ORIGINAL ARTICLE

Work factors as predictors of sickness absence attributed to airway infections; a three month prospective study of nurses' aides

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Aims: To identify the work factors that are related to sickness absence attributed to airway infections (AAI) in nurses' aides.

Methods: The sample comprised 5563 Norwegian nurses' aides, not on sick leave when they completed a mailed questionnaire in 1999. Of these, 4931 (88.6%) completed a second questionnaire three months later. The outcome measure was the three month incidence proportion of certified AAI (>3 days), assessed by self reports at follow up.

Results: Working in a paediatric ward (odds ratio (OR) 2.42; 95% confidence interval (CI) 1.39 to 4.21), perceived lack of encouraging and supportive culture in the work unit (OR 1.78; 95% CI 1.21 to 2.61), and reporting medium (OR 1.52; 95% CI 1.09 to 2.12), and high levels (OR 1.60; 95% CI 1.13 to 2.26) of role conflicts at work were associated with an increased risk of AAI, after adjustments for baseline health complaints, demographic and familial factors, smoking, and a series of physical, psychological, and organisational work factors. The individual level factors male gender, smoking 10 cigarettes per day or more, having widespread pain, having had an accident related neck injury, and having long term health problems also predicted AAI.

Conclusions: In nurses' aides, sickness absence attributed to airway infections seems to be related to the type of ward in which the aides are working, and to psychological and social work factors. Declaring airway infections as occupational diseases would have important consequences for the social security system.

S ickness absence represents a major problem in Western societies.[1] Airway infection is the main cause of many absence spells, and probably the most frequently stated cause of certified sick leave.[2][3]

The relation between work factors and the occurrence of sickness absence has been explored in many studies.[4–17] However, while all-cause sickness absence[4–11] and sickness absence attributed to musculoskeletal pain,[12][13] psychiatric disorders,[14][15] and chronic or unspecified respiratory diseases[16][17] have been addressed in a number of studies, there seems to be no report in the international literature of the relation between work factors and sickness absence attributed to airway infections (hereafter referred to as AAI).

The aetiology of AAI is complex. The causes of a symptomatic infection may be numerous.[18–20] Work factors may contribute to airway infections, as people may be exposed to pathogenic microbes at work,[20] and because psychological work stress may reduce people's immunological defence against microbes.[21] When a person has contracted an infection, the decision to be absent from work may be influenced by a series of factors, such as perception and appraisal of symptoms, concurrent health problems, and work demands factors. Psychological factors, such as perceptual style and mood, may influence the perceptions and the cognitive appraisals in the decision process leading to sickness absence.

The objective of this study was to identify work factors that are related to AAI in nurses' aides. If exposure to pathogenic microbes at work contributes to airway infections, one would expect higher rates of AAI in subjects who are in frequent contact with infectious patients. If psychological and physical stress at work contribute to infections or influence the decision to be absent from work in case of infection, one would expect work stressors to be predictors of AAI. Lack of incentives at work could reduce the general motivation for work, and may, hence, also be associated with the risk of AAI.

METHODS

Subjects

Assistive nursing personnel in Norway include a large group of certified nurses' aides and a smaller group of unlicensed nurses' aides, who have no formal training and often hold temporary jobs. The nurses' aides are the main providers of practical patient care in the Norwegian health services, and are doing both emotional and heavy physical work. They perform activities such as helping patients wash themselves, assisting patients during meals, bringing and emptying bedpans, making beds, and providing emotional support.

The number of vocationally active nurses' aides in Norway was estimated as approximately 55 000 in 1999 (Norwegian Union of Health and Social Workers, personal communication). About 50 000 of these, mainly certified nurses' aides, were organised in the Norwegian Union of Health and Social Workers (the Union).

