A Systematic Review of the Health of Health Practitioners

Joanne O. Crawford, Amy Shafrir, Richard Graveling, Ken Dixon and Hilary Cowie
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EXECUTIVE SUMMARY

Introduction
A systematic review was carried out to address questions with regard to the health of health practitioners within the regulated health professions. The questions to be addressed within the review were:

1. The nature and prevalence of physical health problems in health practitioners and whether these problems differ from those in the general public.
2. Unique factors that contribute to physical health problems in the workplace of health professionals
3. Impact of a health practitioners poor health on service quality, delivery and patient safety
4. Health seeking behaviours of the health practitioner with regard to physical ill health.
5. Referral, follow-up care, rehabilitation and re-integration back into the workplace of the health practitioner
6. Examples of good practice with regard to identification, prediction, prevention and management (what works and what does not work)
7. Any illustrations of how health concerns are currently managed.
8. Particular needs of minority groups
9. Predisposition and risk of practitioners in training; health, dental

Further information was obtained with regard to the management of ill health through interviews with representatives from the regulators.

Methodology
A search strategy was developed and electronic databases interrogated and websites search. On completion of the searches abstracts and titles were screened against inclusion criteria. Full publications were obtained and data extracted from them. Papers were evaluated on methodology (+ or -) and given a rating based on ***, strong evidence, **, moderate evidence, * limited or contradictory evidence and – no scientific evidence.

Search Results
A total of 1,244 papers were identified through the search process. Post-screening, 919 were removed that did not fit the inclusion criteria. Three hundred and eighteen documents were obtained but 7 could not be obtained within the timeframe. A total of 201 papers were included in the review.

The nature and prevalence of physical health problems in health practitioners and whether these problems differ from those in the general public.

Health Care Workers

Substance Abuse/Misuse

There is limited evidence from two studies that addiction and substance misuse interventions may raise awareness about misuse issues in healthcare workers (*).

Violence Assault or Aggression
There is moderate evidence from one study that violence during healthcare assistants and helpers trainee periods predisposes the trainees to violence during their first year of work after graduation (**)

There is moderate evidence from five studies of a high prevalence rate of violence in healthcare workers (**)

There is moderate evidence from two studies that patients are the most frequent perpetrators of violent incidents (**)

There is limited evidence from one study that violent incidents are underreported (*)

There is limited evidence from one study that younger healthcare workers are exposed to more violence than older healthcare workers (*)

*Dermatitis*

There is moderate evidence from three studies that healthcare workers have a higher incidence of dermatitis than other occupational groups (**)

There is limited evidence from one study that corn-starch powdered gloves may cause cases of hand dermatitis (*)

There is limited evidence from one study of hand dermatitis caused by an allergy to drugs, especially antibiotics (*)

There is limited evidence from two studies that frequent hand washing increases the prevalence of hand dermatitis (*)

*Shift Work and Fatigue Management*

There is moderate evidence from two studies that poorer physical health is related to working the night shift compared to other shifts (**)

There is limited evidence that female nurses have lower workability index scores than male colleagues particularly in those on shiftwork (*)

*Workplace Injuries*

There is moderate evidence from two studies that the most common type of workplace injury is musculoskeletal injuries (**)

There is moderate evidence from two studies that the highest rates of injuries are seen in long-term care facilities (**)

There is moderate evidence from one study that causal and part-time healthcare workers are less prone to injuries than full-time workers (**)

*General Health*

There is moderate evidence from two studies that nurses have a high incidence and prevalence rate of occupational asthma compared to other occupational groups (**)

There is moderate evidence from two studies that back injuries are the most frequent type of injuries in healthcare workers (**)

There is limited evidence from one study that nurses visit physicians less frequently than other medical staff (**)

There is limited evidence from one study that biomedical scientists have the highest incidence rate of occupational asthma compared to other occupational groups (*)

**Musculoskeletal Symptoms**

There is moderate evidence from two studies that back pain is the most frequently reported musculoskeletal disorder (**)

There is moderate evidence from two studies that higher biomechanical demands and ergonomic loads are associated with higher prevalence rates of musculoskeletal disorders (**)

There is limited evidence from one study that black and female healthcare workers have higher rates of musculoskeletal workers compared to their colleagues (*)

