



ECONOMIC EVALUATION OF OCCUPATIONAL DISEASE SCREENING – CHRONIC SOLVENT ENCEPHALOPATHY AS AN EXAMPLE

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Current activities / occupational diseases:

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Background

- Early detection of adverse exposure-related health effects supports work ability
- Estimation of underdetection and underreporting of occupational diseases is difficult (country-specific differences in the legal definition, the criteria for diagnosis, and agreements between social partners)
- Benefits of medical screening and surveillance have been studied, especially in the field of respiratory disease (Wilken 2012)
- However, detailed knowledge on costs of occupational disease screening is scarce

Occupational diseases and insurance in Finland

- All employees and farmers must be covered by the statutory insurance system
- In the case of a suspected occupational disease, the examinations are covered
- Occupational disease = work is the primary cause, attributable fraction > 50%
- Employers, doctors, and insurance companies are subject to mandatory reporting requirements
- Accepted case of occupational disease - the level of compensation is higher than the normal social security benefits

Occupational disease examination units – the chain of care

- **Outpatient care**
The most common occupational diseases, e.g. toxic contact dermatitis and strain diseases, are detected in outpatient care, particularly Occupational Health Services (OHS). The employer has a duty to arrange OHS by law
- **University hospitals**
Examinations on diseases requiring specialised research. Occupational medicine clinics work in co-operation with the Finnish Institute of Occupational Health
- **Finnish Institute of Occupational Health (FIOH)**
FIOH in Helsinki functions as a national centre for occupational diseases. E.g. skin and respiratory system examinations requiring specialised capabilities (e.g. chemically-induced asthma), suspected new pathogens, borderline cases and rare diseases (e.g. solvent encephalopathy)

Purpose of the study

- Chronic solvent encephalopathy (CSE) was used as an example, with proactive approach in screening (Kaukiainen 2009, Spee 2012)
- Loss of work ability is associated with CSE (van Valen 2009, Keski-Säntti 2010) – crucial to screen and detect at early stages
- However, despite mandatory OHS health checks CSE seems underdetected in Finland (Furu 2012)

The aims were

- to estimate the cost of detecting one new CSE case by screening and diagnostics
- estimate the career extension needed to cover the costs
- to study work ability

Solvent exposure and CSE - today

- In developed countries, **solvent-exposure has decreased**:
 - structural changes in working life
 - transition to less-harmful products
 - use of improved ventilation and personal protective means
- **Adverse solvent-related effects** in Finland (5.5 million; 1.7 million workforce)
 - **38 500 workers extensively exposed** (>50% OEL)
 - **20 000** of the excessively exposed have a risk of chronic nervous system adverse effects
 - Yearly incidence of CSE has been **only 5-10 cases**
- Included in the ILO List of Occupational Diseases and in the European Commission Recommendation 2003/670/EC
- Still, CSE 'painters encephalopathy' not recognized as an occupational disease in many countries (Spurgeon 2006)

CSE: non-specific, consistent and persistent symptoms



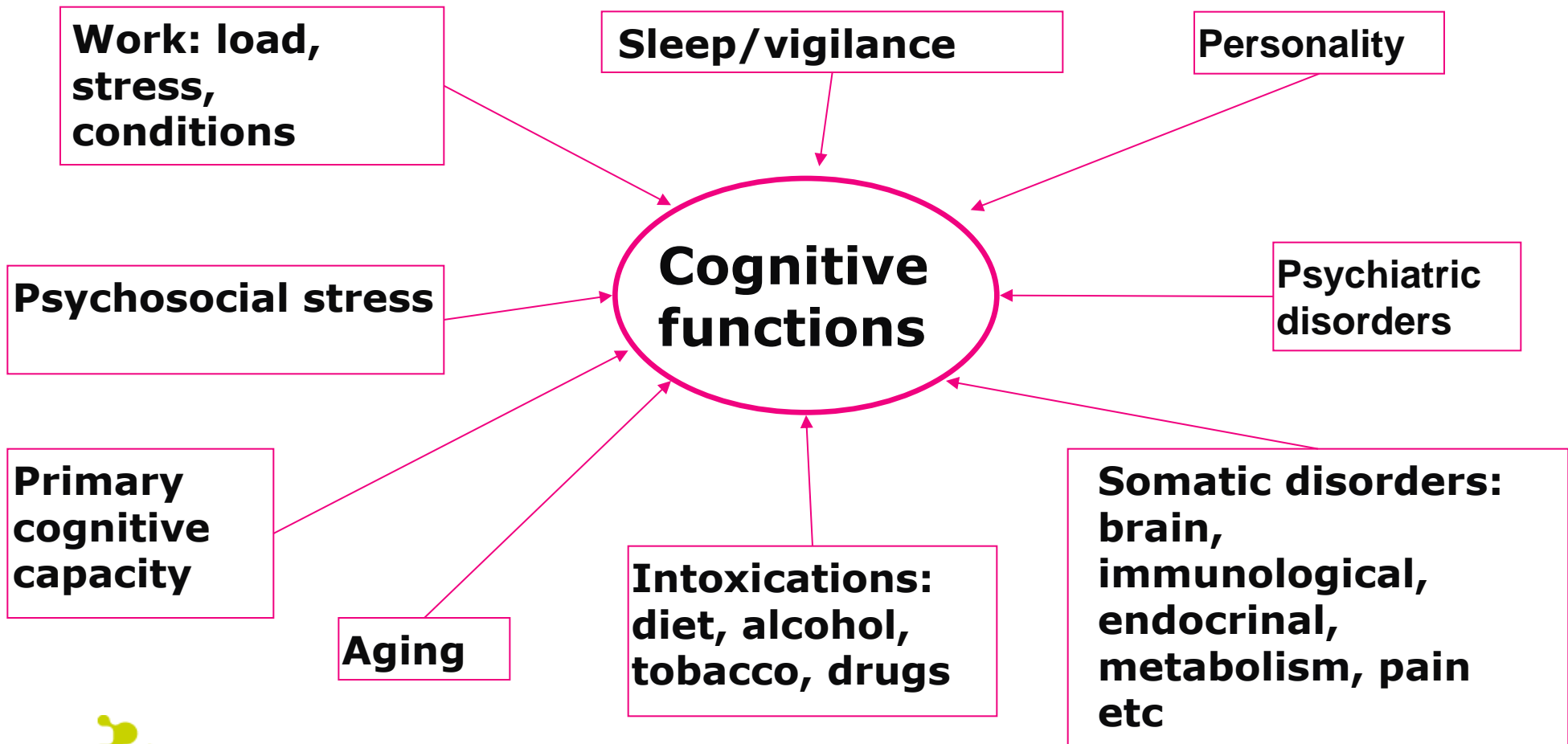
Cognitive and psychiatric symptomatology:

