

## **Results of the Finnish Study on Impacts of an Automatic Emergency Call System on Accident Consequences**

### **Introduction**

The study is among the first in which the accurate and reliable estimates of fatalities that could be avoided by the eCall system have been estimated on the basis of European data. Analyses of accidents were done case by case looking at what happened after the crash in a minute's accuracy based on high-quality accident case material. The study was carried out at VTT on a commission from the Ministry of Transport and Communications and the AINO programme ([www.aino.info](http://www.aino.info)) involving the Finnish Motor Insurers' Centre and the Emergency Response Centre Administration.

The aim of the study was to estimate the impacts of an automatic emergency call system on accident consequences in Finland. More specifically, the aims of the study were to estimate the annual number of fatalities that could be avoided by the eCall system, to estimate the effects of eCall on emergency response times, and to estimate the effects of real-time information about the vehicle location and accident type on the consequences of the accident.

### **Method**

In Finland all fatal accidents are investigated by Road Accident Investigation Teams. These teams investigate all fatal traffic accidents in Finland, approximately 400 cases annually. The 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. The data includes, for example, the following information: description of the event, the location and situation related information, use of safety devices, general information about the user and the vehicle, a police report of the accident, description of injuries and the total extent of the injuries. In every case the investigation team also investigates whether alcohol was involved in the accident.

The studied road accident investigation team data included the years 2001–2003, containing a total of 929 fatalities involving a fatally injured occupant in a motor vehicle. Accidents were divided to two groups: vehicles in which eCall could be installed and vehicles in which the current eCall system could not be installed (for instance motorcycles).

The analyses were carried out with two medical doctors, who are specialists in traffic accident traumatology. First, the patients with fatal injuries were excluded. These were typically large head, chest, aorta or heart injuries, which result in immediate death. The remaining cases were categorised into three groups:

- eCall could probably have prevented the fatality
- eCall would probably not have had influence on accident consequences
- unclear because of insufficient data.

In addition, data on delays in accident reporting were studied with the help of interviews and surveys directed to emergency centre operators, police, and traffic centre operators.

### **Results**

eCall could very probably have prevented death of the victim in 4,6 % of the cases. The fatality could not have been prevented in almost ninety percent of the cases. The percentage of cases where eCall could have helped is slightly larger in single two-wheel cases than in accidents including four-wheel vehicles. However, eCall can not be installed in these vehicles at the moment.

Fatalities that could probably have been prevented by eCall included for instance hypoxia, alcohol abuse, severe attacks and submersion. In many cases there were no such traumas that could have explained the death if the help had been available in reasonable time. These cases included fractures of ribs with slowly proceeding hematoma, mild initial brain contusions in combination with difficulties to breathe leading to severe brain oedema. Many of the deceased people had had a mild heart ischemia or non-traumatic brain bleeding or another severe disease which could have been treated in some of the cases if information and alarm had been sent automatically. In alcoholic abuse cases, one or two passengers died because passengers with no trauma were so drunk that they were sleeping or they were not able to realise the severity of the situation. In several cases, a vehicle had turned around in shallow water or had driven directly into water and passengers were not able to leave the vehicle. In all of these cases, only those with realistic treatment resources were included, for instance rural areas were disclosed in most of the cases due to long distances even if the alarm were immediate.

In addition to the ca. 5% there was as high a percentage of cases where eCall may have prevented the fatality. Altogether, **eCall could have prevented 5–10 % of road fatalities** that occurred during 2001–2003. The benefit/cost ratio was estimated to be between 0.6 and 2.6, i.e. most likely more than 1 despite the fact that the indirect benefits of eCall on security and as an enabler of other services were not considered.

The results of the case study, combination of case study and phone log, and questionnaire show that, in most cases, the emergency call had been made less than five minutes after the accident. In 3.5–4.4 % of the cases the emergency call had been made more than thirty minutes after the accident. Delays in single two-wheel accidents seem to be longer than in accidents including four-wheel vehicles. According to the questionnaire, the accident location is quite often unclear in the beginning of the emergency call. Sometimes the accident site is also mislocated by the emergency caller. Correction of the accident site location is needed very often, but it is rare that the rescuers get lost. Only rarely is the aid delayed due to inexact location information.

## Discussion

The results don't take into account that accurate accident site location information given by the eCall system would probably have effect on response times. The questionnaire, according to the study, showed that there is some location information inexactness. Also fatality prevention influence could be even higher than showed in this study. In the study, it was assumed that the eCall system would be installed in every vehicle. If this is not true, then the effects of the eCall system will be lower.

The results showed that eCall could have greatest potential of saving lives in those cases where the emergency call would, without eCall, be done more than 5 minutes after the accident.

The percentage of cases where eCall could be of help may sound low, but when compared to other traffic safety measures it seems that eCall has greater impact than many other measures. In a study where the aim was to investigate what kind of safety benefits could be expected in Finland due to different measures, it was estimated that only four out of 108 the measures studied could have greater impact than eCall. These measures were the renewal of the vehicle population, a penalty point system, a reduction of speed limits from 50 km/h to 40 km/h in urban areas, and halving the number of persons not wearing a seat belt.

The questionnaire showed that the accident location is sometimes mislocated by the emergency caller and quite often the rescuers ask for focusing of the accident location. eCall could give more accurate knowledge about the accident (time, location...). This would improve the case studies done by the road accident investigation teams and the police.

The study recommends the deployment of eCall in Finland as widely and quickly as possible. The study also recommends the improvement of the registration of the severity of road accident consequences.

## Further information

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