There is limited evidence from one study that nurses’ aides have higher rates of musculoskeletal disorders than other direct patient care providers (*)

There is limited evidence from one study that a zero lift policy reduces back injury claims, time lost due to claims and costs incurred per claim in healthcare workers. More research is needed to identify the key components of the zero lift policy (*)

**Exposure to Antineoplastic/cytotoxic drugs**

There is moderate evidence from two studies that increased DNA damage in healthcare workers is due to exposure to antineoplastic drugs (**)

There is moderate evidence from two studies that a longer duration of exposure to antineoplastic drugs is associated with increased DNA damage in healthcare workers (**)

There is limited evidence from one study that increased use of personal protective equipment reduces DNA damage (*)

**Biomedical Scientists**

**Dermatitis**

There is moderate evidence from two studies that biomedical scientists have a higher incidence of hand dermatitis than the general workforce (**)

**Musculoskeletal**

There is limited evidence from one study that an education and ergonomic intervention reduce musculoskeletal disorders (*)

There is limited evidence from one study that biomedical scientists have a high prevalence rate of musculoskeletal disorders (*)
**Chiropodists**

There is limited evidence from one study that the use of non-vacuum drills increases respiratory and eye symptoms (*).

There is limited evidence from one study of a high prevalence of respiratory and eye symptoms in chiropodists (*).

**Chiropractors**

There is limited evidence from one study that chiropractors experience musculoskeletal injuries in the first few years of practice. Further larger scale research is required to corroborate these findings. (*)

**Dental Hygienists**

There is moderate evidence that dental hygiene work is associated with increased self-reported musculoskeletal symptoms (**).

There is moderate evidence that dental hygiene work is linked to an increase in carpal tunnel syndrome reporting (**).

There is moderate evidence from one study that sickness absence in dental hygienists is affected by both psychosocial and physical work factors. (**) 

**Dental Nurses and Dental Assistants**

There is limited evidence from one paper that respiratory symptoms are associated with exposure to methacrylates by dental nurses. Further research is required to corroborate this (*).

There is limited evidence from one study that dermatitis in dental nurses is associated with methacrylates and rubber chemicals causing allergic contact dermatitis and hand washing with irritant contact dermatitis. Further research is required to corroborate this finding. (*)

There is moderate evidence from two studies that dental assistants’ self-report levels of musculoskeletal symptoms are high. (**) 

**Dental Technicians**

There is limited evidence that dental technicians suffer from musculoskeletal symptoms as a result of the work environment (*).

There is limited evidence that dental technicians report hand dermatitis at rates consistent with other dental professionals. (*)

**Dentists**

**General Health**

There is currently limited evidence from one cross-sectional study that the majority of dentists report being in good or excellent health (*)
Cancer Risks

There is limited evidence from one study that dentists may be at an increased risk of certain cancers. Further research is required to corroborate this finding (*).

Dermatitis

There is limited evidence one study that dental personnel do not show higher rates of allergic contact dermatitis. (*)

Musculoskeletal Symptoms

There is limited evidence from one study that dental students report a high level of musculoskeletal symptoms (**) 

There is moderate evidence from several studies that dentists suffer from a high number of musculoskeletal symptoms (**) 

Sickness Absence

There is limited evidence from one study that recent dental graduates attend work when unwell (*)

Doctors

Addiction/Substance Misuse

There is moderate evidence from two studies that the majority of impaired doctors report using alcohol and a lesser percentage report using prescription drugs (**) 

There is moderate evidence from two studies that over a quarter of impaired doctors had received psychiatric treatment in the past (**) 

There is limited evidence from one study that impaired female physicians are more likely to report medical problems, psychiatric problems, past or present suicide ideation or try to commit suicide (*)

Violence, Assault or Aggression

There is moderate evidence from three studies of a high prevalence of violence particularly verbal abuse towards doctors (**) 

There is limited evidence from one study that psychiatrists have a high risk of facing non-fatal assault during their career (*)

There is limited evidence from one study that having patients with drug problems, working more than 40 hours per week and conducting home visits during business hours leads to higher levels of violence towards doctors (*)
Cancer Risks

There is limited evidence from one study that overall incidence of cancer does not differ between doctors and the reference population (*).

