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Alcohol-induced morbidity and mortality by occupation: a population-based follow-up study of working Finns

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Background: To justify alcohol-related health promotion programs and target them at the correct workplaces, it is important to identify occupations with increased risk of severe health outcomes caused by alcohol. **Methods:** Data on hospital admissions (854 555 men and 801 653 women) from the Finnish health care register and data on deaths from Statistics Finland from 1 January 2001 to 31 December 2004 were merged with information from the 2000 population census. We assessed the age- and education-adjusted relationship between occupation and the sum of hospitalizations and death primarily caused by alcohol, using Cox proportional hazards regression. We also estimated the fraction of incidence of severe alcohol-induced health outcomes that are attributable to factors related to one's occupation (population attributable fraction). **Results:** Most of the cases were men (80%), middle-aged and usually had no more than a secondary level of education. When the reference was professionals, who were at the lowest risk, those at increased risk were mostly manual workers in craft work, construction and service. However, we also found several non-manual occupations at a high risk. According to population attributable fraction, the proportion of severe alcohol-induced health outcomes would have been 31% lower among men and 20% lower among women if all occupational groups had been at the same risk as professionals. **Conclusions:** We detected considerable occupational differences in alcohol-induced morbidity and mortality among a nationally representative working population. This indicates a need for alcohol-focused health promotion programs in these high-risk occupations.

Introduction

According to the report by the World Health Organization, alcohol misuse is a great risk factor worldwide for impaired health and premature death among 25–59-year olds; a group that constitutes the majority of the working-age population.[1] Alcohol-induced morbidity is also a major determinant of sickness absence[2–4] and premature retirement in the Nordic countries.[5,6]

The question of a possible relationship existing between alcohol disorders and work characteristics indicated by occupation has

inspired researchers for a long time,[7] but fresh nationally representative studies are scarce. A large household study in the USA suggested that the occurrence of alcohol dependence- and alcohol abuse disorder was especially high in construction and transportation industries.[7] Several surveys based on national data in England and Wales have consistently found that those with access to alcohol at work, such as publicans and bar staff, are more likely to die from alcohol-related causes than the population as a whole.[8,9] According to a Swedish register-based study investigating occupational differences in alcohol-related hospital admissions and deaths, occupations at an elevated risk were mainly manual; non-manual occupations were at a low risk.[10] Women had increased risk often in male-dominated high-risk occupations such as attendants in psychiatric care, drivers, toolmakers, machinery fitters, building caretakers and cooks.

To provide efficient and economical health promotion programs for the industries that need them most, it is important to identify the occupations with the highest probability of adverse consequences from alcohol. To obtain an overview of occupational differences in severe alcohol-induced health outcomes, we conducted a 4-year follow-up of alcohol-induced hospitalizations and deaths in a cohort with good national coverage. We took also education into account as a considerable part of occupational differences may reflect more general socioeconomic differences.

Methods

The study base was the Finnish Census Data File compiled by Statistics Finland. The data comprised employed people who were aged 20–64 years in 2000 and who had an occupation code. To protect confidentiality, as required by Statistics Finland, we obtained a 90%, rather than 100%, systematic random sample of the data for analysis.

To obtain figures on alcohol-induced morbidity and mortality, we used data on alcohol-related hospitalization from the Finnish Health Care Register and on alcohol-related deaths from the Statistics Finland register on causes of death, from 1 January 2001 to 31 December 2004. The National Institute for Health and Welfare gathers discharge records from all hospitals in Finland. These data were merged with information from Statistics Finland on the 2000 population census, using the participants' unique personal identification codes. The data were given without identification codes to the Finnish Institute of Occupational Health for research purposes.

Measurement

The diagnoses were coded according to the 10th revision of the International Classification of Diseases.[11] The outcome variable was defined as the number of patients who had been hospitalized or who had died with an alcohol-induced disease or disorder as the underlying cause of death or primary diagnosis in the hospital.

