Evidenz-basierte Medizin EBM
Sinn und Nutzen von Leitlinien für die Arbeitsmedizin?

WHEN AND HOW TO ASSESS

WORKABILITY AND FOR WHAT PURPOSE?

PERIODICAL EXAMINATIONS

JF Gehanno

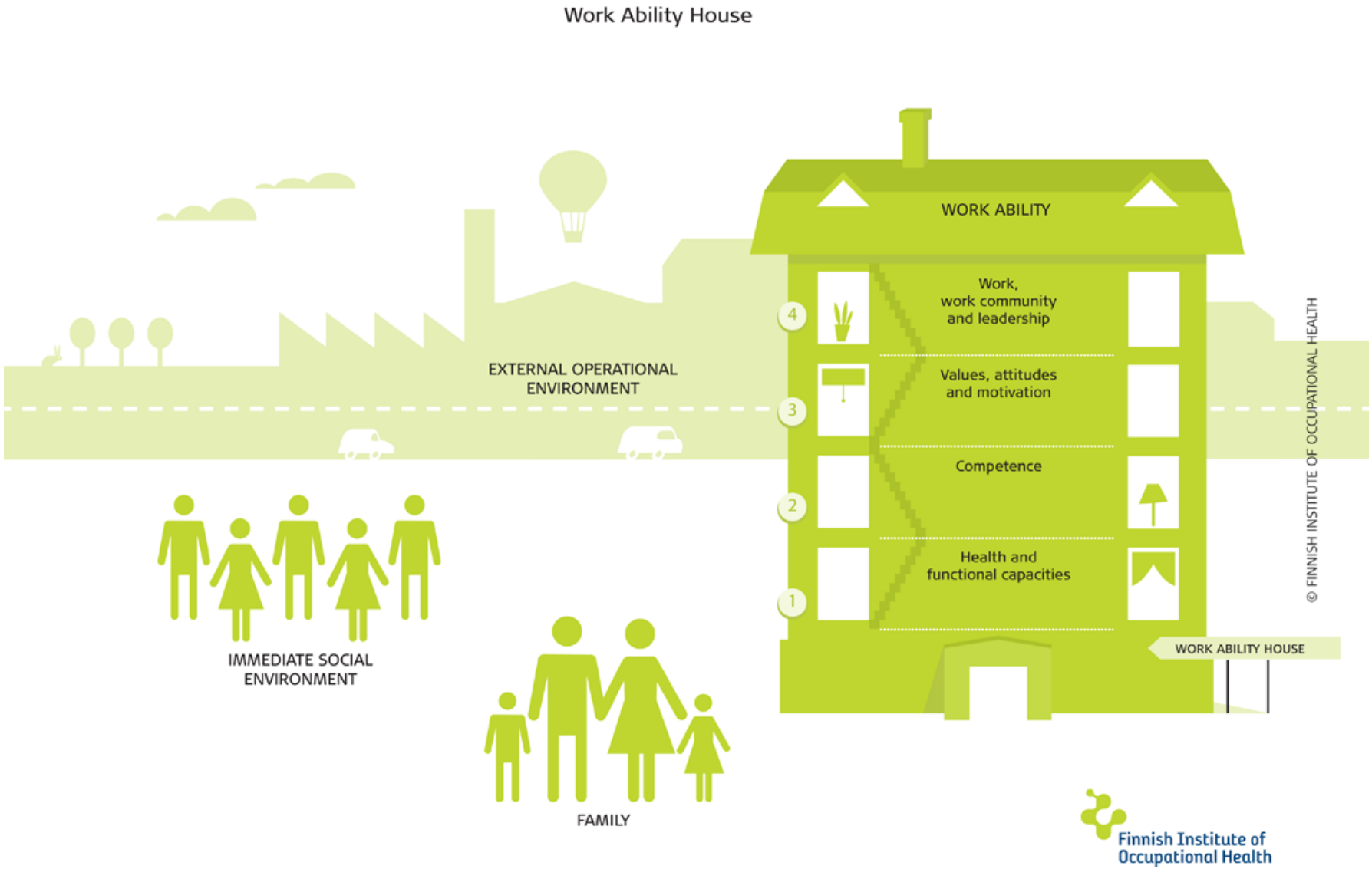
Department of occupational health

Rouen University Hospital, France

Assessment of work ability

- Assessment of work ability of employees is an essential part of
  - occupational health services (OHS)
  - maintenance of work ability
- The assessment begins at the preplacement health examination (?)
- Continues throughout the working career (?)

Ari Kaukiainen, FIOSH


Work Ability House
WORK ABILITY
Work,
work community
and leadership
Values, attitudes
and motivation
Competence
Health and
functional capacities
4
3
2
1
EXTERNAL OPERATIONAL
ENVIRONMENT
IMMEDIATE SOCIAL
ENVIRONMENT
FAMILY
WORK ABILITY HOUSE
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Occupational Health

EMPLOYEE

(resources, health)

- Fonctional capacity
- Physical activity and other lifestyle factors
- Self initiative

WORK AND WORK CONDITIONS

(Ergonomics, occupational hygiene, occupational safety)

- Organization of work
- Work spaces and tools
- Work postures and movements
- Physical load

Work ability maintenance

PROFESIONNAL SKILLS

(expertise)

- Learning
- Versatile skills
- New technology

WORK COMMUNITY

(management, interactions)

- Work organization
- Age management
- Work arangements
- schedules

FIOSH


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Assessment of work ability : where & when

	Employee	Workplace
Not apparently sick	Pre-employment Change of work tasks Periodical / systematic Periodical / reasons to suspect that the work involves a health hazard Periodical : early detection of a risk of incapacity for work	Periodical assessment : recognition of possible risk factors in an employee's work, work community or work environment Changes in the organization …
Sick	When placing an employee with deficient work capacity to work After period of sick leave / illness	Alerts, occupational diseases …

Workability : in case of a disease

- Which disease ?
  - limitations
    - set by disease (including substance abusers)
    - At work
- Traditionally : assessed in terms of incapacity for work (fit note)
- Nowadays : in terms of the remaining work ability and how can we adapt the workplace to support it
- When :
  - After sick leave
  - As often as requested by the employee !
  - Periodicity : according to the limitations & the work environment
- Rehabilitation and reassignment

Workability and screening in the absence of symptoms or complains

- Objective :
  - For early detection of risk of incapacity for work
  - To identify threats to work ability
- Periodical examination : the cornerstone of occupational health ?
- Do we have evidences ?

What is a screening ?

- Early detection of a latent disorder by a test to allow early intervention with the aim of improving prognosis
- Characteristics (WHO 1970)
  - Applies to people with no apparent sign of the disease (≠ diagnosis)
  - With a high risk of disease
  - Must differentiate the probably ill from the probably healthy
  - Should lead to a better prognosis and “lighter” treatments
- Different types of screening:
  - Systematic “mass screening” : for all
  - Opportunistic : using a contact with the healthcare system to apply screening (occupational health)
  - Targeted at a specific population, according to their risk factors
- Validity of screening tools ?