There is limited evidence from one study that doctors have a higher risk of haematological malignancies (*).

General Health

There is moderate evidence from two studies that doctors suffer more from chronic disease than the general population (**).

There is limited evidence from one study that female doctors report better health than the general population (*).

There is limited evidence from one study that male doctors report the same level of good health as the general population (*).

Mortality Rates

There is moderate evidence from one study that the mortality rates of doctors generally lower than the general population. (**)]

There is moderate evidence from one study that physicians are more at risk of suicide than the general population (**).

There is moderate evidence from one study that mortality rates for anaesthesiologists are higher when compared other physician groups (**).

Sickness Absence

There is limited evidence from one study that doctors tend not to take sick leave while infected with influenza or respiratory diseases compared to other diseases and disorders (*).

Nurses and Midwives

General Health

There is moderate evidence from one study that identified that nurses visited the doctor less than a control group. (**)

There is limited evidence from one study that musculoskeletal symptoms and the limited use of lifting aids is associated with leaving the nursing profession (*).

Shift Work and Fatigue Management

There is moderate evidence from one paper that increasing age and poor psychosocial work factors impact on sleep (**).

There is moderate evidence from one paper that physical leisure activity reduces the impact of developing persistent fatigue (**).
There is moderate evidence from one paper that organisational and psychosocial work factors interact both negatively and positively with ill health symptoms (**).

**Violence, Assault or Aggression**

There is moderate evidence to show that nurses are more at risk of violence than other occupational groups (**).

There is moderate evidence to show that both male nurses and less experienced nurses are more at risk of violence (**).

There is moderate evidence that there is more risk of a violent attack in psychiatric care (**).

There is moderate evidence that nurses are more at risk of violence during night work and when under time pressure (**).

**Cancer Risks**

There is an increased risk of breast cancer in females working night or shift work involving nights. (**)

**Dermatitis**

There is limited evidence that hand dermatitis in nurses is associated with previous eczema, dry or itching skin and self-reported exposure to frequent hand washing and disinfectant agents. Further research is required to corroborate this (*)

**Exposure to Antineoplastic Drugs**

There is moderate evidence from three studies that nurses have increased DNA damage due to antineoplastic drugs compared to controls (**).

There is limited evidence from one study that a dose-response relationship exists between DNA damage and duration of exposure to antineoplastic drugs in nurses (*)

There is limited evidence from one study that high exposure to antineoplastic drugs in nurses results in low birth weights, premature deliveries and prolonged times to pregnancy compared to non-exposed nurses (*)

**Musculoskeletal Symptoms in Nurses**

There is moderate evidence suggesting that student nurses report high levels of musculoskeletal symptoms on entry to the profession and symptoms are associated with previous work in healthcare and beginning employment. (**)

There is consistent evidence in multiple studies that musculoskeletal symptoms of the lower back, shoulders and neck are high in nurses and nursing assistants (****)

High physical workload and patient handling have been found to be associated with musculoskeletal symptoms (****)
There is moderate evidence from two studies that musculoskeletal symptoms increase with age (**) 

Working long hours and mandatory overtime has been found to be associated with musculoskeletal symptoms (**) 

Psychosocial factors including less control at work, high levels of mental pressure and boredom are associated with musculoskeletal symptoms (**) 

Interventions to reduce musculoskeletal symptoms from patient handling should be multi-facetted (****) 

Physical activity in one study has been found to reduce musculoskeletal symptom reporting (*) 

*Risks during Pregnancy* 

There is limited evidence from one study that midwives are at an increased risk of spontaneous abortion linked to high workloads. Further research is required to corroborate this. (*) 

There is limited evidence from one small study that nurses are at an increased risk of low birth weight babies. Further research is required to corroborate this. (**) 

There is limited evidence from one study that working night shift was associated with preterm delivery. Further research is required to corroborate this (*) 

There is limited evidence that exposure to sterilising agents in the first trimester of pregnancy is associated with preterm delivery. Further research is required to corroborate this (*) 

*Risks to Fertility* 

There is limited evidence from one study that working night or rotating shifts reduces fecundity in midwives. Further research is required to corroborate this. (*) 

