ICE MEETING
Deaths due to fire and flames
Denmark 1988-1992

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Purpose

The purpose of this presentation is to demonstrate the usefulness of analyses of the free text area in death certificates to obtain additional information on the external causes of fatal accidents as supplement to the conventional ICD coding. Our Danish experiences could be used as guidance for development of a specific international coding scheme for fatal accidents.

Material

We have retrieved all deaths due to fire and flames (E-codes 890-899) from the Danish Central Death Register from 5 years (1988-1992), i.e. 330 deaths.

The death register is complete and each individual is identified by a PIN-code. All certificates from 1943 and onwards are stored on microfilms. The register is situated in the National Board of Health, Copenhagen. All cases of unexpected death, accidents, suicide or suspicion of crime are subject to a legal inquest. These death certificates contain a description of the accident event in narrative text written by the medical officer and includes results from police investigations. This free text area acts as basis for a supplementary coding using the NOMESCO injury classification for place of occurrence and products involved in the accident process.

Age, sex and incidence rates

Table 1 and figure 1 demonstrate the distribution of number of deceased by age (in 10 year age groups) and sex. The number of deceased is increasing by age until the age of 80 where there is a steep decrease in numbers. Males are dominant with 191 deaths against females with 139 cases (male 58% and female 42%). The age curves for males and females are very similar, with peaks around the age group 40-49 and 80-89.

Table 1. Deaths due to fire and flames by age and sex. Denmark 1988-1992.

	Sex		All
	Male	Female	
Age	N	N	N
00-09	10	6	16
10-19	10	1	11
20-29	20	4	24
30-39	20	5	25
40-49	33	17	50
50-59	16	15	31
60-69	20	16	36
70-79	32	24	56
80-89	26	40	66
90+	4	11	15
All	191	139	330

Table 2 and figure 2 demonstrate the total number of deaths due to fire and flames by each year and the number of deaths per million inhabitants. We had a maximum of deaths in 1992 (14.9 deaths per million) and minimum in 1990 (10.9 deaths per million) and the mean figure for the 5 year period was 12.9 deaths per million inhabitants.

Table 2. Deaths due to fire and flames. Denmark 1988-1992.

	1988	1989	1990	1991	1992	All
Number	66	65	56	66	77	330
Population (mill.)	5,130	5,132	5,140	5,154	5,170	25,726
Per mill. inhab.	12.87	12.67	10.89	12.81	14.89	12.82

Table 3 and figure 3 show the incidence rates calculated as numbers of deceased in 10 year age groups and by the population in 1990.

The incidence rate is below 2 per 100.000 inhabitants below the age of 79. From this age the curve rises steeply and reaches 13.2 per 100.000 inhabitants in the age group 90+.

Table 3. Deaths due to fire and flames. Denmark 1988-1992.

Age	Number	Population 1990	Incidence rate per 100,000 inhab.
00-09	16	558,689	0.6
10-19	11	685,261	0.3
20-29	24	796,234	0.6
30-39	25	740,650	0.7
40-49	50	771,132	1.3
50-59	31	541,001	1.2
60-69	36	486,299	1.5
70-79	56	370,244	3
80-89	66	167,700	7.9
90+	15	22,733	13.2
All years	330	5,139,943	1.3

Nature of injury

The nature of the injuries is described by the diagnoses (N-codes) and demonstrated in table 4. 49% of the deaths were due to burns and 51% was due to carbon monoxide poisonings.

Table 4. Deaths due to fire and flames. Nature of injury. Denmark 1988-1992.

	Burns	CO poisoning	Total
1988	34	32	66
1989	37	28	65
1990	31	25	56
1991	30	36	66
1992	31	46	77
All years	163	167	330
%	49.4	50.6	100

Place of occurrence

The location where the accidents took place is described in table 5 and figure 4. 80% (264) of the cases took place in the home including 42% in living rooms and bedrooms, 11% in kitchens and 27% in unspecified parts of the homes. 10% took place in nursing homes.

Table 5. Deaths due to fire and flames. Denmark 1988-1992.

Place	Number	Percent
Kitchen	37	11
Livingroom/bedroom	138	42
Home unspec.	89	27
Nursing homes	33	10
Other places	33	10
Total	330	100

Products involved in the ignitive process

The products involved in the ignitive process are listed in table 6. The death certificates do not state the origin of the fire in 135 cases (41%). This is mainly due to the fact that the police investigations have not been completed when the death certificate was issued. We do not have the complete police data in the National Board of Health, but they can be obtained by going through the finalized police reports.