During the last week of October 1999, a random sample of the nurses' aides organised in the Union were mailed a questionnaire. After one reminder, 7478 of 12 000 (62.3%) consented to participate in the study and completed the questionnaire. The requirements for inclusion in the present study were: (1) having filled in and returned the questionnaire at baseline; (2) working more than 18 hours per week—that is, more than half-time job; and (3) not on leave because of illness or pregnancy at baseline. Of the 5563 respondents who fulfilled these inclusion criteria, 4931 (88.6%) filled in a second questionnaire three months later.

Main messages

- The most important work factors, in terms of predicting certified sick leaves attributed to airway infections in nurses' aides, seem to be paediatric nursing, perceived lack of encouraging and supportive culture in the work unit, and frequent role conflicts at work.

Policy implications

- It is essential that leaders in the health services put more emphasis on creating an encouraging and supportive culture in their work units. More attention should also be paid to avoidance of setting nursing personnel in situations with conflicting expectations.

Dependent variable

At the three month follow up, the nurses' aides were asked whether they had been absent from work because of illness for more than three days in a row (certified by physician) during the previous three months. Those who answered "yes" were asked about the cause of the absence, and invited to mark on a checklist one or several of the following alternatives: airway infection (cold, flu, sinusitis, etc), headache, neck pain, upper back pain, low back pain, pain in the shoulder, arm, or hand, pain in the hip, leg, or foot, and other disease or illnesses. The outcome measure in the present study was the incidence proportion of sickness absence attributed to airway infection during the three month observation period. The incidence proportion was defined as the proportion of subjects with one or several sick leaves.

Independent variables

At baseline, demographic and familial characteristics, work related factors, health complaints, and behavioural characteristics were recorded, as described in detail elsewhere.[22]

The type of ward in which the subjects were working was registered by asking "What is your main work place?". There was a checklist with 12 optional answers.

Exposure to heavy physical work was measured with three questions exploring the frequency of moving patients manually in the bed, frequency of lifting or supporting patients manually between bed and chair, and frequency of lifting, carrying, or pushing heavy objects, such as heavy furniture and equipment. The first two questions were translations of questions developed and validated by British scientists.[23] The subjects also reported the extent their job required physical endurance.

Psychological, social, and organisational work factors were measured with scales in the General Nordic Questionnaire for Psychological and Social factors at Work, "QPSNordic", a comprehensive questionnaire recently developed and validated by Nordic specialists in working environment on behalf of the Nordic Council of Ministers.[24] There were questions exploring quantitative job demands, positive challenges in the job, role conflicts at work, control at work, social support at work, fairness of the immediate superior's leadership, the organisational culture of the work unit, rewards for good work, threats or violence at work, harassment at work, personal commitment to the work unit, and mastery of work. The responses were scored on Likert five point frequency scales. The multi-item factors were expressed as quintiles of the mean of the item scores.

Ethics

The research protocol was approved by the Committee for Medical Research Ethics. Informed written consent was given by the responders.

Statistical analysis

Statistical analysis was conducted with the Statistical Package for Social Sciences (SPSS) version 6.1. Pearson's χ^2 test, the Mantel-Haenszel test for linear trend, Fisher's exact test, and logistic regression analysis were used.

The logistic regression model was built in a traditional way, seeking the most parsimonious model that still explains the data, as recommended by Hosmer and Lemeshow.[25]

Age, gender, and all relevant variables that were related to the dependent variable with a p value below 0.05 in univariate analyses were included in an automatic forward stepwise logistic regression analysis. The criteria for inclusion and exclusion during the automatic analytic process were p = 0.05 and p = 0.10, respectively, for the overall variables in likelihood ratio tests. Associations between the overall variables (scales) and the outcome measure were considered statistically significant when p values were lower than 0.05.

In addition to demographics, familial characteristics, lifestyle factors, and work related factors, baseline health complaints were considered relevant for the model, as these were seen as independent variables that, along with and in interaction with other factors, could influence the decision to be absent from work in case of infection. The variables that described the type of ward were considered potential candidates for the logistic regression model along with the other work factors, because they reflected aspects of work and exposures that were not fully reflected in the other variables.

RESULTS

Characteristics of respondents and dropouts

Some differences were seen between subjects who responded to both questionnaires (respondents) and those who dropped out at follow up (table 1). The great majority of respondents were middle aged women.