The causes of death due to alcohol-induced diseases or accidental poisoning by alcohol were as follows: mental and behavioural disorders due to use of alcohol (F10), degeneration of nervous system due to alcohol (G31.2), alcohol-induced epileptic seizure (G4051), alcoholic polyneuropathy (G62.1), alcoholic myopathy (G72.1), alcoholic cardiomyopathy (I42.6), alcoholic gastritis (K29.2), alcoholic liver disease (K70.0), alcohol-induced pancreatitis (K86.0) and accidental alcohol intoxication (X45).

For hospitalizations, the following were included in addition: care of mother because of alcohol-induced danger to foetus or newborn (O354, P043), finding of alcohol in the blood (R78.0), toxic effect of alcohol (T51), alcohol rehabilitation (Z50.2), alcohol abuse counselling and surveillance (Z71.4) and problematic alcohol use (Z72.1).

Classification of occupation

Occupation was classified according to the Finnish version of the International Standard Classification of Occupations 2001 (ISCO-88 COM).[12] The structure of the classification is defined by skill, which has two dimensions: skill level and skill specialization. Skill level describes the complexity and range of the tasks and duties involved, and skill specialization the field of knowledge required, the tools and machinery used, the materials worked on or with, as well as the kinds of goods and services produced. Occupations are classified into ten major groups, which are related to four educational levels. Professionals represent the highest level of education and elementary occupations the lowest level. We obtained the occupation labels from Statistics Finland at a four-digit level.

Other variables

Age in 2000 was classified into nine 5-year categories. Education was classified into three levels according to the highest qualification achieved, to basic, middle and high, corresponding to about $\leq$9, 10–12 and >12 years of education.

Statistical analyses

Associations between occupations and alcohol-induced morbidity and mortality were assessed using the Cox proportional-hazards models. For each participant, the follow-up was from 1 January 2001 to an alcohol-induced hospital admission, death or 31 December 2004, whichever came first. Those who died without an alcohol-related diagnosis during follow-up were treated as censored cases. The proportionality assumption was checked by visual inspection of the log cumulative hazard functions. To examine the relationship between occupation and alcohol-induced health outcomes, we calculated age- and education-adjusted hazard ratios (HR) and 95% confidence intervals (95% CIs) for occupational groups, first at a one-digit level and thereafter more closely at a three-digit level (108 labels), supplementing the results from the four-digit level when an increased risk was not visible at the 3-digit level. Professionals (ISCO-class 2) comprised the reference group (19 labels at three-digit level) in all analyses, as they were at a low risk of hospitalization or death due to alcohol. We presented results of those occupations that had over five observed or expected cases at increased risk. The models were assessed for men and women separately.

A piecewise constant hazards model was used to assess the population attributable fraction (PAF) in alcohol-related morbidity and mortality associated with occupation, for men and women separately. The reference group for PAF comprised professionals (labels at a one-digit level). Age and education were adjusted for, and two-sided 95% CIs of PAF were estimated using the delta method. Cox analyses were performed using the PHREG and TPHREG procedures in the SAS statistical program package (SAS Institute, Cary, NC, version 9.4), and the SAS macro, developed by Laaksonen,[13] was used to calculate the PAF estimates.

Results

Table 1 presents the distribution of the whole sample and the HRs for alcohol-induced health outcomes by age and education. There were 9243 cases (7421 males, 1822 females), of which 1073 (11.6%) were alcohol-related deaths. Most of the alcohol-related cases were 40–59 years old (70.3% of men, 85.9% of women) and usually had no more than a secondary level of education (81.6% of men, 73.7% of women). Men and women with basic education were at a 2.4-fold and 2.3-fold risk of severe alcohol-induced health outcomes, respectively, compared to people with high education.