There is limited evidence from one study that high exposure to nitrous oxide by midwives is related to reduced fecundity. Further research is required to corroborate this. (**) 

**Occupational Therapists** 

There is moderate evidence from one paper that there is increased risk of bronchial hyper responsiveness in occupational therapists. Further research is required to corroborate this. (**) 

There is moderate evidence from two papers using the same sample group that musculoskeletal symptoms occur in trainee occupational therapists with increased risk of symptoms over the 4 year study period. (***)
Paramedics

Violence Assault or Aggression

There is moderate evidence from one systematic review that ambulance personnel are more at risk of specific health problems including musculoskeletal disorder, circulatory disorders and mental health problems than the general population (**)

Musculoskeletal

There is moderate evidence that paramedics are at an increased risk of musculoskeletal symptoms compared to the general working population (**)

There is moderate evidence that paramedics have an increased risk of injury or illness compared to nurses and other hospital workers (**)

Pharmacists

There is limited evidence from one paper that pharmacists use non-prescribed drugs but this does not appear to be significantly higher than other health professionals (*)

There is limited evidence from one paper that multidisciplinary treatment programmes can enable impaired pharmacists to return to work (*)

Physiotherapists

There is moderate evidence from one study that low back pain is regularly reported in physiotherapy students and is associated with increased duration of studying (**) 

There is strong evidence that physiotherapists self-report a high level of musculoskeletal symptoms (***)

Risk factors associated with musculoskeletal symptom reporting include handling patients, manual therapy and high patient loads. (**) 

Radiographers

There is evidence that the prevalence of musculoskeletal symptoms for those involved in radiography is higher than other occupational groups and this is associated with age and high physical exposures at work. (**) 

There is evidence that there is increased reporting of musculoskeletal symptoms in sonographers. (*)

Ill Health in Relation to the General Population

There has been limited research carried out comparing ill health in health practitioners and the general population. Health practitioners, specifically health care workers have a higher incidence of dermatitis; nurses (from one study) have a higher incidence and prevalence of occupational asthma. Although a lot of research has been carried out in musculoskeletal symptoms much of this has been based on self-report rather than clinical examination. Where there has been a clear diagnostic pathway and reporting system as in dermatology, such comparisons have been made.
Unique Factors that Contribute to the Health Problems of Health Professionals
Due to the varied nature of health practitioners’ work and working environments they are exposed to numerous workplace exposures. However, several work factors impact on the health of individuals and these include patient handling and musculoskeletal symptoms, work equipment and work posture and musculoskeletal symptoms, shift work, exposure to violence, presenteeism, dermatitis and exposure to antineoplastic drugs. While it is appreciated other occupational groups are exposed to some of the risks identified, there has been little interventional research carried out in the area of healthcare.

Impact of a health practitioner’s poor health on service quality, delivery and patient safety
No papers were identified that examined the impact of poor health on service delivery. Sickness absence rates are higher within healthcare than other groups and it is self-evident that where staff are absent this will impact on service delivery. At the current time no research papers are available to inform this question.

Health seeking behaviours of the health practitioner with regard to physical ill health.
There was limited information available with regard to health seeking behaviours and most of that research was among doctors. The research identified that most physicians in the UK are registered with a GP but few had consulted them over the last 12 months. Similar results were found for nurses in one paper. Evidence was found that doctors and dentists attended work when they would have advised others not to. Two thirds of physiotherapists surveyed would seek informal treatment routes from colleagues. However, this may be due to inability to access services out of work hours and concerns about confidentiality. Further research is required to address this.

Interviews with the Regulators
Six interviews were carried out with the regulators of the health professions. These identified a varied caseload. Reporting of health issues to the regulators is either through employee referral or during re-registration when the health declaration is made. The vast majority of cases were for mental health issues. Good practice identified included managing confidentiality during process, the use of mentors, independent medical assessment and continuous education for mentors or supervisors. Challenges to the regulators included deciding whether the issue was a health or social issue, managing episodic illnesses, the nature of the work that individuals are capable of and the insight that medical assessors have with regard to the work carried out by health practitioners.