The list in table 6 demonstrates a broad spectrum of household products but the most important product is tobacco as burning cigarettes and cigars. In table 7 we have listed the types of furniture, including wheelchairs, ignited by burning cigarettes and cigars. In 54% (35 cases) beds, mattresses and bedding were ignited by burning cigarettes and cigars.

Table 6. Deaths due to fire and flames. Product causing fire. Denmark 1988-1992.

Product	Number	Percent
No product stated	135	41
Gas cooker/gas light	16	5
Candle	24	7
Lighter	9	3
Gas oven	2	1
Woodburning stove	2	1
Matches	5	2
Paraffin stove/paraffin heater	1	0
Television set	2	1
Spirit stove	1	0
Refrigerator	1	0
Open fireplace	1	0
Electric cooker	4	1
Deep-fat-frier	6	2
Primus stove	1	0
Straw (open fire)	5	2
Petrol	2	1
Hot-air fan	2	1
Toaster	2	1
Clip lamp	1	0
Diesel oil	1	0
Electric heater	1	0
Smoking tobacco	106	32
Total	330	100

Table 7. Deaths due to fire and flames. Furniture ignited while smoking. Denmark 1988-1992.

Furniture	Number
Chair	9
Upholstered chair	7
Sofa	8
Bed	22
Mattress	4
Bedding	9
Wheel chair	6
Total	65

Influencing factors

By reading the narrative text on the death certificates we became aware of factors probably influencing the course of the accident process. We have isolated 6 important influencing factors (diseases, medicaments, drugs, intoxication, smoking and senility) and the content of each factor is described as:

1. Disease: The deceased suffered a disease which probably influenced his/hers reaction in the situation.
2. Medicaments: It is reasonable to assume that the deceased was under influence of medicaments as neuroleptica, sedatives etc.
3. Drugs: It is reasonable to assume that the deceased was under influence of narcotic drugs.
4. Intoxication: It is reasonable to assume that the deceased was under the influence of alcohol.
5. Smoking: It is reasonable to assume that the fire was ignited by cigarettes/cigars.
6. Senility: Deceased characterized as senile, dement or arteriosclerotic.

Table 8 demonstrates the numbers of these 6 influencing factors. 156 (47%) of the deceased suffered from diseases that probably reduced the victims ability to react in the dangerous situation, and 105 victims were probably under the influence of alcohol with similar consequences. 81 cases without information on influencing factors (24,5%)

Table 8. Deaths due to fire and flames. Denmark 1988-1992.

Influencing factors	Numbers	%
Diseases	156	47
Medicaments	42	13
Drugs	2	1
Intoxication	105	32
Smoking	106	32
Senility	31	9
All cases	330	100

These two factors (diseases and intoxication) are very important as information in the planning of injury control. I am aware of the lack of consistency in these types of influencing factors and present them for discussion.

Diseases, medicaments (pharmaceuticals), drugs, and intoxication are conditions influencing the victims pattern of reaction, while smoking is a different category, a habit.

In a study of drownings (Denmark 1980-85) we made an analysis of death certificates which revealed the following similar list of influencing factors:

Intoxication 31%
Diseases 19%
Senility 1%

The problem of categorizing these obvious important factors is expected to be universal. The value of the information from our death certificates could be enhanced by using a standardized "classification" of these influencing factors.

Our new database on fatal injuries

There is an intensive use of our death register database. The basic information in the base is the E-codes, but most of the questions raised can not be answered by the E-codes. Consequently we decided to recode all fatal accidents. We retrieved all death certificates from 5 years, read the text and recoded them (place of occurrence at 2 digit level, mechanism of injury, activity, and product codes) using the NOMESCO injury classification and included a summary of the accident event in text. Due to the huge public interest in fatalities in childhood we have extended the database with fatal accidents in childhood (0-14 years) for an additional 5 years.

Recommendations

In my opinion it would be very valuable to develop a necessary addendum to the WHO death certification containing the most supplementary information in case of fatal accidents. By obvious reasons for optional use. It would enhance our knowledge of the external causes of fatal accidents and facilitate international comparisons. The existence of an international (WHO?) addendum to the death certificate could be a valuable support in national negotiations on expansion of the data in death certificates needed for injury control.

Conclusions

* Fire and flames are one of the important external causes of fatal injuries.
* Death certificates are the most important source of information.
* We want to enhance the information from death certificates by questions on specific location, products involved, and influencing factors.
* I propose the development of a specific WHO death certificate for fatal injuries and for optional use.

We have all data on a diskette including the free text in an abbreviated form (due to lack of resources for translation). The diskette is available on request for further analyses.