Table 2 presents HRs for the major (one-digit level) occupational groups adjusted for age, and for age and education. Although the difference between professionals and other occupational groups in

Table 1 Severe alcohol-induced health outcomes by age and basic education

	Men				Women			
	sample	Cases	HR	95% CI	sample	Cases	HR	95% CI
Total	854 555	7421			801 653	1822		
Age (years)								
20–24	66 734	186	1.0		58 093	39	1.0	
25–29	93 026	292	1.1	0.9–1.4	75 238	47	0.9	0.6–1.4
30–34	111 812	607	1.9	1.7–2.3	94 167	126	2.0	1.4–2.9
35–39	123 086	954	2.8	2.4–3.3	111 169	201	2.7	1.9–3.8
40–44	121 690	1404	4.2	3.6–4.8	117 856	356	4.5	3.2–6.3
45–49	122 177	1634	4.8	4.2–5.6	124 002	423	5.1	3.7–7.1
50–54	124 059	1491	4.3	3.7–5.1	126 964	394	4.6	3.3–6.4
55–59	68 783	688	3.6	3.1–4.3	72 587	191	3.9	2.8–5.6
60–64	23 188	165	2.6	2.1–3.2	21 577	45	3.1	2.0–4.8
Education (years)								
>12 (high level)	264 204	1362	1.0		317 299	480	1.0	
10–12 (secondary)	391 317	3480	2.0	1.8–2.1	327 742	724	1.5	1.3–1.7
0–9 (basic)	199 034	2579	2.4	2.3–2.6	156 612	618	2.3	2.1–2.6

Cox regression, HRs and 95% CIs, HRs for personal education adjusted for age.

Table 2 Severe alcohol-related health outcomes by major occupational groups (one-digit level)

ISCO-88 (COM)[a]	Sample	Cases	Adjusted for age		Adjusted for age and education	
			HR	95% CI	HR	95% CI
Men						
Professionals (2)	129 174	626	1.0		1.0	
Legislators, senior officials, managers (1)	39 906	174	0.8	0.7–0.9	0.8	0.6–0.9
Technicians and associate professionals (3)	147 772	1001	1.4	1.2–1.5	1.2	1.1–1.3
Clerks (4)	30 171	248	1.9	1.6–2.2	1.4	1.2–1.7
Service workers and shop and market sales workers (5)	60 926	519	2.1	1.9–2.4	1.6	1.4–1.8
Skilled agricultural and fishery workers (6)	50 080	537	2.0	1.8–2.2	1.4	1.3–1.6
Craft and related trade workers (7)	187 477	2218	2.5	2.3–2.7	1.8	1.6–2.0
Plant and machine operators and assemblers (8)	142 483	1343	2.1	1.9–2.3	1.4	1.3–1.6
Elementary occupations (9)	58 297	723	2.9	2.6–3.2	2.0	1.8–2.3
Armed forces (0)	8269	32	0.9	0.7–1.3	0.9	0.6–1.2
Women						
Professionals (2)	131 138	192	1.0		1.0	
Legislators, senior officials, managers (1)	18 461	32	1.1	0.7–1.5	1.0	0.7–1.5
Technicians and associate professionals (3)	163 017	309	1.3	1.1–1.5	1.1	0.9–1.4
Clerks (4)	111 019	250	1.5	1.2–1.8	1.2	1.0–1.5
Service workers and shop and market sales workers (5)	205 143	452	1.6	1.3–1.9	1.2	1.0–1.5
Skilled agricultural and fishery workers (6)	28 270	81	1.8	1.4–2.3	1.3	1.0–1.8
Craft and related trade workers (7)	19 266	62	2.2	1.7–2.9	1.6	1.2–2.2
Plant and machine operators and assemblers (8)	41 502	114	1.9	1.5–2.4	1.3	1.0–1.7
Elementary occupations (9)	83 584	329	2.6	2.2–3.1	1.8	1.5–2.3
Armed forces (0)	253	1	-	-	-	-

Cox regression, HRs and 95% CIs.
a: The International Standard Classification of Occupations.

alcohol-induced outcomes generally decreased when education was adjusted for in addition to age, several associations retained. The highest HRs were found among elementary occupational groups (men HR: 2.0; 95% CI: 1.8–2.3; women HR: 1.8; 95% CI: 1.5–2.3) and among craft and related trade workers (men 1.8; 1.6–2.0, women 1.6; 1.2–2.2).