Confidentiality was maintained during any investigations but interim orders can be used where there is a risk to safety. Where conditions on practice are set down these are monitored. Two of the largest regulators reported carrying out in-house training for those involved in mentoring or supervising practitioners. The findings of any health case are also made public either through circulars or on the regulators website.

All regulated health practitioners have to make health declarations. These are made on entry to the profession. One regulator has biennial registration where the declaration has to be made each time.
Referral, follow-up care, rehabilitation and re-integration back into the workplace of the health practitioner
No papers were identified with regard to these issues

Examples of good practice with regard to identification, prediction, prevention and management (what works and what does not work)
No papers were identified with regard to prediction, prevention or management of ill health

Any illustrations of how health concerns are currently managed.
No research was identified that examined management of ill health concerns. One vignette was identified

Particular needs of minority groups
No papers identified any specific needs within the review

Predisposition and risk of practitioners in training
Again little research was available but the review highlights the burden of musculoskeletal disorders in nurses, physiotherapists and occupational therapists on entry and during training

Data gaps
The review identified a number of gaps including the lack of longitudinal research, the lack of interventional research, no research on the impact on quality of service, no research on the costs of ill health and no collated data on sickness absence.
1 INTRODUCTION

Within the UK and other comparable countries, levels of ill health among NHS staff are high in comparison with other occupational groups. This has been highlighted as a result of the White Paper (Trust, Assurance and Safety) and the need to have health practitioners who are "Fit to Practice".

The following review aims to address the following questions:

1. The nature and prevalence of physical health problems in health practitioners and whether these problems differ from those in the general public.
2. Unique factors that contribute to physical health problems in the workplace of health professionals
3. Impact of a health practitioner’s poor health on service quality, delivery and patient safety
4. Health seeking behaviours of the health practitioner with regard to physical ill health.
5. Referral, follow-up care, rehabilitation and re-integration back into the workplace of the health practitioner
6. Examples of good practice with regard to identification, prediction, prevention and management (what works and what does not work)
7. Any illustrations of how health concerns are currently managed.
8. Particular needs of minority groups
9. Predisposition and risk of practitioners in training; health, dental

Within the current framework, this review identifies published and unpublished research to develop an evidence-based review of the health problems experienced by regulated health practitioners. This review will feed into the current evidence gathering exercise which aims to support and maintain the health, wellbeing and safety of NHS staff within the UK.

The review's focus is on physical ill-health in health practitioners. Although it is apparent that there are numerous sources of hazards with the potential to cause ill-health in healthcare environments, a number of those have been identified, risk assessed and action taken to control the risks under specific and general health and safety legislation and so are not included in the current review. These include procedures and practice for the safe use of radiation, prevention of percutaneous injuries, vibration exposure, noise exposure, latex exposure, exposure to blood borne viruses or other infectious diseases, mercury exposure and known chemical exposure.
2 METHODOLOGY

2.1 SEARCH STRATEGY

From initial scoping work carried out a search strategy was developed and is presented below.

Population: NHS Health practitioners listed below

Arts therapists
Biomedical Scientists
Chiropodists/podiatrists
Chiropractors
Clinical scientists
Dental hygienists
Dental therapists
Dentists
Dieticians
Dispensing opticians
Doctors
Midwives
Nurses
Occupational therapists
Operating department practitioners
Optometrists
Orthoptists
Osteopaths
Paramedics
Pharmacists
Physiotherapists
Prosthetists & Orthotists
Radiographers
Specialist community public health nurses
Speech and language therapists

Health care workers
Health practitioners

Comparison:

Health problems in general population

Outcomes:

Identification of health problems
Prevalence/incidence of health problems
Specific health problems
Increased/decreased risk of specific health problems compared to general population
Severity of health problems
Duration of health problems
Identification of work factors/workplace factors associated with specific health problems
Increased/decreased risk of health problems due to work factors
Improvement/decline in quality of healthcare service
Improvement/decline in delivery of healthcare
Improvement/decline in patient safety
Identification of health seeking behaviours
Utilization of healthcare system by health practitioners
Prevalence of self care
Prevalence of self medication
Identification of referral, rehabilitation and re-integration guidelines and practices
Level of usage of referral, rehabilitation and re-integration processes
Identification of good practice in managing health issues
Identification of priority needs for specific minority groups
Level of need in minority groups

Study Designs

Systematic reviews
Randomised Control Trials (RCTs)
Case control studies
Cross-sectional studies
Observational studies
Case reports
Quasi-experimental
Audit and evaluation
Qualitative research

Exclusion criteria

Studies of mental health or well-being
Studies of workers outside the healthcare practitioner groups defined
Studies published before 1990 for primary research
Studies published before 1997 for systematic reviews
Restricted to English language studies
Studies that report rather than provide new data (articles rather than research papers)

2.2 SEARCH DATABASES

A complete list of databases searched is listed below.