Background factors and sickness absence; univariate analyses

Univariate analyses showed that AAI was associated with being 50 years or older (p = 0.007), being male (p = 0.047), being single (p = 0.039), having health problems at baseline (p values below 0.010), having injured the neck in an accident (p = 0.000), and smoking 10 cigarettes per day or more (p = 0.016) (data not shown). AAI was also more common in the 709 subjects who had ever changed work or work tasks because of pain (p = 0.003).

Work factors and AAI; univariate analyses

AAI was more common in subjects who were working in paediatric wards (table 2). A series of specific work factors, physical as well as psychological, social, and organisational, were associated with the incidence proportion of AAI in univariate analyses (table 3). The following work factors were not associated with the incidence proportion of AAI: frequency of night shifts, frequency of moving patients in the bed, frequency of lifting or supporting patients manually between bed and chair, frequency of handling heavy objects, personal control over decisions, personal control over work pace, perceived support from immediate superior, perceived suspicious culture in the work unit, and harassment at work (data not shown).

The relation between mastery of work and personal commitment to the work unit and the incidence proportion

Table 1 Baseline characteristics of respondents and dropouts

Characteristics at baseline	Respondents (n = 4931)		Dropouts (n = 632)	
	n	%	n	%
Gender				
Male	191	3.9	37	5.9
Female	4739	96.1	93	94.1
Age				
<30	345	7.0	81	12.8
30–39	932	18.9	161	25.5
40–49	2027	41.1	257	40.7
50–59	1417	28.7	114	18.0
>59	209	4.2	19	3.0
Daily consumption of cigarettes				
0	2770	57.3	314	50.6
1–9	1098	22.7	171	27.6
≥10	970	20.0	135	21.8
Affective symptoms*				
1 and 2	2113	43.2	248	39.8
3	938	19.2	89	14.3
4	882	18.0	134	21.5
5	958	19.6	152	24.4
Commitment to the work unit*				
1	856	17.5	133	21.2
2	986	20.1	128	20.4
3	868	17.7	121	19.3
4	1415	28.9	162	25.8
5	779	15.9	83	13.2
Role conflicts at work*				
1	781	15.9	84	13.4
2	1164	23.8	125	19.9
3	785	16.0	78	12.4
4	1408	28.7	217	34.6
5	762	15.6	124	19.7
Encouraging and supportive culture in the work unit				
Very little or not at all	71	1.5	12	2.0
Rather little	285	5.9	46	7.5
Some	1142	23.7	155	25.3
Rather much	2006	41.7	245	40.0
Very much	1305	27.1	154	25.2
Fairness in superior's leadership*				
1	1092	22.2	154	24.4
2	506	10.3	82	13.0
3	1490	30.3	189	30.0
4	545	11.1	65	10.3
5	1278	26.0	140	22.2
Threats or violence at work (previous two years)				
Never or very seldom	3018	61.4	353	56.1
Rather seldom	631	12.8	89	14.1
Sometimes	821	16.7	119	18.9
Rather often	346	7.0	49	7.8
Very often	96	2.0	19	3.0

*In quintiles.

of AAI tended to be U shaped, with highest absence rates in subjects with high and low levels of mastery and commitment (data not shown).

A total of 359 (7.3%) reported at follow up that they had changed work or work tasks during the three month observation period. There was no association between

Table 2 The responders' main workplace at baseline, by the incidence proportion of sickness absence attributed to airway infection (AAI) during the successive three months

Main workplace	N	AAI n (row %)
Somatic department (adults)	646	97 (15.0)
Psychiatric department (adults)	357	62 (17.4)
Paediatric department	82	21 (25.6)**
Nursing home	2064	292 (14.1)
Old people's home, or unit of apartments for old people	462	71 (15.4)
Community nurse	773	99 (12.8)
Institution or dwelling unit for mentally handicapped	507	82 (16.2)
Polyclinic, child care, or institution for drug abusers	83	13 (15.7)
Other	221	29 (13.1)

**$p < 0.01$; p values in χ^2 tests or Fisher's exact tests; subjects working in one type of workplace were compared with subjects not working in this type of workplace.
The workplace categories are not mutually exclusive; some subjects reported more than one workplace.