The results regarding occupations on the 3–4 digit levels, adjusted for age and for age and education are presented in table 3 for men and in table 4 for women. Below we only refer to HRs adjusted for both age and education, as these are the differences that go beyond general social class differences. Compared with professionals, among male technicians and associate professionals (ISCO-class 3), HRs were high in some small occupation groups, such as life science technicians (3.1), artistic, entertainment and sports associate professionals (2.0) and social work associate professionals (1.9). The HRs were from 1.7 to 1.8 among optical and electronic equipment operators (5.0 among women), trade brokers, estate agents and property managers, administrative associate professionals and police inspectors and detectives. Further within this category in men, two large occupation groups at increased risk were finance and sales associate professionals (1.5) and civil engineering technicians (1.4). Female artistic, entertainment and sports associate professionals (2.9), employment agents and labour contractors (2.3) and life science technicians and associate professionals (1.8) had also high HRs. Both genders had increased risk among customer information clerks (men 1.8, women 1.7) and other office clerks (men 1.8, women 1.6), which were large occupation groups among women but small among men (ISCO-class 4).

Both men and women had increased HRs among service and care occupations (ISCO-class 5): home care assistants and personal care workers (men 3.5, women 1.7), waiters and bartenders (men 3.0, women 1.9), practical nurses (men 2.4, women 1.3), housekeepers

Table 3 Increased risk for severe alcohol-related outcomes by occupation among men