AMED (Allied and Complementary Medicine)
ASSIA (Applied Social Science Index and Abstracts)
British Nursing Index
CINAHL (Cumulative Index of Nursing and Allied Health Literature)
Cochrane Central Register of Controlled Trials
Cochrane Database of Systematic Reviews (CDSR)
Current Contents
EMBASE
Environline (Environment, useful for Physical Activity)
HMIC (Health Management Information Consortium. Comprises King’s Fund Database and DH-Data database)
MEDLINE
National Research Register
PsycINFO
The electronic database searches were complemented by searching websites including HSE, NIOSH and the European Agency for Safety and Health. Contact was also made with the unions including the BMA, BDA, RCN, SCP, Unison and Amicus. This was to identify if they held further research information. The nine regulators were also contacted to identify any further research that was held by them.

2.3 ABSTRACT AND TITLE SCREENING

On completion of the electronic database searches, 1244 papers were identified. A title and abstract screening process was undertaken by two researchers working independently. This resulted in the removal of 919 references which did not fit the inclusion criteria.

During the screening process, further references were identified through contact with authors, reviewing of references within documents and contact with the British Association of Arts Therapists, the Chartered Society of Physiotherapy, the British Dental Association, and College of Occupational Therapists. These were again screened independently by the research team. Where it was unclear from the title and abstract as to the content of the paper, the full publication was ordered.

2.4 MANAGEMENT OF INFORMATION

The searches were managed by Ref Works which is a software programme developed for this purpose. All papers identified from searches were stored in this database. The programme allowed printing of abstracts for review. The abstracts were independently reviewed by two of the team members and a consensus reached as to the relevance of the papers with regard to the inclusion criteria. For abstracts that met the inclusion criteria, full papers were ordered.
2.5 REVIEWING AND DATA EXTRACTION

All papers obtained were reviewed against the inclusion and exclusion criteria and data extracted onto a pre-designed spreadsheet. Where team members were unable to decide on the quality of a paper, this was discussed to allow agreement to be reached.

An assessment was made of the study quality (+ or -) in relation to the participants, response rate and the outcome measures used (validated or non-validated). On completion of data extraction, reviewers were asked to summarise the main points of the paper and grade it on the following scale. During synthesis of findings, each evidence statement was graded based on the findings and repeatability of findings.

*** Strong evidence, provided by consistent findings in multiple, high quality scientific studies

** Moderate evidence, provided by generally consistent findings in fewer, smaller or lower quality scientific studies

* Limited or contradictory evidence, produced by one scientific study or inconsistent findings in multiple scientific studies

- No scientific evidence

During the review process, a number of papers were rejected from the review. These included the publication being an article with no new scientific data and editorial articles.
3 RESULTS

3.1 GENERAL SEARCH RESULTS

A total of 325 papers were included after screening. However, a number were rejected from the review when the full paper was received as this identified them as articles with no new data or editorial comment. The results are summarised in Table 1, which gives a breakdown of each occupational group and the health risks identified.