Table 3 Physical, psychological, and organisational work factors at baseline, by the incidence proportion of sickness absence attributed airway infection (AAI) during the successive three months

Work characteristics at baseline	N	AAI n (row %)	p values*
Work hours per week			0.009
19–36	4168	597 (14.3)	
>36	708	128 (18.1)	
Quantitative work demands			0.023 (0.014)
1 (lowest quintile)	1137	160 (14.1)	
2	581	81 (13.9)	
3	1197	157 (13.1)	
4	1134	177 (15.6)	
5	815	148 (18.2)	
The extent to which the work requires physical endurance			0.011 (0.029)
Never or very seldom	288	46 (16.0)	
Rather seldom	432	49 (11.3)	
Sometimes	1193	171 (14.3)	
Rather often	1527	211 (13.8)	
Very often or always	1367	238 (17.4)	
Positive challenges in the job			0.000 (0.450)
1 (lowest quintile)	647	122 (18.9)	
2	1408	171 (12.1)	
3	982	135 (13.7)	
4	807	121 (15.0)	
5	1011	169 (16.7)	
Encouraging and supportive culture in the work unit			0.002 (0.001)
Not at all/very little	71	18 (25.4)	
Rather little	281	58 (20.6)	
To some extent	1131	171 (15.1)	
Rather much	1987	279 (14.0)	
Very much	1285	174 (13.5)	
Relaxing and pleasant culture in the work unit			0.017 (0.003)
Not at all/very little	158	29 (18.4)	
Rather little	378	65 (17.2)	
To some extent	1196	202 (16.9)	
Rather much	1967	262 (13.3)	
Very much	943	128 (13.6)	
Level of role conflicts			0.003 (0.000)
1 (lowest quintile)	774	97 (12.5)	
2	1149	150 (13.1)	
3	776	125 (16.1)	
4	1394	211 (15.1)	
5	753	141 (18.7)	
Fairness of the immediate superior's leadership			0.000 (0.002)
1 (lowest quintile)	1080	204 (18.9)	
2	502	83 (16.5)	
3	1479	182 (12.3)	
4	540	74 (13.7)	
5	1255	181 (14.4)	
Rewards for good work			0.141 (0.015)
Not at all /very little	2004	323 (16.1)	
Rather little	849	131 (15.4)	
Some	1139	151 (13.3)	
Rather much	651	85 (13.1)	
Very much	154	21 (13.6)	
Threats or violence at work (previous 2 years)			0.049 (0.004)
Never or very seldom	2981	417 (14.0)	
Rather seldom	624	86 (13.8)	
Sometimes	816	140 (17.2)	
Rather often	342	60 (17.5)	
Very often	96	19 (19.8)	

N = number of subjects in the category; n = number of cases in the category.
*p value in Pearson χ^2 test, with p value in Mantel-Haenszel test for linear trend in brackets.

changes of work or work tasks during the observation period and the incidence proportion of AAI.

Predictors of AAI; multivariate analyses

In a forward stepwise logistic regression analysis (table 4), working in a paediatric ward (odds ratio (OR) 2.42; 95% confidence interval (CI) 1.39 to 4.21), perceived lack of encouraging and supportive culture in the work unit (OR 1.78; 95% CI 1.21 to 2.61), reporting medium (OR 1.52; 95% CI 1.09 to 2.12) and high levels (OR 1.60; 95% CI 1.13 to 2.26) of role conflicts at work, reporting very high mastery of work (OR 1.35; 95% CI 1.01 to 1.78), male gender (OR 1.63; 95% CI