ISCO-88 (COM)[a]	Occupation	Population	Cases	HR[b]	HR[c]	95% CI
2	Professionals (reference)	129 174	626	1.0	1.0	
3112	Civil engineering technicians	15 958	127	1.5	1.4	1.1–1.6
313	Optical and electronic equipment operators	2107	24	2.4	1.9	1.2–2.8
3211	Life science technicians	1502	30	3.9	3.1	2.1–4.4
3413	Estate agents and property managers	3641	38	1.9	1.7	1.2–2.4
3419	Finance and sales associate professionals not elsewhere classified	15 768	148	1.8	1.5	1.2–1.8
3421	Trade brokers	2774	32	2.1	1.8	1.2–2.5
343	Administrative associate professionals	4097	37	1.9	1.7	1.2–2.4
345	Police inspectors and detectives	2343	23	1.6	1.7	1.1–2.6
346	Social work associate professionals	1817	19	2.4	1.9	1.2–3.1
347	Artistic, entertainment and sports associate professionals	3708	39	2.6	2.0	1.4–2.8
4131	Stock clerks	4345	46	2.1	1.6	1.2–2.1
414	Library, mail and related clerks	8174	87	2.2	1.6	1.2–2.0
419	Other office clerks	5630	42	2.2	1.8	1.3–2.4
422	Customer information clerks	1671	13	2.3	1.8	1.0–3.1
5121	Housekeepers and related supervisors	4750	66	3.0	2.3	1.8–3.0
5122	Cooks	3657	29	2.5	1.9	1.3–2.7
5123	Waiters and bartenders	5097	65	4.0	3.0	2.3–3.9
5131	Child-care workers	572	6	3.3	2.5	1.1–5.7
5132	Practical nurses	4470	59	3.0	2.4	1.8–3.1
5133	Home care assistants, personal care workers	2610	56	4.6	3.5	2.7–4.6
514	Other personal services workers	1969	20	2.1	1.7	1.1–2.6
6123	Farmer's locums	1753	29	3.7	2.7	1.9–4.0
614	Forestry and related workers	4511	76	3.0	2.1	1.6–2.7
615	Fishery workers, hunters and trappers	1030	16	3.0	2.2	1.3–3.6
711	Miners, shot firers, stone cutters and carvers	1579	22	2.8	2.0	1.3–3.1
7121	Construction workers	10 019	203	4.7	3.5	3.0–4.2
7122	Bricklayers and stonemasons	1796	26	2.9	2.1	1.4–3.2
7124	Carpenters and joiners	20 597	254	2.4	1.8	1.6–2.2
713	Building finishers	23 621	306	2.7	2.0	1.8–2.4
714	Painters and building structure cleaners	7055	101	3.0	2.2	1.7–2.7
721	Metal moulders, welders, sheet-metal workers	20 919	309	3.0	2.3	2.0–2.6
722	Blacksmiths, tool-makers and related trade workers	20 143	243	2.6	2.0	1.7–2.3
723	Machinery mechanics and fitters	38 181	339	1.9	1.4	1.2–1.6
724	Electrical and electronic equipment mechanics and fitters	21 609	176	1.8	1.3	1.1–1.6
731	Precision workers in metal and related materials	2590	24	1.9	1.5	1.0–2.3
741	Food processing and related trade workers	2766	31	2.5	1.8	1.3–2.6
742	Wood treaters, cabinet-makers and related trade workers	9488	100	2.3	1.7	1.4–2.1
743	Textile, garment and related trade workers	1298	14	2.3	1.7	1.0–2.8
744	Pelt, leather and shoemaking workers	562	13	4.7	3.3	1.9–5.8
811	Mining and mineral-processing-plant operators	798	9	2.3	1.6	0.8–3.1
812	Metal-processing plant operators	3932	31	1.7	1.2	0.8–1.8
814	Wood-processing- and papermaking-plant operators	14 000	167	2.5	1.8	1.5–2.2
815	Chemical-processing-plant operators	5145	39	1.7	1.2	0.9–1.7
8163	Incinerator, water-treatment and related plant operators	579	10	3.1	2.4	1.3–4.4
821	Metal- and mineral-products machine operators	5532	49	2.1	1.5	1.1–2.0
8232	Plastic-products machine operators	4626	36	1.9	1.4	1.0–2.0
824	Wood-products machine operators	2050	29	3.2	2.3	1.6–3.4
825	Printing-, binding- and paper-products machine operators	5984	50	1.9	1.3	1.0–1.8
8264	Bleaching-, dyeing- and cleaning-machine operators	612	7	2.7	2.0	1.0–4.3
827	Food and tobacco products machine operators	6261	20	1.8	1.7	1.0–2.7
828	Assemblers	12 908	111	2.4	1.8	1.4–2.2
832	Motor vehicle drivers	53 822	512	2.0	1.4	1.2–1.6
833	Agricultural and other mobile plant operators	16 066	158	2.0	1.4	1.2–1.7
834	Ships' deck crews and related workers	1177	21	3.4	2.5	1.6–3.8
913	Domestic and related helpers, cleaners	6516	81	3.5	2.6	2.0–3.2
914	Building caretakers and window and related cleaners	14 373	204	2.8	2.0	1.8–2.4
915	Messengers, porters, doorkeepers and related workers	3470	34	2.5	1.9	1.3–2.6
916	Garbage collectors and related labourers	458	6	2.5	1.8	0.8–4.0
931	Mining and construction labourers	7667	149	4.4	3.0	2.5–3.6
932	Manufacturing labourers	4447	53	2.8	2.0	1.5–2.7
933	Transport labourers and freight handlers	20 887	193	2.3	3.3	2.7–4.2

a: The International Standard Classification of Occupations.
b: Cox regression, HRs adjusted for age. HRs are statistically significant.
c: Cox regression, HRs and 95% CIs adjusted for age and education.

and related supervisors (men 2.3, women 1.7) and cooks (men 1.9, women 1.6). Male child-care workers also had high HRs (2.5).

Among agricultural and fishery workers (ISCO-class 6), farmer's locums had high HRs (men 2.7, women 3.4). Male fishery workers and hunters and trappers (2.2) also had high HRs, as did male forestry and related workers (2.1).