Validity of the test ?

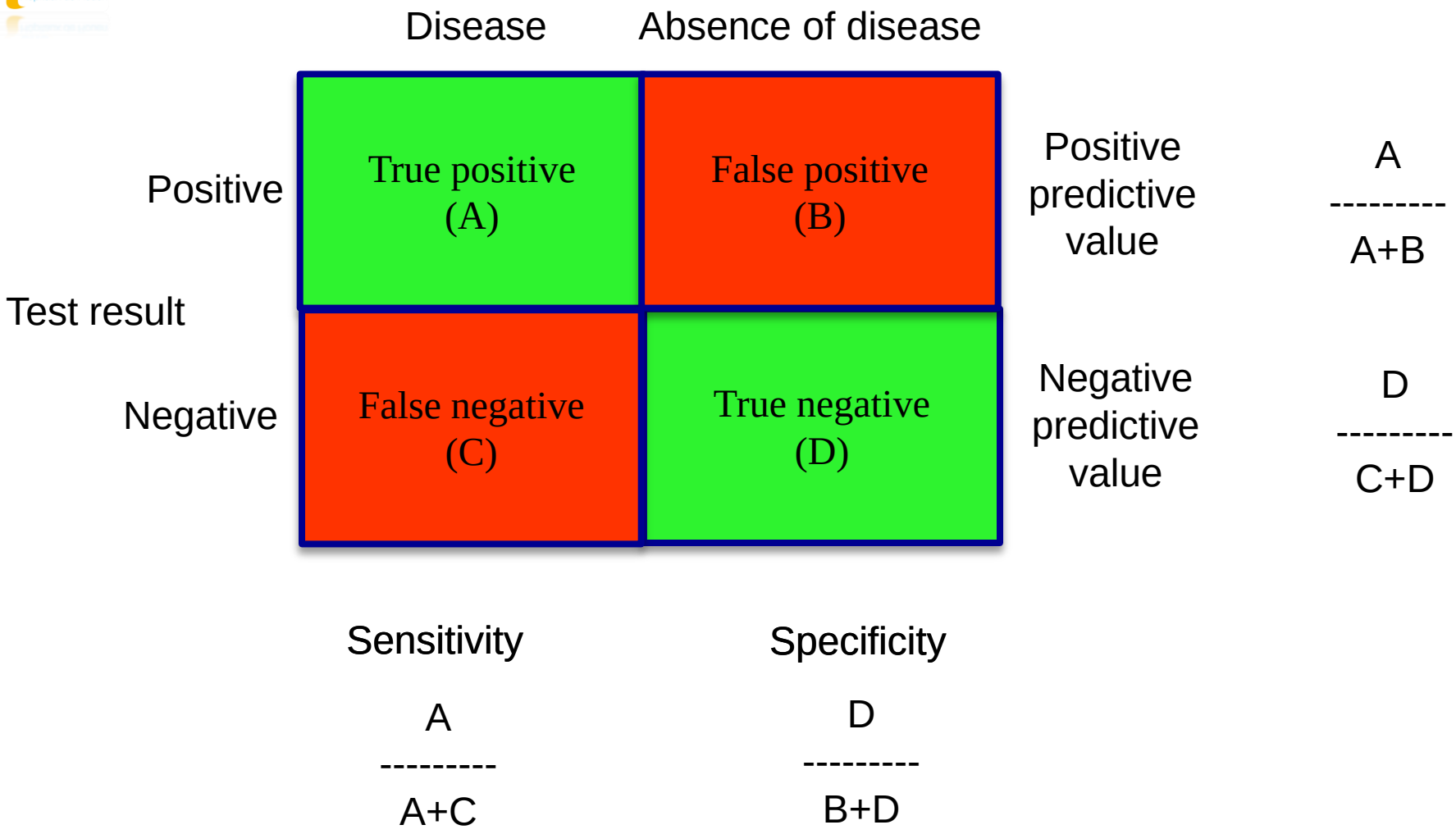
what is the chance that a person with a positive test truly has the disease?

what is the chance that a person with a negative test truly does not have the disease?

% of sick people who are correctly identified as having the condition

% of healthy people who are correctly identified as not having the condition

Test result	Disease	Absence of disease
Positive	True positive (A)	False positive (B)
Negative	False negative (C)	True negative (D)


Disease
Absence of disease
Positive
Test result
Negative
True positive
(A)
False positive
(B)
False negative
(C)
True negative
(D)
Positive predictive value
A

A+B
Negative predictive value
D

C+D
Sensitivity
A

A+C
Specificity
D

B+D

Test result	Disease	Absence of disease
Positive	True positive (A)	False positive (B)
Negative	False negative (C)	True negative (D)

Sensitivity

Specificity

Depend on the test

Depend on the prevalence

Impact of prevalence on the PPV

Test characteristics : Se : 82 %
Sp : 92 %

Prevalence	PPV	NPP
50%	91%	91%
25%	74,8%	93,2%
10%	53,8 %	97,7%

Impact of prevalence on the PPV

Test characteristics : Se : 82 %
Sp : 92 %

Prevalence	PPV	NPP
50%	91%	91%
25%	74,8%	93,2%
10%	53,8 %	97,7%

I have 50% chance not to have the disease even if my test is +

Prevalence of some occupational diseases

- Asthma (Ameille, 2006)
  - among workers exposed to latex : 2.5%
  - among workers exposed to enzymes : 50%
- Mesothelioma among oil companies employees
  - 45 deaths / 45,110 (0,1%) among UK oil refinery & petroleum distribution workers (Sorahan, Occ Med 2002)
    - Retired employees
- Leukaemia in the petroleum industry :
  - 6 cases / 4,319 (0.14%) in the Swedish petroleum industry (Järvholm, EOM 1997)
  - 137 deaths / 45,110 (0,3%) among UK oil refinery & petroleum distribution workers (Sorahan, Occ Med 2002)

Interest of a periodical health examination ?