1.10 to 2.42), smoking 10 cigarettes per day or more (OR 1.31; 95% CI 1.05 to 1.63), having had an accident related neck injury (OR 1.62; 95% CI 1.21 to 2.16), having widespread musculoskeletal pain (OR 1.48; 95% CI 1.22 to 1.80), and having long term health problems of any kind were associated with an increased risk of AAI. The factor "personal commitment to the work unit" was also retained in the final equation. These associations were seen after adjustments for the following factors (not retained in the final equation): marital status, intensity of musculoskeletal pain, level of affective symptoms, sleep complaints, fatigue, having ever changed work or work tasks because of pain, number of

Table 4 The baseline characteristics that predicted sickness absence attributed to airway infection during the successive three months

Characteristics at baseline	OR (95% CI)	p value*
Working in a paediatric department		0.004
No	1.00	
Yes	2.42 (1.39 to 4.21)	
Level of role conflicts at work		0.008
1 (lowest quintile)	1.00	
2	1.10 (0.80 to 1.50)	
3	1.52 (1.09 to 2.12)	
4	1.52 (1.12 to 2.06)	
5	1.60 (1.13 to 2.26)	
Perceived encouraging and supportive culture in the work unit		0.030
Not at all/very little/rather little	1.78 (1.21 to 2.61)	
To some extent	1.13 (0.85 to 1.52)	
Rather much	1.14 (0.90 to 1.45)	
Very much	1.00	
Mastery of work		0.021
1 (lowest quintile)	1.00	
2	0.81 (0.59 to 1.11)	
3	0.98 (0.75 to 1.28)	
4	1.02 (0.75 to 1.38)	
5	1.35 (1.01 to 1.78)	
Personal commitment to the work unit		0.050
1 (lowest quintile)	1.00	
2	0.94 (0.70 to 1.25)	
3	1.10 (0.81 to 1.51)	
4	0.86 (0.64 to 1.18)	
5	1.32 (0.92 to 1.89)	
Age		0.005
<30	1.00	
30–39	0.78 (0.53 to 1.15)	
40–49	0.89 (0.62 to 1.26)	
50–59	1.12 (0.77 to 1.61)	
>59	1.68 (1.00 to 2.81)	
Gender		0.018
Female	1.00	
Male	1.63 (1.10 to 2.42)	
Had injured the neck in an accident		0.002
No	1.00	
Yes	1.62 (1.21 to 2.16)	
Daily consumption of cigarettes		0.005
0	1.00	
1–9	0.85 (0.68 to 1.07)	
10 or more	1.31 (1.05 to 1.63)	
Widespread pain		0.000
No	1.00	
Yes	1.48 (1.22 to 1.80)	
Long term health problem (any kind)		0.018
No problem	1.00	
Yes, but not bothered	1.36 (0.99 to 1.87)	
Yes, somewhat bothered	1.34 (1.07 to 1.67)	
Yes, a lot bothered	1.39 (1.00 to 1.93)	

The final equation in a forward stepwise logistic regression analysis, with likelihood ratio test used as the criterion for determining variables to be removed from the model. n = 4179.
*p values from likelihood ratio test if term (overall variable) removed.

working hours per week, the extent to which the work required physical endurance, amount of quantitative work demands, positive challenges at work, fairness of the immediate superior's leadership, rewards for good work, the extent of pleasant and relaxing culture in the work unit, and threats and violence at work. The overall rate of correct classification of the dependent variable (predicted outcome compared with the observed outcome) was estimated as 85.5%.

DISCUSSION

In this prospective study of Norwegian nurses' aides, working in a paediatric ward, perceived lack of encouraging and supportive culture in the work unit, and frequent role conflicts at work predicted AAI. The individual level factors male gender, heavy smoking, and severe health complaints were also associated with an increased risk of AAI.

Methodological considerations

The response rate in the first data collection was moderate (62%). The list of members of the Union also includes retired persons, and contacts over telephone during the data collection gave the impression that many non-working subjects were not motivated for participating in the study. Hence, the true response rate in vocationally active subjects was probably higher. During the last decade, the recruitment of nurses' aides in Norway has been poor among young people. This may explain the relatively high proportion of middle-aged respondents. Even so, some may have chosen not to participate in the study for reasons other than retirement or not currently working in the field. Some may have been off sick and therefore did not respond, and those who did respond may have had more to say about the factors that contribute to sickness absence, such as low support at work. Hence, selection bias in the first sample may have influenced the results.