Most of the occupations in which men were at an increased risk were craft workers (ISCO-class 7). There were several large occupation groups with high HRs, such as construction workers (3.5), metal moulders, welders and sheet-metal workers (2.3), building finishers (2.0) and blacksmiths and tool makers (2.0). Large groups with HRs from 1.3 to 1.8 were also observed, such

Table 4 Increased risk for severe alcohol-related outcomes by occupation among women

ISCO-88 (COM)[a]	Occupation	Population	Cases	HR[b]	HR[c]	95% CI
2	Professionals (reference)	131 138	192	1.0	1.0	
313	Optical and electronic equipment operators	937	8	6.5	5.0	2.5–10.3
321	Life science technicians and associate professionals	5872	18	2.1	1.8	1.1–2.9
3423	Employment agents and labour contractors	1857	7	2.4	2.3	1.1–4.8
343	Administrative associate professionals	33 103	70	1.3	1.2	0.9–1.6
347	Artistic, entertainment and sports associate professionals	2684	10	3.5	2.9	1.5–5.5
4112	Word-processor and related operators	1809	8	2.8	2.2	1.1–4.6
4133	Rail traffic controllers and other transport clerks	3130	11	2.5	2.0	1.1–3.7
414	Library, mail and related clerks	7919	20	1.6	1.3	0.8–2.0
419	Other office clerks	20 977	59	2.0	1.6	1.2–2.2
422	Customer information clerks	11 539	33	2.0	1.7	1.1–2.4
5121	Housekeepers and related supervisors	1711	37	2.1	1.7	1.2–2.5
5122	Cooks	11 664	32	1.9	1.6	1.1–2.3
5123	Waitresses and bartenders	16 060	44	2.5	1.9	1.4–2.7
5132	Practical nurses	36 580	85	1.5	1.3	1.0–1.8
5133	Home care assistants, personal care workers	25 730	84	2.1	1.7	1.3–2.3
6123	Farmer's locums	2118	13	4.3	3.4	1.9–6.0
724	Electrical and electronic equipment mechanics and fitters	2021	11	4.0	3.1	1.7–5.7
731	Precision workers in metal and related materials	863	6	4.9	3.7	1.7–8.5
734	Craft printing and related trades workers	2200	7	2.2	1.6	0.8–3.5
742	Wood treaters, cabinet-makers and related trade workers	1331	7	3.4	2.5	1.2–5.3
822	Chemical-products machine operators	1241	7	4.1	2.9	1.4–6.3
827	Food and tobacco products machine operators	6261	20	2.4	1.7	1.0–2.7
9132	Hospital, domestic and kitchen helpers, cleaners	65 032	269	2.7	2.0	1.6–2.5
933	Transport labourers and freight handlers	5876	21	2.7	1.9	1.2–3.0

a: The International Standard Classification of Occupations.
b: Cox regression, HRs adjusted for age. HRs are statistically significant.
c: Cox regression, HRs and 95% CIs adjusted for age and education.

as carpenters and joiners, other wood treaters, machinery mechanics and fitters and electrical and electronic equipment mechanics and fitters. Smaller occupation groups with high HRs were pelt, leather and shoemaking workers (3.3) building structure cleaners (2.2) bricklayers and stonemasons (2.1) and food processing workers (1.8). Women within ISCO-class 7 with high HRs were small groups: precision workers in metal and related materials (3.7), electrical and electronic equipment mechanics and fitters (3.1) and wood treaters, cabinet makers and related trade workers (2.5).

Men among plant and machine operators and assemblers (ISCO-class 8) had HRs from 1.4 to 1.8 in the following large occupation groups: wood-processing- and papermaking-plant operators, assemblers, motor vehicle drivers and agricultural and other mobile plant operators. Small occupation groups with high HRs were ships' deck crew workers and related workers (2.5); incinerator, water-treatment and related plant operators (2.4) and wood-product machine operators (2.3). Women had high HRs in such small occupation groups as chemical-product machine operators (2.9) and food or tobacco product machine operators (1.7).