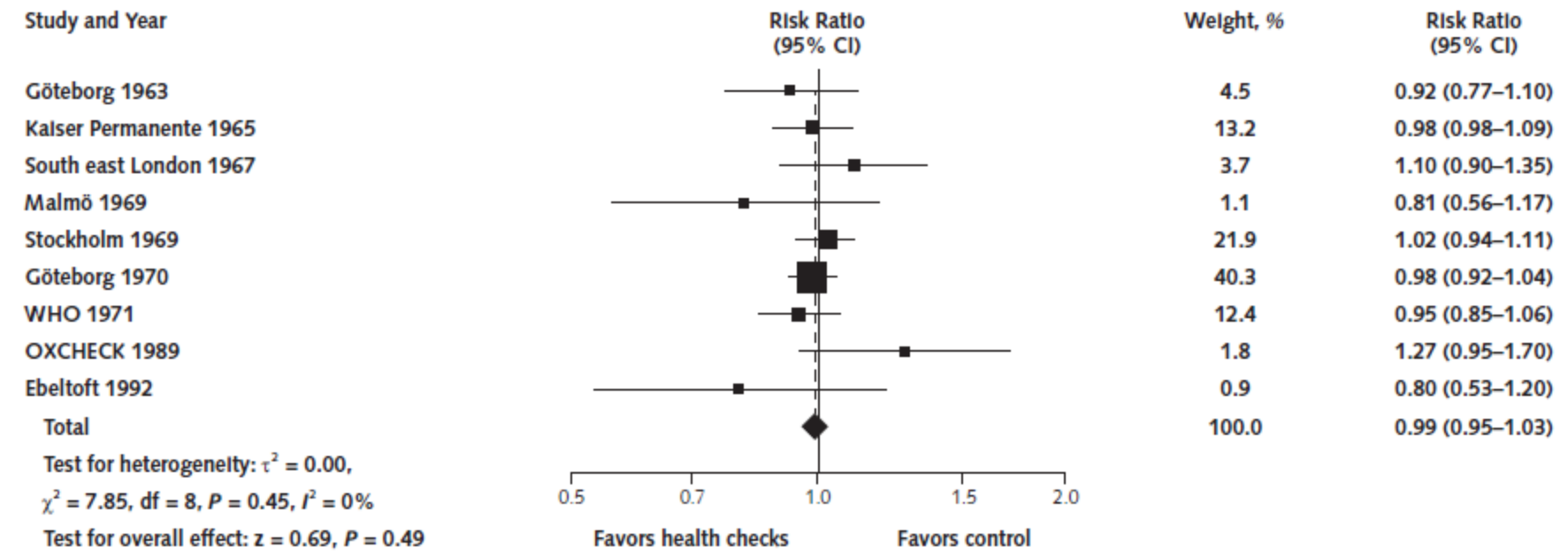
- Proposition of an annual health examination to screen for tuberculosis :
  - 1861 : Horace Dobell, London
  - 1915 : US National Tuberculosis Association
- Still recommended in the US in the 70ies
- Arising of EBM : proposal to give up
  - 1979 : Canadian task Force on preventive medicine
  - 80ies : US
- However: concerned still 4,4% of consultations in the early 2000 in the US (Chacko, Am J Med 2007)
  - 65% of Americans think it is usefull (Oboler, Ann Int Med, 2002)
  - 65% of physicians also (Prochazka, Arch Int Med 2005)

Cochrane review, 2012, General health checks

- 14 studies included/ 182 880 participants
  - Median follow up : 9 years(22 years for the Stockholm study)
- Interventions : medical examination or questionnaire
  - Only one → several
- Effects investigated :
  - Mortality : total, cancer, cardio-vascular
  - Morbidy : hospitalisation, disability, worry, additional physician visits, or absence from work
- **“did not reduce morbidity or mortality, neither overall nor for cardiovascular or cancer causes”**
  - increased the number of new diagnoses.
- Selection bias ? Healthy ones participate more than sick ones ?
- Important harmful outcomes not studied or reported.

Krogsbøll, BMJ 2012

Figure. Forest plot showing the effect of general health checks on total mortality.



Reproduced from Krogsbøll LT, Jørgensen KJ, Larsen CG, Gøtzsche PC. General health checks in adults for reducing morbidity and mortality from disease: Cochrane systematic review and meta-analysis. BMJ. 2012;345:e7191.

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Review Article

Are cardiovascular disease risk assessment and management programmes cost effective? A systematic review of the evidence

John Tayu Lee [a,b,*], Kenny D Lawson [c,d], Yizhou Wan [a], Azeem Majeed [a], Stephen Morris [e], Michael Soljak [a], Christopher Millett [a]

In conclusion, recommendations for population-wide risk assessment and management programmes lack a robust, real world, evidence basis.

Given implementation is resource intensive there is a need for robust economic evaluation, ideally conducted alongside trials, to assess cost effectiveness.

periodic follow-up examination at work

- Medical outcomes among 6857 elderly construction workers (Welch, JOEM 2017)
  - initial and at least one periodic follow-up examination at > 3 years
  - significant improvements ($P < 0.05$) were observed for
    - total serum cholesterol;
    - non-HDL cholesterol;
    - hemoglobin A1c,
    - hypertension;
    - current cigarette smoking;
    - 10-year cardiovascular disease (CVD) risk scores

SOME SCREENINGS ARE RECOMMENDED IN THE GENERAL POPULATION

Screening for alcool abuse

- USPTF Recommendations :
  - “The USPSTF recommends that clinicians screen adults aged 18 years or older for alcohol misuse and provide persons engaged in risky or hazardous drinking with brief behavioral counseling interventions to reduce alcohol misuse”. (Grade B recommendation)
  - Ann Int Med 2013
- Recommendations French Society of Occupational Medicine (2013)
  - Idem
  - When one abuse is identified, screen for others.

Screening for diseases

Disease	Source	How to screen	grade
Obesity	HAS	BMI during all consultation. Abdominal perimeter if BMI > 25	C
	USPSTF	Idem + behaviour councelling if BMI > 30	B
Type 2 diabetes	GECSSP	High risk : HbA1c screening every 3-5 years Very high risk: annual screening	Low
Type 2 diabetes	GECSSP	non recommended if low risk(FINDRISC questionnaire)	High

HAS : Haute Autorité de Santé
USPSTF: US Preventive Services Task Force
GECSSP: Groupe d'étude Canadien sur les soins de santé Préventifs

Screening for cancer: recommended

- Breast cancer
  - France (2004): Mammography + clinical exam/2ans 50 - 74 years
  - GECSSP : Mammography /2ans 50 - 74 years
  - USPSTF : Mammography after 50 (Grade C)
- Cervical cancer
  - GECSSP : pap test every 3 years, from25 to 69 years old (High Level)
  - USPSTF : pap test every 3 years, from21 to 65 years old (Grade A)
- Colorectal cancer USPSTF :
  - Individual risk assessment recommended
    - Screening between 50 and 77 year-old
      - Start at 40 if risk factors
    - Fecal Occult Blood Test, sigmoidoscopy or colonoscopy
  - France : Fecal Occult Blood Test/2 years, between 50 and 74

Screening for cancer: negative recommendations

- Breast cancer: not recommended USPSTF & GECSSP
  - From 40 to 49,
  - No MRI, no self exam
- Cervical cancer
  - GECSSP : no screening before 25
  - USPSTF : no screening before 25
- Prostate cancer
  - USPSTF (2012) : No PSA measurement in the general population
  - USPSTF (2013) : PSA measurement not recommended for people who did not clearly asked for it
    - not recommended < 50 year-old, > 69 or life expectancy <10 years

Limits of these recommendations

- Based on evidences … and concensus
- So... sometimes discrepent (Gelly, Prev Med 2013;57:3-11)
- Comparison of 166 preventive services recommendations
  - F, Ca & US
- Agreement
  - Strong agreement : 26%
  - Intermediate agreement 49%
  - Strong disagreement : 25%
- Multivariate analysis
  - Strong agreement for history taking & physical examination
  - Disagreement on the intervention
    - Age & sex of the population
    - Periodicity

