

the relevant information. Developing a well-formulated research question is one of the challenging tasks an occupational health professional encounters when planning a public health intervention.

The detailed specification of the question will guide many aspects of the research including the formulation of the search strategy. The structure of the search strategy should be based on a clearly defined research question. The World Health Organisation suggests the PICO model to help defining the question. This acronym stands for Population (P), Intervention (I), Comparison (C), and Outcome (O). You cannot simply use the PICO terms to search in PubMed – the free search engine maintained by the US National Library of Medicine. You have to translate them into search terms. There are two types of search terms: the Medical Subject Headings (MeSH) terms and the ‘free text words’ (ie. non-MeSH terms). First, you have to define the MeSH terms from the PubMed thesaurus to produce highly specific searches. Then, it is recommended to include ‘free-text words’ considering that these search strategies are usually more sensitive than those containing MeSH terms only. When using non-MeSH terms, it is important to check for synonyms of the selected non-MeSH terms (eg. tennis elbow and epicondylitis), taking into account differences between British and American spelling and vocabulary.

In addition, you can take advantage of ready-to-use search filters for prompt identification of pertinent literature available in PubMed.

#### 1652c WHAT STUDY DESIGNS CAN BE UTILISED TO EVALUATE THE EFFECTIVENESS OF INTERVENTIONS?

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10.1136/oemed-2018-ICOHabstracts.452

**Introduction** When evaluating the effectiveness of an intervention it is imperative that one uses the research design with the smallest possible risk of bias (i.e. highest methodological quality).

**Methods** During this talk I will present a range of study designs that can be used to conduct assessments of intervention effectiveness. These range from the established gold standard for clinical interventions, the randomised controlled trial (RCT), to various non-randomised designs, time-series and case-control studies.

**Result** It will hopefully become apparent that a lot of the criticism against RCTs being too difficult in occupational health settings is actually often based on misconceptions. At the same time, it is also true that the RCT is not a one size fits all solution, i.e. the only study design that can yield informative results. It is good to understand that there is a gradient from low inherent risk bias methods, such as the RCT, that yield the most reliable results to increasing risk of bias and less reliable results when, for example, one relaxes the demands for removing various sources of confounding.

**Discussion** Conducting an intervention effectiveness study requires considerable investment in terms of time, money and resources. At worst all this goes to waste by planning, conducting and reporting studies that are either uninformative, unreliable or both.

#### 1652d PREVENTIVE OCCUPATIONAL HEALTH INTERVENTIONS: SOME WORKPLACE EXAMPLES

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10.1136/oemed-2018-ICOHabstracts.453

Three examples of evaluating Dutch workplace interventions will be presented. This is input for discussing the essential elements in evaluations of interventions at workplaces on outcomes for work-related diseases or injuries.

- i. Needle stick injuries (NSIs) are frequently reported as occupational injuries among health care workers. The objective of a cluster randomised trial was to evaluate whether the number of NSIs decreased among health care workers at risk (n=796) after introduction of injection needles with safety devices in combination with an interactive workshop in an academic hospital. This combined intervention led to the highest reduction in the number of self-reported NSIs compared to a workshop alone or no intervention.
- ii. Low back complaints are frequently reported as work-related diseases among bricklayers. The objective of a within-subject controlled intervention study was to evaluate whether work related risk factors and discomfort of the low back decreased among bricklayers (n=10) after introducing a scaffolding console to adjust the working height of the storage of materials in a construction company. Working with a scaffolding console resulted in a significant reduction of the frequency and duration of trunk flexion 79% and 52% respectively, and as well as discomfort of the lower back compared with bricks set out on the ground floor.
- iii. Occupational risks affect the health of construction workers. The objective of a non-randomised controlled trial was to evaluate whether a job-specific workers' health surveillance improved the preventive actions of construction workers (n=374) following occupational physicians recommendations. In total 73% of the workers undertook job-specific actions versus 59% in the control group, while occupational physicians provided more job-specific recommendations in the intervention group.

Risk assessment, context related interventions and compliance to interventions are essential elements before and alongside the evaluation of real world preventive interventions.

#### 1702 EFFECTIVENESS OF PERIODIC HEALTH EXAMINATION IN EUROPE AND ASIA

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10.1136/oemed-2018-ICOHabstracts.454

**Aim of special session** The session will give the audience the current status, effectiveness, challenge, and new perspectives of periodic health (medical) examination in Europe and Asia, which is widely performed in many countries as one of tools of occupational health service for all workers.