Men had high HRs in some large elementary occupation groups (ISCO-class 9) such as transport labourers and freight handlers (3.3), and building caretakers and window cleaners (2.0). HRs were especially high in two small occupation groups: mining and construction labourers (3.0) and transport labourers and freight handlers (3.3). Women had high HRs in such common occupations as hospital workers, domestic and kitchen helpers and cleaners (2.0). Transport labourers and freight handlers' HR was 1.9.

According to the PAF estimates, approximately 31% (95% CI: 25–36%) of the male and 20% (95% CI: 7–31%) of the female cases related to severe alcohol-induced health outcomes observed in this data were attributable to factors related to one's occupation. This means that if all other occupational groups had been at the same risk as professionals, severe alcohol-induced health outcomes would have been 31% lower among men and 20% lower among women. As age and education were adjusted for, these proportions describe the impact of occupation independent of the effects of age and education.

Discussion

In this register-based follow-up study, we found increased risks of alcohol-induced morbidity and mortality mainly among manual workers, but also in some non-manual occupations, allowing for age and education. Men, those with a low level of education and aged 45–59 years comprised most of the cases. Excluding the impacts of age and education, severe alcohol-induced health outcomes would have been 31% lower among men and 20% lower among women if all occupational groups had been at the same risk as professionals, according to PAF estimates.

Men in construction, craft work, services and some elementary occupations were generally at the highest risk of alcohol-induced outcomes. Many of the risky occupations we found have been presented earlier for both genders; for example, artistic and entertainment professionals, clerks, assistant nurses, home helpers, farm workers, waiters and bartenders, cooks, personal care workers and cleaners and among men also construction workers, sailors, miners, drivers, mobile plant operators, bricklayers, carpenters, painters, sheet-metal workers, toolmakers, welders, wood treaters and food processing workers.[7,9,14] Civil engineering technicians and finance and sales associate professionals formed large non-manual occupation groups among which males were at an increased risk.

Drinking per se, and high-volume drinking especially, is usually more prevalent among men than among women.[15] Our results are in accordance to this, most cases of alcohol-induced morbidity and mortality being observed in men. Alcohol-related mortality is also found to be more common among people with lower socioeconomic status, indicated by education, occupation, employment status or income,[16] although the magnitude of the inequalities varies much between countries.[17] People with low socioeconomic status drink larger quantities at a time,[18] and they may be more vulnerable to the adverse consequences of alcohol consumption than more advantaged people.[19,20] In our results, this same pattern is repeated, and these educational differences explained a part, but not all, of the occupational differences.

The current data did not allow us to study the causes of occupational differences (apart from the impact of education), but some speculative explanations of possible mechanisms of the associations can be offered on the basis of the literature. On the basis of the previous studies, we have reason to assume that certain occupations attract people who drink a great deal of alcohol (self-selection mechanism) or have working conditions that in one way or another promote excessive alcohol drinking (causal mechanism). Stable and newly recruited employees in the same occupations seem to have very similar relative risks, which can partly be explained by the selective recruitment of heavy drinkers.[10] Workplace normative context seems to have an important effect on alcohol consumption.[21,22] Both workplace injunctive and descriptive norms were important predictors of substance use in the US workforce.[22] The specific tasks[23] or a subculture[24] of a workplace may also play a significant role, as well as hazardous physical working conditions.[25] According to a review, mental or physical stress at work was associated with excessive alcohol drinking.[26]

Strengths and limitations

Our study has certain strengths. The sample was highly representative of the occupationally active Finns. The data included all hospitalizations and deaths primarily caused by alcohol consumption in a 4-year follow-up. Hence, we could prospectively observe how the workers' occupations predicted hospitalization or death due to alcohol-specific reasons. The detection of deaths was reliable because of the high quality and nationwide coverage of data collection in Finland. Further, it is estimated that the Finnish Health Care Register covers about 95% of all discharges from hospitals, and the accuracy of most of the main items has been evaluated as high in comparison to patients' hospital records.[27,28] We used Cox proportional hazards regression to compare workers' risks in different occupational groups to those in occupations in which the risk of severe alcohol-induced health outcomes was the smallest, instead of the mean prevalence. Therefore, our analyses showed increased hazards for a larger scope of occupations than in previous studies. In addition, we could take into account the participants' education as a possible confounding factor. Thus our results underline the impact of occupation and related factors other than education.