Mandatory vaccinations in Europe for HCWs

	Influenza	MMR	Chicken pox	HAV	HBV	DT	Polio	Pertussis	Meningo	Tuberculosis
Autriche	R	R	R	R	R	R	R	R	R	-
Belgique	R	R	R	-	M	R	-	R	-	-
Finlande	R	M	R	-	R	R	-	R	-	-
France	R	R	R	-	M	M	M	R	-	M
Allemagne	R	R	R	R	R	-	-	R	R	-
Grèce	R	-	-	R	R	-	-	-	-	-
Italie	R	R	R	R	R	-	-	-	-	M
Pays Bas	-	-	-	-	M	-	-	R	-	M
Norvège	-	R	R	-	R	-	-	R	R	R
Russie	R	R	-	-	R	R	-	-	-	-
Espagne	R	R	R	-	R	R	-	-	-	-
Suisse	R	R	R	R	R	R	R	-	R	-
UK	R	R	R	-	R	R	R	R	-	R

- : not recommended/ R : recommended for some HCWs
M : Mandatory

Maltezou, Vaccine 2014

Conclusions on « public health » screening

- General health checks in adults : no interest in public health
  - So no interest in occupational health, appart from specific risk factors ?
  - Does it bring trust in the physician/patient relationship ?
  - A way to deliver preventive messages ?

- Some specific screenings should be performed
  - More targeted on risk factors
  - Which periodicity ?
  - Sometimes « one shot »

What is our mission as OP ?

- Perform those public health screenings ?
  - Why not … it helps to maintain work-ability
  - Do we have time?
- Be sure they are done !
  - Send to GPs ?
- Save time for health promotion ?
  - Is health promotion on the workplace efficient ?
  - Yes, but
    - If you identify the right target (Saltychev, Scand J Work Environ Health 2012)
    - The cost is high (van Dongen, Scand J Work Environ Health 2012)
    - The effects are usually moderate (Rongen, Am J Prev Med 2013)

Legal aspects in France

- Periodical examination
  - Every year for every one → 30 July 2004
  - 2004 → 2012
    - Every 2 years for everyone
  - Décret n° 2012-135 du 30 janvier 2012
    - Every 2 year for specific risk factors
    - Less surveillance if not exposed
  - Law august 2016
    - Every 4 year for specific risk factors (and consultation by a nurse at year 2)
    - Max every 5 years, possibly by a nurse for others
- EBM or driven by the shortage of physicians ?

SCREENING FOR OCCUPATIONAL DISEASES, WHICH CAN IMPAIR WORK ABILITY ?

An old question…

Brit. J. industr. Med., 1951, **8**, 53.

THE ROLE OF PERIODIC EXAMINATION IN THE PREVENTION OF COALWORKERS' PNEUMOCONIOSIS

BY

A. L. COCHRANE, C. M. FLETCHER, J. C. GILSON, and P. HUGH-JONES

From the Pneumoconiosis Research Unit of the Medical Research Council, Llandough Hospital, Nr. Cardiff

There can be no doubt that coalworkers' pneumoconiosis presents one of the most serious problems in industrial medicine in Britain, at least in respect of the numbers of men affected. From 1931 up to

are really no more than a provisional target for engineers engaged on dust suppression.

Since the complete suppression of all airborne dust in the mines is impracticable and safe

Occupational rhinitis

- Recommendations French Society of OM (Ameille & Coll. 2011)
- For what / whom ?
  - Flour, hairdressing products, latex, dust mites, aldehydes, quaternary ammoniums , wood dust, amines isocyanates …
  - Bakers, hairdressers, health professionals & cleaners : 72% of cases
- How?
  - During training and the first two years of practice
  - Asking for intermittent or persistent symptoms of :
    - nasal congestion, sneezing, rhinorrhea, itching
  - Which improve during WE and holidays

Wood dust

- Recommendations SFMT 2011 : nasal cavity and paranasal sinus cancer

- Not recommended : X rays, MRI, CTscan

- Recommended
  - For whom ?
    - > 30 years after the first exposure
    - For exposures
      - > 12 months
      - > 1 mg/m^3/day
  - How ?
    - Nasal endoscopy + search for symptoms every 2 years

Screening for occupational asthma

- Recommendation of the ERS Task Force on the Management of Work-related Asthma (Wilken, Eur Respir Rev 2012)
  - Literature review : 72 articles included

- Screen from the first exposure

Recommendations	Strength of recommendation	Level of evidence
Questionnaire-based identification of all workers at risk of developing work-related asthma is recommended as basis for surveillance	Strong	High
Pre-placement screening for specific cross-reacting, work-associated sensitisation among potentially HMW allergen-exposed subjects is recommended in order to identify those at higher risk for work-related asthma	Strong	Moderate
Detection of sensitisation either by specific IgE or SPT should be included in surveillance (not only pre-placement) for identification of subjects at risk of work-related asthma with foreseeable regular exposure to HMW agents (such as laboratory animals, bakery dust, enzymes or latex)	Strong	Moderate
In atopics and subjects with pre-existing asthma or sensitisation, pre-employment investigation should be performed in order to inform them about their increased work-related asthma risk	Weak	Moderate
Because of the low PPV, exclusion of asymptomatic atopics or sensitised subjects from exposure to potential occupational allergens or irritant agents cannot be recommended		
In all workers with confirmed occupational rhinitis and/or NSBHR, medical surveillance programmes should be performed		
They should include periodic administration of a questionnaire, detection of sensitisation by standardised SPT or serum specific IgE antibodies, early referral of symptomatic and/or sensitised subjects for specialised medical assessment and assessment of asthma	Strong	Moderate
Surveillance programmes should already be implemented during vocational training of individuals at risk		
Identification of symptoms or sensitisation during surveillance should result in an investigation to confirm or exclude occupational asthma, work-related asthma, rhinitis and COPD	Strong	High
Risk stratification by diagnostic models can be used in medical surveillance to select exposed workers for further medical evaluation	Strong	Moderate
As a secondary prevention measure, a comprehensive medical surveillance programme should, in addition to early detection of sensitisation, allergic symptoms and occupational asthma, comprise exposure assessment and intervention targeted both at workers and exposure	Strong	Moderate

HMW: high molecular weight; Ig: immunoglobulin; SPT: skin-prick test; PPV: positive predictive value; NSBHR: nonspecific bronchial hyperresponsiveness; COPD: chronic obstructive pulmonary disease.

Diseases worsened by work ?

