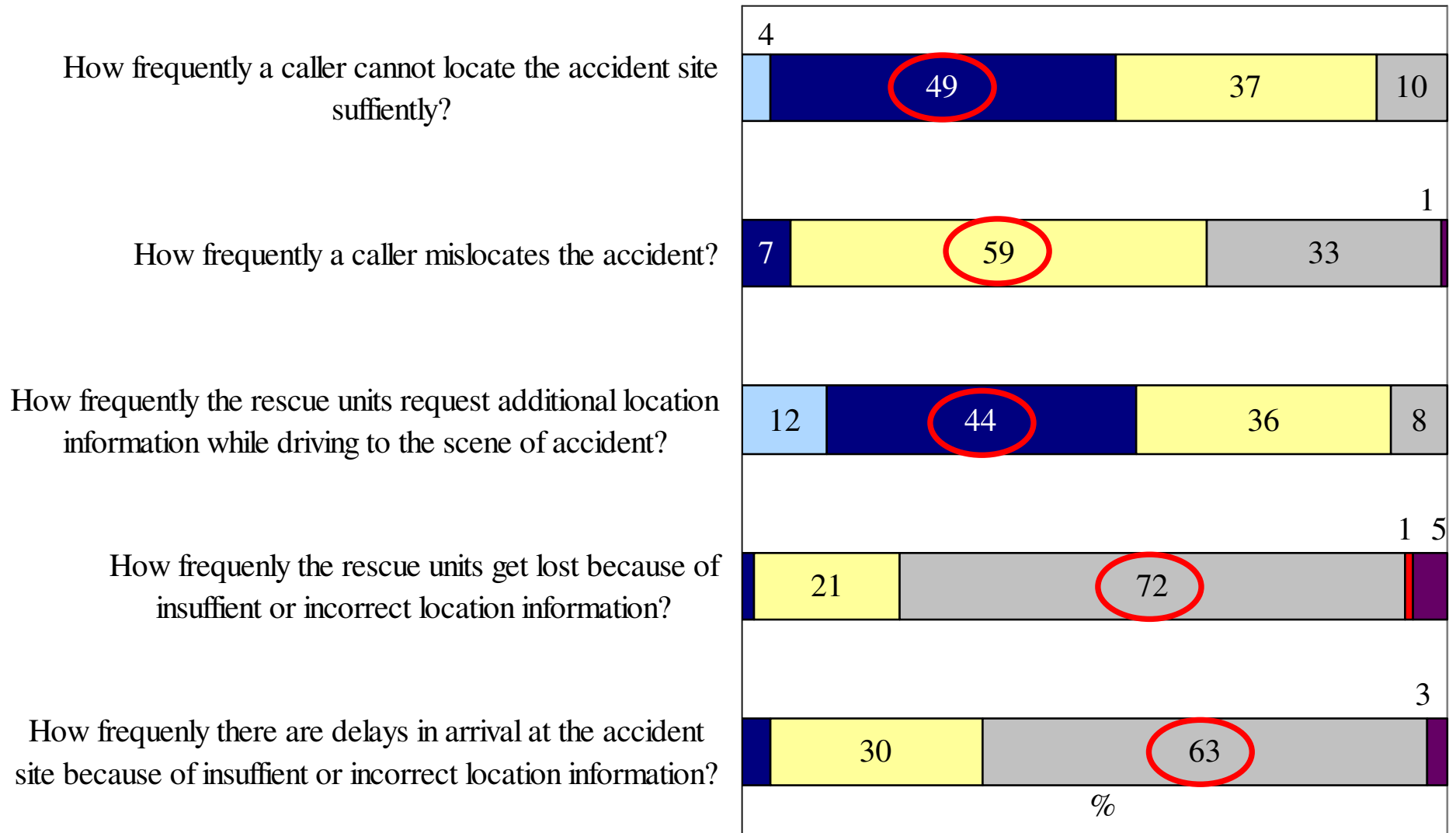
- Questionnaire to the Operators of the Emergency Response Centres
 - 181 answers

Results - Emergency call delays

Delay	Fatal motor vehicle occupant, %		Fatal unprotected road user, %		Overall, % (N=998)
	eCall designed for vehicle (N=726)	eCall not designed for vehicle (N=24)	Four-wheel vehicle involved (N=221)	No four-wheel vehicle involved (N=27)	
Less than 5 minutes	79,8	70,8	97,3	77,2	83,4
5 to 30 minutes	17,0	4,2	1,8	11,7	13,2
More than 30 minutes	3,2	25,0	0,9	11,1	3,4
Total	100,0	100,0	100,0	100,0	100,0

Results – Rescue process delays

■ Always/almost always
 ■ Quite often
 ■ Sometimes
 ■ Seldom
 ■ Never
 ■ Do not know



Analyses of the fatalities

- Procedure:
 - First, exclusion of the patients with immediately fatal injuries
 - Final categorisation done by the medical doctors
- Categories:
 - eCall could very probably have prevented the death of the victim
 - eCall would probably not have prevented the death of the victim
 - Unclear cases (not enough data)

Results – Fatalities (1/2)

Impact estimate	Fatalities in accidents involving motor vehicle occupant fatality, %		Fatalities in accident involving fatal unprotected road user fatality, %		Overall, % (N=1 180)
	eCall designed for vehicle (N=882)	eCall not designed for vehicle (N=37)	Four-wheel vehicle involved (N=233)	No four-wheel vehicle involved (N=28)	
Likely prevention	4,4	10,8	0,0	0,0	3,6
Likely prevention could not be authenticated	94,2	86,5	100,0	100,0	95,2
Insufficient data	1,4	2,7	0,0	0,0	1,1
Total	100,0	100,0	100,0	100,0	100,0

In addition to the 3.6%, **about similar amount** of the fatalities may have been prevented -> **4–8% reduction of fatalities**

Results – Fatalities (2/2)

Fatalities that could probably have been prevented by eCall included for instance

- Hypoxia
- Alcoholic abuse
- Severe heart attacks or similar cases
- Submersion

Conclusions

- eCall could have prevented 4–8% of the road fatalities in Finland during 2001–2003
 - + accurate accident location produced by the eCall would probably reduce the rescue response time
 - eCall system would not be installed in every vehicle
 - Insufficient functionality of the system
- Biggest effect expected on minor rural roads, at night time, in off-peak traffic

THANK YOU!

Further information

Niina Virtanen, VTT Technical Research Centre of Finland
e-mail: niina.virtanen@vtt.fi

The authors wish to thank the following persons and institutes for their assistance and support with this research: Jari Salo (MD), Kari Karkola (MD), the Traffic Safety Committee of Insurance Companies, the Ministry of Transport and Communications Finland, the Ministry of the Interior and the Emergency Response Centre Administration.

Steering group

Anu Lamberg, Ministry of Transport and Communications Finland

Seppo Öörni, Ministry of Transport and Communications Finland

Mikko Jääskeläinen, Ministry of the Interior

Pekka Sulander, Traffic Safety Committee of Insurance Companies (VALT)

Timo Ernvall, Professor, Helsinki University of Technology (TKK)

Kari Karkola, Medical Doctor

Jari Salo, Medical Doctor

Juha Luoma, Research Professor, VTT Technical Research Centre of Finland

Risto Kulmala, Research Professor, VTT Technical Research Centre of Finland

Anna Schirokoff, M.Sc.(Tech.), VTT Technical Research Centre of Finland

Niina Virtanen, Author of the Master's Thesis, VTT Technical Research Centre of Finland