We were not able to assess the contribution of specific occupational exposures or other possible mediating factors linked with occupation to the variation in the risk of alcohol-induced outcomes. Another limitation of this study was that the data did not include people who were unemployed at baseline, because their occupational titles were not available in our data. People suffering from severe alcohol-related consequences have higher rates of unemployment,[29,30] therefore it is likely that the HRs reported here rather underestimate than overestimate the true HRs. However, according to a previous study, only waitresses who were employed were at an elevated risk of alcohol disorders,[7] which suggests that current employment in some occupations and unemployment in others may be linked to alcohol morbidity.

Conclusion

The ranking of occupations according to an increased risk of severe alcohol-induced health outcomes reveals the high-risk occupations that would most likely profit from prevention programs aimed at decreasing heavy alcohol consumption. In Finland, particular attention should be paid at least to construction workers, transport labourers, mining labourers, waiters and bartenders, home care assistants, life science technicians, optical and electronic equipment operators and farmer's locums.

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Key points

- Identification of occupations with high morbidity and mortality caused by alcohol is important to target new health promotion programs at the right workplaces.
- The alcohol-induced morbidity and mortality of different occupations varied greatly among both genders.
- Severe alcohol-induced health outcomes would have been 31% lower among men and 20% lower among women if all occupational groups had been at the same risk as professionals.

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Addressing the challenges of chronic viral infections and addiction in prisons: the PRODEPIST study

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Objectives: In 2010 only 30.9%, of the Puy-de-Dome prison detainees were screened for human immunodeficiency virus (HIV), hepatitis C virus (HCV) and hepatitis B virus (HBV). Our goal was then to promote these assesments, as well as to identify addictive behaviour using FAGERSTROM, Cannabis Abuse Screening Test and CAGE tests, diagnose fibrosis by means of Fibrometer or Fibroscan in hepatic virus carriers and heavy drinkers, and perform HBV vaccinations. **Setting**: This prospective study of adult detainees in the prisons of Puy-de-Dome, France, took place from June 2012 to December 2013. **Results**: Of the 702 incarcerated individuals, 396(56.4%) were screened and 357(50.9%) enrolled. HIV prevalence was 0.3%, HCV 4.7% and HBV 0.6%. While 234/294(79.6%) smokers and 115/145(79.3%) cannabis users were screened for dependence, excessive alcohol consumption was tested for in 91/179(50.8%) cases. Fibrosis was screened for in 75/80(93.7%) individuals selected with 16.0% presenting with moderate to severe fibrosis, 4/9(44.4%) HCV carriers and 8/65(12.3%) excessive alcohol consumers. HBV vaccination was given to 81/149(54.4%) individuals with no serological markers. A total of nine HIV tests were conducted at the 57 discharge consultations, involving 215 detainees being released, all of which were negative. **Conclusion**: The promotion of these evaluations proved beneficial, although viral screening could be achieved for only approaching half of the detainees, as could alcohol consumption assessment and HBV vaccination for those concerned. Fibrosis screening revealed lesions in HCV carriers yet also in heavy drinkers, who are typically less likely to be assessed. Consultations and HIV screening on release were found to be rarely possible.

Introduction

In France, each detention establishment is connected to a hospital and patient care is provided by three structures: (i) medical units (MUs), where medical examinations of detainees take place, offering management concerning sexually transmitted infections (STIs) jointly with free anonymous screening centres; (ii) regional psychological services; (iii) drug and alcohol addiction treatment centres and prevention services (CSAPA: *Centre de Soins, d'Accompagnement et de Prévention en Addictologie*).[1]