- Screening for breast cancer
- Shift work = risk factor (IARC 2A)
  - So women > 50 + shift work : screening ++
- But (Tsai, Am J Ind Med 2013)
  - US National Health Interview Survey
  - Women who perform shift work participate less to breast cancer screening than those in day shift
  - 23% vs 34% ($p<0,05$)

Pre-employment

- Cochrane review
- 2 RCTs, 7 controlled before-after (CBA) studies, and 2 interrupted time-series studies (ITS)
  - Very low quality evidence that a general examination for light duty work may not reduce the risk for sick leave,
    - but may have a positive effect on fitness for duty for army recruits after 12 months follow-up.
  - Inconsistent evidence of an effect of job-focused pre-employment examinations on the risk of musculoskeletal injuries in comparison with general or no pre-employment examination.
- Pre-employment examinations may result in an increase of rejecting job applicants in six out of seven studies.

Schaafsma et al., Cochrane Database of Systematic Reviews 2016, Issue 1. Art. No.: CD008881.

WHICH TOOLS ?

CONSIDER SENSITIVITY AND SPECIFITY BEFORE APPLY

« use under medical supervision »

Se / Sp of physical examination

- Sometimes very limited

- Carpal tunnel syndrome (Dale, Am J Ind Med 2011)
  - 1108 pre-employment screening
  - Clinical signs vs Nerve conduction velocity
  - Good specificity but sensitivity not > 20%

Se / Sp of physical examination : shoulders

Table 2 Alphabetical list of common scapular physical examination tests

Test name(s)	Pathology	Lead author	Sensitivity	Specificity
Scapular dyskinesis test	Shoulder pain	Tate[8]		
	>3/10 shoulder pain		24	71
	>6/10 shoulder pain		21	72
Winging scapula	Shoulder pain	Struyf[7]	11	86
Tilting scapula	Shoulder pain	Struyf[7]	33	78
Kinetic medial rotation test	Shoulder pain	Struyf[7]	28	28
Lateral Scapular Slide test	Shoulder dysfunction	Odom[34]		
1 cm threshold				
0° Abduction			35	48
45° Abduction			41	54
90° Abduction			43	56
1.5 cm threshold				
0° Abduction			28	53
45° Abduction			50	58
90° Abduction			34	52

Wright AA, *et al. Br J Sports Med* 2013;**47**:886–892.

Use of questionnaires

- Screening for CTS in epidemiological studies (d'Escatha, OEM 2010)
  - Gold standard : Nerve conduction velocity
  - Questionnaire better than physical examination

- Follow-up of animal workers (Allan Occ Med 2010)
  - « spirometry does not detect new cases other than those already identified by questionnaire »

Clinical biomarkers for the detection of alcohol dependence

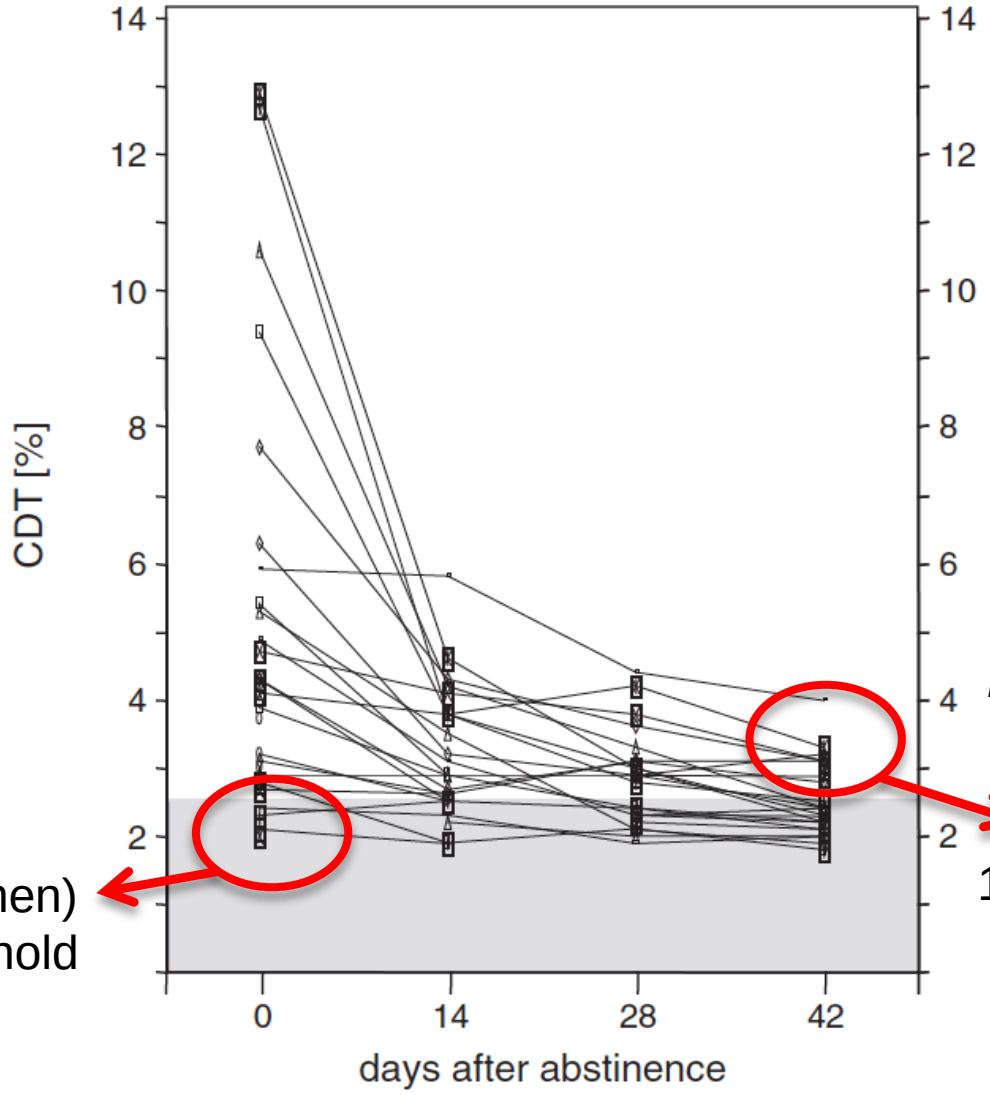
Test	Sensitivity(%)	Specificity(%)
CDT	60 – 70 *	80 – 95
gGT	40 - 60	80 - 90
MCV	30 – 75	60 – 90
AST	20 – 80	50 – 95 **
Ethyl Glucuronide	70 – 90	80 - 95
CDT + gGT	60 – 90	80 – 95
CDT + MCV	60 – 95	80 - 95

* : low sensitivity if < 50 g/j or occasional
** : AST/ALT > 2 good Sp, bad Se
Increase > 40% AST : 90% Se for relapse

Tavakoli et al, Innov Clin Neurosci. 2011;8(3):26–33

Use of CDT to monitor for abstinence

N=29
M = 189 g/j
Threshold CDT : 2,6%



I don't drink anymore !

I don't drink !