The number of dropouts between the first and the second data collection was low (11%), but there were some differences between the responders and the dropouts, which may have influenced the results. It is not likely, though, that

selection bias due to withdrawal between the two data collections explains the main findings in this study.

A healthy worker selection[26] due to the fact that unhealthy persons may have avoided specific high exposure jobs or changed to lower exposure jobs, may have resulted in an underestimation of associations between work factors and sickness absence. However, the prospective design combined with adjustments for baseline health complaints and prior changes of work or work tasks because of pain probably reduced the impact of this effect.

The outcome measure, sickness absence of more than three successive days during the previous three months, was based on self reports. Patients in Norway have to contact a physician for sickness certification when the absence lasts longer than three days, and most people will recall such a consultation during the previous three months. Several studies have shown high agreement between information from official registers and self reported spells of certified sickness absence, also for absence attributed to specific disorders, such as back pain.[27–29] Self reports of absence attributed specifically to airway infections have not been validated, though, and it is possible that some of the cases reported as AAI were caused by problems other than airway infections.

Vaccination campaigns among workers could have influenced the incidence of sickness absence attributed to airway infections. There was no such campaign supported by the Norwegian government. We are not aware of local campaigns either, but these may have taken place without our knowledge.

The validity and reliability of self reported work factors have been explored and discussed by several authors.[9 30 31] Some authors have found high correlations[30] and others have found fair or modest correlations[9 31] between ''objective'' and self reported information on psychosocial work environment. Few psychological aspects of the work situation may be measured objectively, though. Intermethod surveys indicate that self reports have acceptable validity for gross activities in the job.[23 32 33] The questions in the present study that were used to assess the frequency of patient handling were found to have good validity in a British study.[23] The instruments that were used to measure psychosocial and organisational work factors were scales in the QPSNordic.[24] These scales have been found to have good construct and predictive validity as well as good internal consistency and test-retest reliability.[24]

Workers with health problems are probably more likely than other persons to perceive aspects of their work as strenuous or problematic.[33] This problem was taken into account by adjusting for the severity of common health complaints at the time the work factors were recorded.

The incidence of AAI

In a survey of the total working population in Buskerud county, Norway, in which the gathering of data was performed during the period 25 February to 24 March 1985, the annualised incidence rate of certified sick leaves (>3 days) attributed to influenza, tonsillitis, sinusitis, unspecified acute upper respiratory tract infections, or bronchitis was reported to be 14.8%.[2] In the present study, the annualised incidence rate of AAI was more than four times higher, as 14.9% of the nurses' aides had had at least one spell during the three months: November and December 1999, and January 2000. The observation period of the present study coincided with both the influenza epidemic[34] and the epidemic of respiratory syncytial virus (RSV) (National Institute of Public Health, personal communication) this winter, both peaking in January 2000. By the start of the Buskerud study, the epidemics of influenza and RSV that winter, both peaking in January 1985, had declined. This could explain the difference between the two studies in the incidence rates of AAI.