- **Short term (working) memory problems, decreased problem solving and learning abilities**
- **concentration problems**
- mood changes, irritability, mild depression
- slowness in motor tasks
- sleep disorders

Material and methods - stepwise postal-clinical CSE screening

- 3 640 solvent-exposed workers in the age range of 30–65 years in two provinces (trade union registers and municipal OHS)
 - **Step I.** A postal survey: Euroquest (EQ) neurotoxic symptom questionnaire, Beck's Depression Inventory (BDI), Alcohol Use Disorders Identification Test-Consumption (Audit-C), and questions on exposure, medical conditions, and work ability
 - **Step II.** Clinical examination, with methods applicable to OHS
 - **Step III.** Investigations of suspected CSE cases (FIOH)
- A financial analysis was carried out, results compared to the existing health check based practice of occupational health services (OHS screening)
- Work ability was studied in relation to the retirement rate and the Work Ability Index (WAI)

Differential diagnosis



Stepwise postal-clinical screening of CSE



3640 employees in trades with CSE risk
- covering 18% of the abundantly exposed Finnish workers

1730 responses (48%)

338 respondents with **CSE-like symptoms** (EQ memory and concentration)

129 with CSE-suspicion by screening were invited for further studies
adequate exposure, CSE-compatible symptoms AND
no evident non-occupational explanation of symptoms

32 not willing
12 didn't show up
2 previously
diagnosed CSE

**83 workers came to
clinical examinations**

No suspicion
of CSE, n=47

previously investigated

3 non-CSE

1 CSE

**Clinically suspected
"new" CSE, n= 32**

Clinical investigations for occupational disease at FIOH, resulting in 15 CSE cases

Costs of detecting one new CSE case by stepwise postal-clinical (SPC) screening

= 12 242 € / CSE case

	n	€ total
Questionnaire	3 640	5 712
Response handling	1 740	5 944
Clinical examinations	83	25 293
Loss of working time (½ day/person)	83	7 060
Referrals	32	2 438
Diagnostic CSE investigations	32	130 045
Loss of working time	32->20	7 145
Total price (÷ 15 cases)		183 637

Costs of detecting one CSE case by standard occupational health (OHS) practice = 294 163 € / CSE case

	n	€ total
Health checks (1+½h)	20 000	3 047 337
Loss of working time (½ day/person)	20 000	1 701 183
Laboratory (S-ALAT)	20 000	369 822
Referrals	128	9 751
CSE investigations	128 ->25	437 105
Loss of working time	128 ->25	23901
Total price (÷ 19 cases)		5 589 099

Work career extension needed to cover screening and diagnostic costs

- Average monthly income 2800 €
- Value of one month's work $(2800 \text{ €} \times 12,5 \times 1,26) : 12 = 3675 \text{ €}$

Postal-clinical screening

- **12 242 €/ CSE case**
- $12\,242 \text{ €} \div 3\,675 \text{ €/month} = \mathbf{3.3 \text{ months}}$

Standard procedure

- **294 163 €/ CSE case**
- $294\,163 \text{ €} \div 3\,675 \text{ €/month} = \mathbf{79 \text{ months} = 6.5 \text{ years}}$

Work ability



The retirement rate (at the time of diagnosis):

- SPC screened CSE cases 6.7%
- OHS screened cases 74% p 0.0004

WAI scores of SPC screened CSE cases compared with Finnish reference material (building, maintenance and manufacturing workers, Gould 2006):

- Proportion of poor to moderate WAI scores in at least 55-year-olds
 - SPC screened 83.3% (n 10)
 - Reference workers 38.2% (n 13) p 0.0187

Conclusions – work ability



- Work ability (retirement rate) of the CSE found by SPC screening is more preserved than in cases sent by OHS
- This implies that
 1. More severe cases are detected by OHS
 2. Milder cases are missed by OHS,
 3. Nationally, the current annual numbers of recognized CSE are too low
- It may be that the screened cases are
 - CSE, picked up earlier in the progressive course of the disease or
 - CSE which would not necessarily be diagnosed at all
- In line with the screening programme on CSE among Dutch painters (Spee et al 2012)

Conclusions – cost-effective screening

- It is possible to screen a relatively rare occupational disease at an early stage
- Only a short extension in working life covered the costs in proactive low-cost approach of screening
- It is promising → CSE cases can be found with questionnaire surveys and practices suitable for OHS and general practice
- Can directed and proactive approach be beneficial in detecting other, more common occupational diseases?
- E.g. respiratory diseases: Questionnaire-based identification of workers in risk is recommended (Wilken 2012)
- Shift of 3-D type of jobs from industrialized countries into developing countries – increasing need for low-cost screening?

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Thank you for your attention!

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