4 patients (3 women) with CDT < threshold

10 patients with CDT > threshold at 6 weeks

Ridinger, Experimental and Molecular Pathology 92 (2012) 50–53

So

- If a screening is warranted …
- Use the appropriate tools
  - Use of questionnaires is sometimes enough
    - Questionnaire specific
    - Favour sensitivity instead of specificity
    - Personnel trained (occupational health nurses ?)
- The screening strategy must be defined according to the risks and the diseases we target

ETHICAL ASPECTS

Limitations of screening

- Screening can involve cost and use of medical resources on a majority of people who do not need treatment.
- Adverse effects of screening procedure
  - e.g. stress and anxiety, discomfort, radiation exposure, chemical exposure.
- False positives
  - Stress and anxiety caused by a false positive screening result.
  - Unnecessary investigation and treatment of false positive results.
- False negatives
  - A false sense of security, which may delay final diagnosis
- True positives
  - Stress and anxiety caused by prolonging knowledge of an illness without any improvement in outcome.
  - Overdiagnosis : identification of forms of the disorder with a spontaneous good prognosis (*e.g.* prostate cancer)

Prostate cancer

44 « real » cancers for 1000 people

Screening	1000 men without screening
Benefit	
Nb who die from prostate cancer	8
Nb who die from other cause	200
Harm	
Nb diagnosed and treated without benefit	0
False positive and biopsy	0

Djulbegovic, BMJ 2010

Prostate cancer

44 « real » cancers for 1000 people

Screening	1000 men without screening	1000 men screened (IC 95%)
Benefit		
Nb who die from prostate cancer	8	7 (6-9)
Nb who die from other cause	200	198 (194-202)
Harm		
Nb diagnosed and treated without benefit	0	20
False positive and biopsy	0	180

Djulbegovic, BMJ 2010

Screening for lung cancer

- NLST (National Lung Screening Trial)
- Population : 50 000 people
  - Smokers or former smokers (> 20 cig/day for 30 years)
  - 55 - 74 years old
- Low dose Computed Tomographic screening
  - 1/year for 3 years
- Se : 94%, Sp : 73%
- noncalcified nodules with long-axis diameters of 4 mm or greater in the axial plane were considered to be positive for potential lung cancer.
  - 96% of false positives

Aberle et al. NEJM 2011;365:395-409

NLST trial

- Benefits : significant reduction of
  - 20 % mortality by lung cancer
  - 6,7 % total mortallity
- Harms :
  - Irradiation → cancer risk ?
  - False positives → investigations → morbidity
    - 290 biopsy procedure
      - 6 deaths

Aberle et al. NEJM 2011;365:395-409

Conclusions on health screening

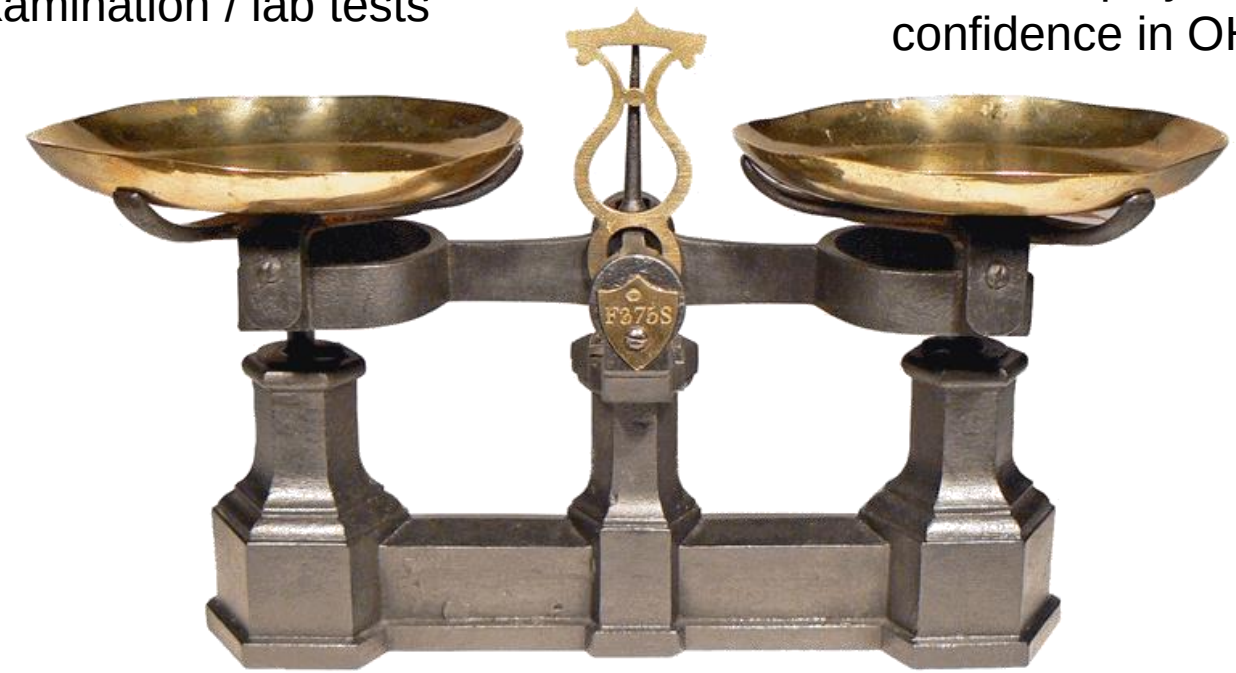
- Periodical assessment for screening ?
  - Valid for some medical conditions, unrelated to work
    - Is it the job of Ops or GPs ?
  - The screening strategy must be defined according to the risks and the diseases we target
    - On size DOES NOT fits all !
- Beware of the risk of exclusion
- Consider the benefits AND the harms of screening
  - Primum non nocere

- Meet employees around 45 to assess health status ?