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### 1702a PRE-EMPLOYMENT EXAMINATIONS FOR PREVENTING INJURY, DISEASE AND SICK LEAVE IN WORKERS

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10.1136/oemed-2018-ICOHabstracts.455

**Introduction** To evaluate the effectiveness of pre-employment examinations of job applicants in preventing occupational injury, disease and sick leave.

**Methods** We systematically searched in medical databases for randomised controlled trials, controlled before-after studies, and interrupted time-series studies up to March 2015.

**Result** Nine studies evaluated the screening process as a whole. Two studies evaluated measures to mitigate the risks found following the screening process. The studies were too heterogeneous for statistical pooling of results.

There is very low quality evidence based that a general examination for light duty work may not reduce the risk for sick leave (MD -0.09, 95% CI: -0.47 to 0.29). For army recruits, there is very low quality evidence that there is a positive effect on fitness for duty after 12 months follow-up (OR 0.40, 95% CI: 0.19 to 0.85).

There is 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. There is very low quality evidence that incorporation of a bronchial challenge test may decrease occupational asthma (trend change -2.6, 95% CI: -3.6 to -1.5) compared to a general pre-employment examination with lung function tests. In six out of seven studies, the rates of rejecting job applicants increased because of the studied examinations.

There is very low quality evidence that risk mitigation among applicants considered not fit for work may result in a similar risk of work-related musculoskeletal injury during follow-up compared to workers considered fit for work.

**Conclusion** This evidence supports the current policy to restrict pre-employment examinations to only job-specific examinations. Better quality evaluation studies on pre-employment examinations are necessary, including the evaluation of the benefits of risk mitigation, given the effect on health and on the financial situation for those employees who do not pass the pre-employment examination.

### 1702b LESSONS FROM THE EXPERIENCE OF WORKERS' MEDICAL EXAMINATION IN KOREA

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10.1136/oemed-2018-ICOHabstracts.456

Since 1972, workers exposed to the specific risk factors at workspace have been received annual medical check-up in Korea. The number of medical examinees has increased from 8 00 000 in 1972 to 2,000,000 in 2016 with expansion of the working population and the risk factors listed by the regulation. Recently, approximately 500 occupational physicians and 150 medical institutes are participated in this system.

The risk factors have been increasing along with the new scientific findings. There were 31 kinds of risk factors that employers should provide to their employees. They increased to 122 kinds in 1999, and 177 in 2005. Since 2014, health examination to night shift workers has introduced because night shift work can be a risk factor of cardiovascular diseases, insomnia, and gastro-intestinal disorders.

Recently, the diagnosis rate of occupational diseases detected by the health examination is very low (lesser than 0.1%) which is not appropriate for screening on mass medical examination. We also do not have the scientific evidence regarding effectiveness of the workers' medical examination system for preventing of occupational diseases. However, the system has an important role of surveillance for health condition by exposure to hazardous substances and of providing occupational health services with the medical test results. Moreover, the opportunity of the annual health check-up of small sized industries is still valuable for detecting work-related diseases and life style diseases as well, which justifies the good reason for performing the periodic medical examination.

The purpose of the workers' medical examination at the beginning was not only limited to the early diagnosis of occupational diseases, but the basic information of occupational health services at workplace. The medical examination system should be amended continuously to accomplish the both purposes: early diagnosis (screening) and occupational health services (promotion).

### 1702c PERIODIC HEALTH EXAMINATION FOR WORKERS IN TAIWAN

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10.1136/oemed-2018-ICOHabstracts.457

In Taiwan, the Labour Health Protection Regulation is implemented on the basis of Occupational Safety and Health Act. The Regulation mandates employers arrange screening health examinations for employees before starting to work and also lists 12 categories of special health examinations targeting at jobs with exposure to special health hazards such as ionising radiation, noise, lead, etc. Workers who have certain diseases and conditions are not allowed to engage in certain categories of jobs. Employers are required to conduct a health examination on workers who are under 40 years of age every five years. For those who are between 40 and 65 years of age, health examinations should be conducted every three years, and for those who are above 65 years of age, every year. For workers who were engaged in the hazardous jobs listed by the Regulation, the health examination should be conducted