Work factors as predictors of AAI

The present study revealed an increased risk of AAI among nurses' aides working in paediatric wards. Many children are admitted to hospitals because of infections with highly contagious microbes, such as influenza virus and RSV, and the frequency of nosocomial infections in paediatric patients is high.[35 36] Hence, the nursing personnel in paediatric wards are exposed to a large amount of pathogenic microbes. On the other hand, one would expect adults to develop immunity against some of the common childhood infectious agents after having worked with paediatric patients for some years. Another explanation of the high rates of AAI in paediatric wards may be that paediatric nursing personnel with intercurrent infections seek to avoid infecting their patients, and, hence, stay at home in case of infection. The present study does not indicate that the working conditions of nurses' aides in paediatric wards are particularly stressful (data not shown). In a study of the hospital staff at Winnipeg's Health Sciences Centre, Canada, during the peak of an epidemic of influenza, Hammond and Cheang reported greater increase in all-cause sickness absence among the nursing staff in paediatric acute infection wards, in general medical wards, and in wards for patients with chronic respiratory disease than in the nursing staff of other hospital departments.[11] One does not know for sure, though, that this increase in absenteeism was due specifically to influenza among the nursing staff. The increased absenteeism could also be due to increased work demands, which may have provoked different kinds of illnesses. Borbounnais et al found higher absenteeism in nurses working in psychiatric wards, surgical wards, and short term care units compared with nurses working in other hospital departments.[4 5]

The present study supports the hypothesis that psychological and social work factors are predictors of AAI; frequent role conflicts at work and perceived lack of encouraging and supportive culture in the work unit were predictors of AAI. Low social support at work, albeit not as a characteristic of the organisational culture, has been shown to predict both all-cause sickness absence and sickness absence attributed to back pain and mental disorders in other occupational groups.[9 13 14] Role conflicts at work predicted all-cause sickness absence in industrial workers.[7] ''Job context stress'', including role conflicts and role ambiguity, predicted all-cause sickness absence in hospital workers.[8]

High quantitative work demands were not related to the risk of AAI when adjustments were made for other work factors. Several studies suggest that the combination of high demands and low control at work (the job strain model) produces adverse health effects or sickness absence.[6 9 30] This hypothesis was not confirmed in other studies[10 13] or in the present one (data not shown).

It is unclear why the reporting of very high mastery of work was associated with an increased risk of AAI. Individuals that exhibit high social desirability may report very high mastery,[37] and if these are also more prone for infections or sickness absence it could perhaps explain the association. The level of commitment to the work unit was also associated with the risk of AAI. However, this association was weak and did not reveal any linear trend, threshold effect, or other clear pattern.

Other predictors of AAI

The association between age and the occurrence of AAI was characterised by a U shaped pattern, with the highest absence rates in the youngest and the oldest age groups. Tellnes et al found a similar pattern for absence attributed to unspecific

upper respiratory tract infections in the general working population.[2]

The occurrence of AAI was higher in men than in women. Hensing et al found that men in extremely female dominated occupations had the highest rates of psychiatric absence of all men, and suggested that this might be effects of the low integration of sexes at the workplace.[15] Tellnes et al found a tendency for a higher incidence of AAI in males also in the general working population, except for absence attributed to sinusitis, which was twice as frequent in females as in males.[2]

Subjects who reported at baseline that they had injured the neck in an accident, subjects with widespread musculoskeletal pain, and subjects with long term health problems of any kind had an increased risk of AAI. Neck injuries may result in chronic pain and dysfunction, and widespread pain is strongly associated with reduced functional ability.[38] Long term health problems include chronic lung diseases, such as asthma and chronic bronchitis, which may exacerbate in connection with intercurrent airway infections. It is also a common clinical experience that subjects with long term health problems, whether it be musculoskeletal or respiratory disorders, have less buffer capacity, and, hence, will have a lower ability to cope with work demands during intercurrent illnesses.

Smoking 10 cigarettes per day or more predicted AAI. It is well documented that smoking may contribute to lower respiratory infections, such as bronchitis and pneumonia.[19] Other studies have shown that smoking is associated with all-cause absence.[39]

Confounding

The results may have been influenced by background factors for which we were not able to control. Lifestyle factors other than smoking and exercise, such as alcohol consumption, and psychological trait factors, such as strive-achieve behaviour,[8] hostility, poor self esteem, social desirability,[37] and unrealistic expectations about work and colleagues, could have influenced the reporting of the working conditions as well as the decisions to be absent from work.

Conclusions

In nurses' aides, sickness absence attributed to airway infections seems to be related to the type of ward in which the aides are working, and to psychological and social work factors. Declaring airway infections as occupational diseases would have important consequences for the social security system.

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