Another factor to consider : trust

Avoid to perform unnecessary examination / lab tests

Benefits of relationship building ?
Gain employees confidence in OHS

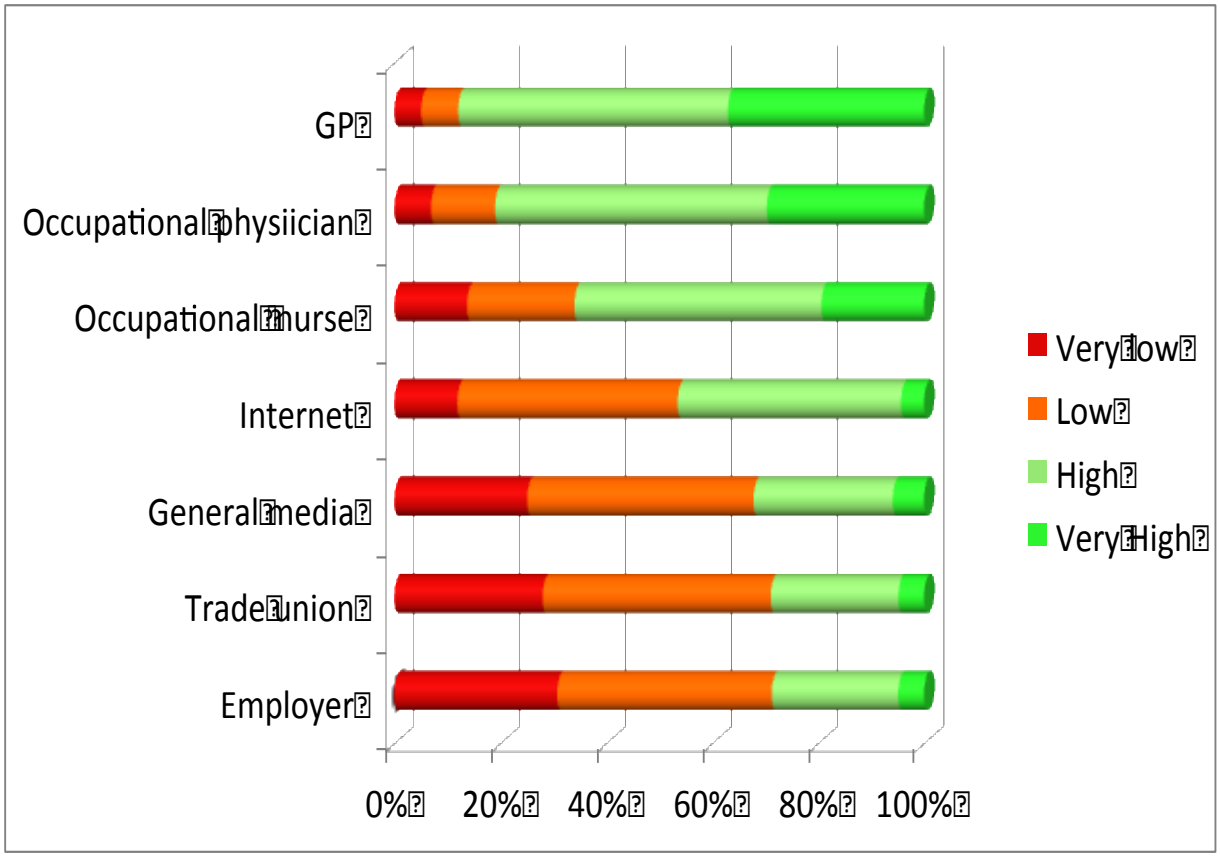


Can employees trust us if they never see us ?

Not everything that can be counted counts and not everything that counts can be counted (WB Cameron, 1963)

Level of trust in the provider of information on health at work

Study in Normandy among 2641 employees



Rollin & Gehanno, Occ Med 2013


EMPLOYEE
(resources, health)
- Fonctional capacity
- Physical activity and other lifestyle factors
- Self initiative
WORK AND WORK CONDITIONS
(Ergonomics, occupational hygiene, occupational safety)
- Organization of work
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Work ability maintenance
PROFESIONNAL SKILLS
(expertise)
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- New technology
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(management, interactions)
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- schedules

FIOSH

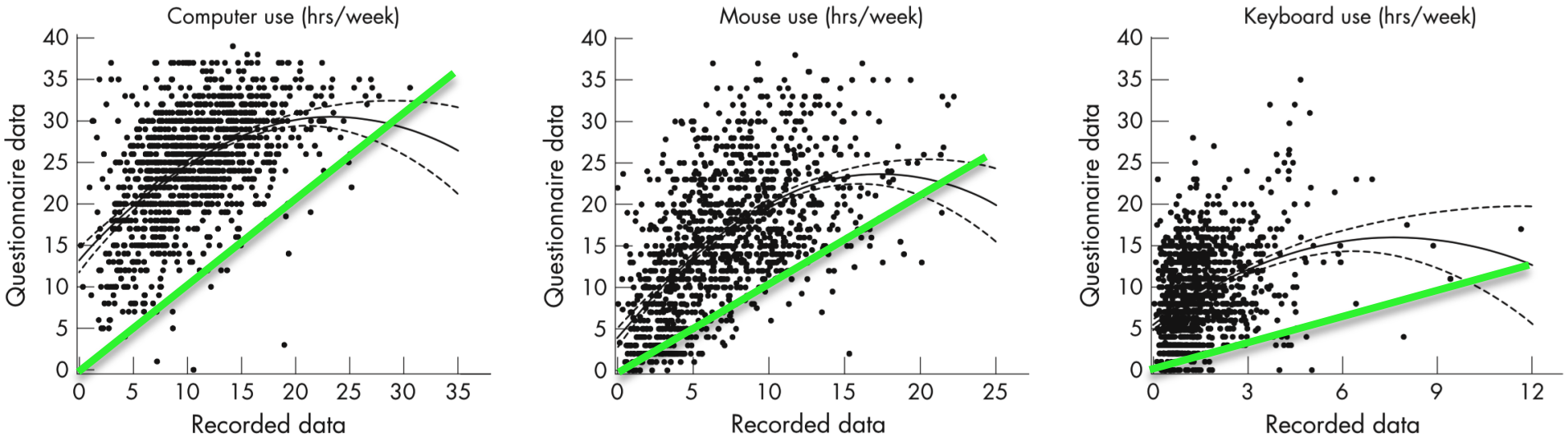
Validity of self-assessment: physical risk factors

- MSD risk factors (Mortimer, Appl Ergon 1999;30(6):477-86)
  - Time spent sitted, standing hand above shoulders, at trunc level or below waist
  - 20 persons: observation vs questionnaire
  - Good agreement
- Job constraints (Hjelm, J Occup Environ Med 1995;37(10):1210-7)
  - 39 men, 58 women
  - Ratings of physical exertion & physical activity at the end of a work shift vs average heart rate during the same work shift
  - Significant correlation for men ($p<0,01$)
  - No relation for women
- Noise exposure (Neitzel, J Occup Environ Hygiene, 8: 310–323)
  - Perceived vs measurement
  - Poor agreement

Validity of questionnaire self-reports on computer, mouse and keyboard usage during a four-week period

Sigurd Mikkelsen, Imogen Vilstrup, Christina Funch Lassen, Ann Isabel Kryger, Jane Frølund Thomsen, Johan Hviid Andersen

Occup Environ Med 2007;**64**:541–547. doi: 10.1136/oem.2005.026351



Questionnaire (self assesment) = recorded exposure

Figure 1 Scatter plots of questionnaire data versus objectively recorded data on computer, mouse and keyboard usage (hours per week) during the same four-week period (n = 1211). The lines are regression lines with 95% confidence intervals (y = bx + bx2).

