

predominantly an issue of safety for the elderly. In combination with more deaths now being attributed to carbon monoxide poisoning, new preventative strategies might be required.

415 EVIDENCE-BASED FIRE SAFETY EDUCATION AND TRAINING MATERIAL FOR SOCIAL AND HEALTHCARE SERVICE PROVIDERS

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Background Fire safety in institutional care of vulnerable people in Finland is at a good level. However, in assisted living, residential and home care fatal fires still occur. Risk assessment, as well as knowledge of good procedures is therefore needed. Information of fire safety is included in vocational education of social and health care sector but for formal, non-formal and in-formal education material to improve care practices and identify the fire hazards at clients home is lacking.

Objective The aim of the project was to produce evidence-based educational material about fire safety for social and health care professionals. To produce this material, data gathered by National Institute for Health and Welfare, literature and good practices from social and health care and rescue services were utilised. The project took place 2012–2016 and was sponsored by Fire Protection Fund.

Results Fire safety education material for social and health care professionals, students and planners was first published in 2014. The web-based material includes information about background, legislation, fatal fire cases, principles of risk management and learning from accidents. In addition, there are statistic, special knowledge about fire sensitive fabrics, electrical equipment and chemicals and also good practices to improve fire safety. Additional compact educational package for craft teachers is available. The material can be used also in voluntary work and for example for people taking care of their relatives.

Conclusions Web-based material is freely available at <https://www.thl.fi/fi/tutkimus-ja-asiantuntijatyo/hankkeet-ja-ohjelmat/step-hanke/stepin-koulutusaineisto>. The material is available in Finnish and Swedish. English version is under consideration as there is urgent need of fire safety training also for increasing number of foreigners and immigrants in Finland.

416 THE CAUSE OF BURN ACCIDENTS BY THE USE OF BIO-ETHANOL

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Background Since 2010, commercially available bio-ethanol fuelled burners became increasingly popular in Europe. Unfortunately, the increase in bio-ethanol use resulted in an increase in the number of burn injury victims as a result of accidents with bio-ethanol. In 2010 there were 2 victims of accidents with bio-ethanol requiring admission in a Dutch burn centre, whereas this number rose to 29 victims in 2011. To assess what caused this sudden peak in accidents with bio-ethanol, a qualitative exploring research with an interpretative variant was performed.

Methods First, field research was conducted. Three experts on bio-ethanol (burners) were questioned in order to construct sensitising concepts as a background for framing the interviews. Second, non steering semi-structured interviews were conducted among 14 victims of a bio-ethanol burn accident. Complete transcripts of the recorded interviews were divided by thematic fragments and coded according to the sensitising concepts. All the identical coded fragments were combined.

Results Bio-ethanol was often misused, that is 8 of the 14 participants used the bio-ethanol as an accelerant for lighting up a fire or barbecue instead of using it for bio-ethanol fuelled burners.

All participants had poor knowledge of bio-ethanol use and most participants did not read the conditions of use. Vapour formation in half-full bio-ethanol bottles forms a major risk for an explosion, especially when there is a flame in close proximity when using bio-ethanol. Many of the bio-ethanol bottles were half-full when the accident happened and flames were still in place when using bio-ethanol.

Conclusions Bio-ethanol is cheap and easily obtainable, which creates an image of an innocent product. Instead, bio-ethanol is a product with a high risk of accidents when misused. Our outcomes showed that during accidents with bio-ethanol, there was a lack of knowledge, bio-ethanol was used for the wrong purpose and flames were still in place when using bio-ethanol.

417 INCIDENCE AND EPIDEMIOLOGY OF BURNS TREATED IN THE WELSH CENTRE FOR BURNS

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Background It is important to understand the epidemiology of burns in order to support the development and refinement of preventative measures. We used population based data from the Welsh Centre for Burns and Plastic Surgery (catchment area 2.3 million people) to study trends in the epidemiology of burns.

Methods Anonymised data from the Welsh Burns Centre have been included in the Secure Anonymised Information Linkage (SAIL) databank and linked to a population register. To describe the epidemiology of burns treated at the centre, data were restricted to acute injury assessments/admissions between 01/01/2003 and 31/12/2012 for patients who lived in Wales.