Software-recorded and self-reported duration of computer use in relation to the onset of severe arm—wrist—hand pain and neck—shoulder pain

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« No association was found between the software-recorded duration of computer use at work and the onset of severe arm-wrist-hand and neck-shoulder symptoms using an exposure window of 3 months. In contrast, a positive association was found between the self-reported duration of computer use at work and the onset of severe arm-wrist-hand and neck-shoulder symptoms. The different findings for recorded and self-reported computer duration could not be explained satisfactorily. »

Table 5 Univariate and multivariate associations between self-reported and recorded duration of computer use at work and arm—wrist—hand and neck—shoulder cases

	Arm—wrist—hand		Neck—shoulder	
Exposure variable	**Univariate RR (95% CI)**	**Multivariate* RR (95% CI)**	**Univariate RR (95% CI)**	**Multivariate† RR (95% CI)**
Self-reported duration of total computer use at work, h/day				
0 to <4	1	1	1	1
4 to <6	1.4 (0.9 to 2.2)	1.9 (1.1 to 3.1)	1.3 (0.9 to 1.7)	1.1 (0.8 to 1.5)
≥6	2.0 (1.3 to 3.0)	2.0 (1.2 to 3.2)	1.7 (1.3 to 2.3)	1.2 (0.9 to 1.6)
Self-reported duration of mouse use at work, h/day				
0 to <2	1	1	1	1
2 to <4	0.9 (0.6 to 1.4)	1.1 (0.7 to 1.7)	1.0 (0.7 to 1.3)	1.1 (0.8 to 1.5)
≥4	1.5 (1.0 to 2.2)	1.4 (0.9 to 2.1)	1.6 (1.2 to 2.2)	1.5 (1.1 to 2.0)
Recorded duration of total computer use at work, h/week				
1 to <10	1	1	1	1
10 to <14	1.0 (0.7 to 1.4)	1.0 (0.7 to 1.5)	1.0 (0.7 to 1.4)	1.2 (0.8 to 1.6)
14 to 36	0.9 (0.6 to 1.4)	0.9 (0.6 to 1.4)	0.8 (0.5 to 1.1)	0.8 (0.6 to 1.1)
Recorded duration of mouse use at work, h/week				
0 to <5	1	1	1	1
5 to <7	0.8 (0.5 to 1.2)	0.8 (0.6 to 1.2)	0.8 (0.6 to 1.1)	0.8 (0.6 to 1.1)
7 to 22	0.9 (0.6 to 1.3)	0.9 (0.6 to 1.3)	0.8 (0.5 to 1.1)	0.8 (0.6 to 1.1)
Recorded duration of keyboard use at work, h/week				
0 to <2	1	1	1	1
2 to 3	0.8 (0.6 to 1.2)	1.0 (0.7 to 1.4)	0.9 (0.6 to 1.2)	1.1 (0.8 to 1.6)
3 to 13	0.7 (0.5 to 1.1)	0.7 (0.5 to 1.1)	0.8 (0.5 to 1.1)	1.0 (0.7 to 1.4)

Occup Environ Med 2011;68:502-509.

Conclusion

- Periodical assessment of the health status of employees to maintain work ability is not evidence based
  - And may be harmful
  - Except for some exposures to specific risk factors !
- Using periodical examination to assess exposures at work is probably misleading
- Go to the workplace to assess exposures
  - Probably more efficicent than using periodical health assessment to assess workplace exposures
  - And act to reduce exposures !

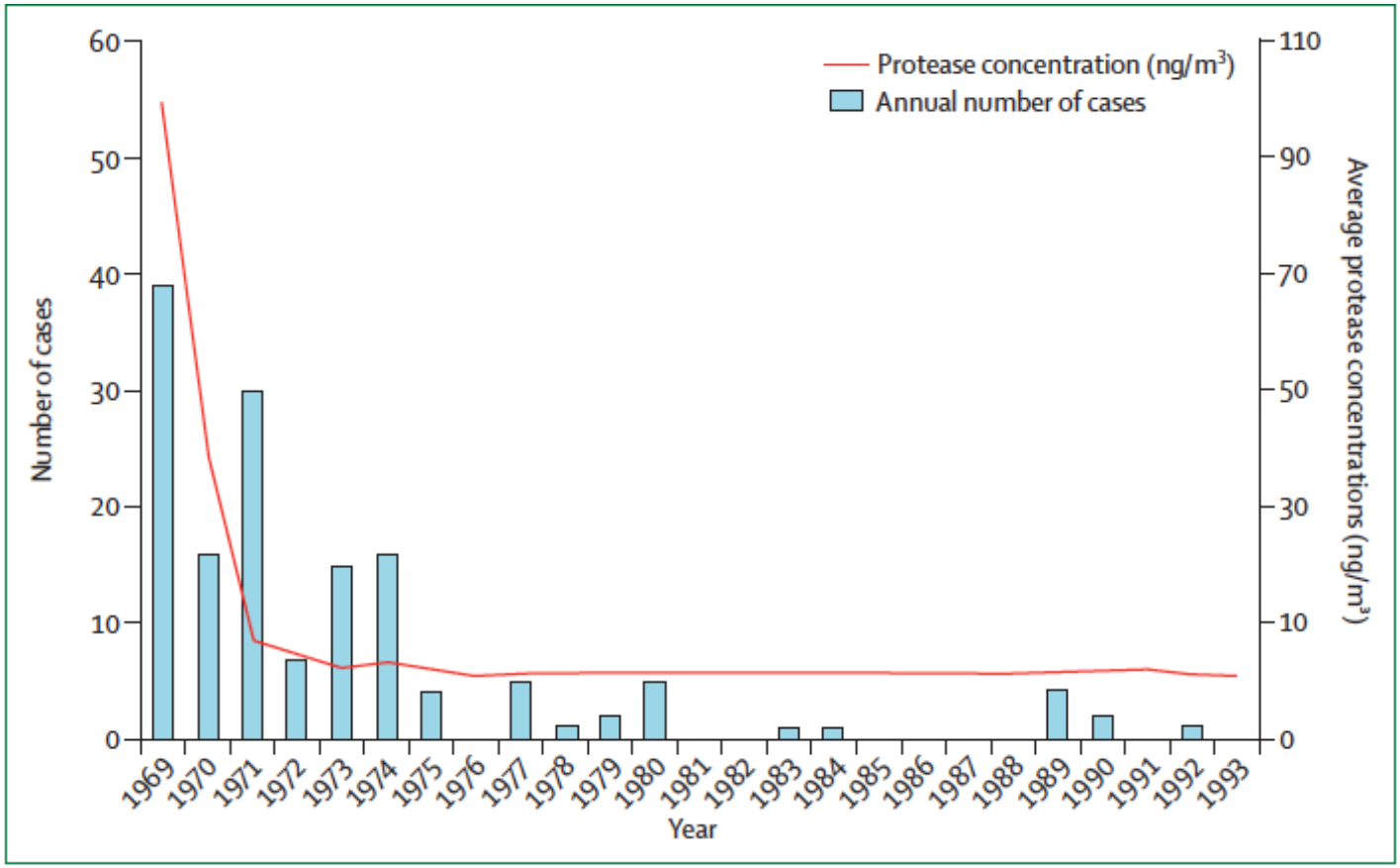

Figure 6: **Annual incidence of occupational asthma and average concentrations of protease exposure in factory air in 1969–93 in five UK detergent powder factories**
Data adapted from Cathcart and colleagues.[96]

Cullinan et al., Lancet Respir Med 2017

THANK YOU FOR YOUR ATTENTION