Results During the 10 years, there were 7160 acute injury admissions/assessments. There is an increasing trend in the rates over the decade, increasing from 26.6 per 100,000 population in 2003 to 31.9 in 2012. Rates of burns in the home have increased from 13.2 per 100 K in 2003 to 20.8 in 2012 and more specifically, rates of burns in the kitchen have increased. During 2012, rates of treated burns were highest in males aged 0–4. The 0–4 age group suffer mainly from scalds followed by contact burns; contact burn rates have doubled over the ten years for this group of patients. Over the decade, rates were highest in the most deprived quintiles; however the rates are increasing in the least deprived and a substantial narrowing of the inequality can be seen over time. The distance travelled to Morriston hospital does not appear to be increasing over time and the severity of the burns have not changed over the decade; therefore the increase in the rate of treated burns does not appear to be due to an increasing rate of transfers of more serious burns from other hospitals in Wales.

Conclusions Given increasing incidence and narrowing of inequalities more effective preventive interventions are needed.

Safety management, Strategies and Policies, Traffic safety

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418 RISK ASSESSMENT OF FURNITURE AND PRODUCT LAYOUT USING INJURY BIG DATA

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Background Environmental modification is highlighted as one of the most effective method in child injury prevention, and environmental modification requires analysing and predicting possible injury situations corresponding to not only products themselves but also layout and interaction of them. However, guardians rely not on injury data or children's development data but on their experience and subjectivity now.

Methods We developed a system to analyse injury situations corresponding to layout of products and furniture. First, the developed system creates statistical model of injury by performing natural language parsing for big data on injury situation collected in medical institutions. Then based on both the created statistical model of injury and children's development data, the system predicts possible injury situations in a target layout of products

Results The current system allows a user such as a parent and a designer to easily estimate climbable areas or objects that can be reached by a child. The visualisation of climbable areas and reachable objects informs the user about possible injury situation in a target environmental layout. To demonstrate the validity of the developed system, we compared the actual injury data with the prediction. The detailed data on actual injury and situation information were collected by home visit investigations of four houses, and the simulation succeeded in predicting 13 of 14 actual injuries.

Conclusions In this study, we developed injury analysis and prediction system. The system allows a non-specialist to easily grasp a possible serious injury situation corresponding to a target layout of products and furniture. It is useful for determining the arrangement of products and furniture and the storage place of dangerous objects for injury prevention.

419 HOW TO PREDICT FUTURE IN RISK MANAGEMENT

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Background The goal in risk management is to define threats and to minimise risks in upcoming operations and actions. The problem is that risk management tools are usually based on things that have already happened, and related safety investigations and reports.

Description of the problem Vastly changing operational environment requires the ability to foresee future operations and the

threats related to it. Our flight safety organisation made an observation that the risk management tools generally used could not answer to this demand. With this in mind the Air Force started to develop a systematic risk management tool for pointing out future threats and for planning the actions for minimising the risks.

Results The Finnish Air Force built up a risk management tool in which the experience, knowledge and know-how of our employees are made use of in the best possible way, as the tool gathers their ideas and forms focuses for future flight safety. In our tool the organisational filters are minimised for the safety information to pass the decision holders and the Air Force Commander. This tool enhances safety culture as it makes personnel work with flight safety issues and it also gives them recognition for their efforts. The Finnish Air Force has had good results using this tool. One example is the Finnish Defense Force reform that caused vast changes in our command structure, operations and personnel. With this tool we have been able to reduce the impact of the reform on flight safety.

Conclusions With this risk management tool we can modify our future operations so that most of the threats foreseen will not come true. The tool combines know-how of root level personnel and flight safety organisation still leaving the operational freedom for every level of the organisation. This tool also has a significant influence on safety culture.

420 DEVELOPMENT OF THE SAFETY MANAGEMENT SYSTEM AT ENTERPRISES

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Background Safety management system (SMS) can be considered as a key concept in the success of high level of occupational health and safety in the industrial enterprises. However establishing an SMS may only formally lead to excessive bureaucracy, window coupling and additional costs, especially for small and medium-sized enterprises. The paper concentrates on the analysis of relationships between the key elements in safety management and finding solutions to enhance safety level in different types of the industrial companies.

Methods Safety auditing by the MISHA method was used as the main tool to study the current safety level in the manufacturing companies. Additionally, qualitative data from safety interviews were studied and interpreted. During the study in 2014, 24 safety interviews were conducted in 16 Estonian manufacturing companies. The investigated enterprises were first divided into two groups: OHSAS 18001-certified and OHSAS 18001 non-certified. But the latter proved to have a significant difference in the safety level based on its affiliation: corporated enterprises showed better results in the safety activities than locally owned companies.

Results The study showed that the implementation of OHSAS 18001 will not automatically ensure high safety activities in the company. However, holding an OHSAS 18001 certification creates a basis for the systematic work in the area of safety management, hazards identification and prevention, and promotes strong improvement process put in use. The novelty of the paper lies in the conceptual model of the safety management system, that provides the key elements in formal, real and combined safety using qualitative and quantitative processing of audit results.