As can be seen from Table 1, no research has been identified for groups including Clinical Scientists, Arts Therapists, Dieticians, Dispensing Opticians, Operating Department Practitioners, Optometrists, Orthoptists, Osteopaths, Prosthetists and Orthotists, Specialist Community Public Health Nurses or Speech and Language Therapists. There was also limited research available with regard to Biomedical Scientists, Chiropodists and Chiropractors.
<table>
<thead>
<tr>
<th>Health Issue</th>
<th>Health Care Workers (General Term)</th>
<th>Biomedical Scientists</th>
<th>Chiropodists</th>
<th>Chiropractors</th>
<th>Dental Hygienists</th>
<th>Dental Nurses and Assistants</th>
<th>Dental Technicians</th>
<th>Dentists</th>
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<tbody>
<tr>
<td>Dermatitis</td>
<td>8 Papers</td>
<td>2 Papers</td>
<td>*</td>
<td>*</td>
<td>1 Paper</td>
<td>2 Papers</td>
<td>1 Paper</td>
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<tr>
<td>Musculoskeletal Problems</td>
<td>5 Papers</td>
<td>1 Paper</td>
<td>*</td>
<td>1 Paper</td>
<td>12 Papers</td>
<td>2 Papers</td>
<td>3 Papers</td>
<td>11 Papers</td>
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<td>Respiratory Exposures</td>
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<td>1 Paper</td>
<td>2 Papers</td>
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<tr>
<td>General Health Risks</td>
<td>5 Papers</td>
<td>*</td>
<td>2 Papers</td>
<td>*</td>
<td>1 Paper</td>
<td>*</td>
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<td>6 Papers</td>
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<td>Sickness Absence</td>
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<td>1 Paper</td>
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<td>Risks to fertility</td>
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<td>Addiction/Substance Abuse</td>
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<td>1 Paper</td>
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<tr>
<td>Shift Work</td>
<td>3 Papers</td>
<td>*</td>
<td>*</td>
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<td>*</td>
</tr>
<tr>
<td>Assault/Aggression/Violence</td>
<td>6 Papers</td>
<td>*</td>
<td>*</td>
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<tr>
<td>Exposure to Antineoplastic/Cytogenic Drugs</td>
<td>2 Papers</td>
<td>*</td>
<td>*</td>
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<td>*</td>
<td>*</td>
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<td>*</td>
</tr>
<tr>
<td>Workplace Injuries</td>
<td>2 Papers</td>
<td>*</td>
<td>*</td>
<td>*</td>
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</tr>
<tr>
<td>Health Issue</td>
<td>Doctors</td>
<td>Nurses/ Midwives</td>
<td>Occupational Therapists</td>
<td>Paramedics</td>
<td>Pharmacists</td>
<td>Physiotherapists</td>
<td>Radiographers</td>
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<tr>
<td>Dermatitis</td>
<td>*</td>
<td>3 Papers</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
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<tr>
<td>Musculoskeletal Problems</td>
<td>*</td>
<td>37 Papers</td>
<td>2 Papers</td>
<td>4 Papers</td>
<td>*</td>
<td>10</td>
<td>6 Papers</td>
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<tr>
<td>Sickness Absence</td>
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<td>*</td>
<td>*</td>
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<tr>
<td>General Health Risks</td>
<td>7 Papers</td>
<td>2 Papers</td>
<td>*</td>
<td>1 Paper</td>
<td>*</td>
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<tr>
<td>Risks During Pregnancy</td>
<td>*</td>
<td>3 Papers</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
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<tr>
<td>Risks to fertility</td>
<td>*</td>
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<tr>
<td>Addiction/Substance Abuse</td>
<td>3 Papers</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>2 Papers</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Cancer Risks</td>
<td>1 Paper</td>
<td>3 Papers</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Occupational Asthma</td>
<td>*</td>
<td>*</td>
<td>1 Paper</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Assault/Aggression/Violence</td>
<td>4 Papers</td>
<td>13 Papers</td>
<td>*</td>
<td>1 Paper</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Mortality Rates</td>
<td>2 Papers</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
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<td>*</td>
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<tr>
<td>Shift Work Fatigue Management</td>
<td>*</td>
<td>3 Papers</td>
<td>*</td>
<td>1 Paper</td>
<td>*</td>
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<tr>
<td>Exposure to Antineoplastic/Cytogenic Drugs</td>
<td>*</td>
<td>3 Papers</td>
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</table>
3.2 THE NATURE AND PREVALENCE OF HEALTH PROBLEMS IN HEALTH PRACTITIONERS

3.2.1 Health Care Workers

Forty-five papers were reviewed in relation to healthcare workers and health. Twelve of the papers were rejected as they did not fit the inclusion criteria. The health areas identified in the review were addiction and substance misuse, violence, dermatitis, sleep and fatigue management, workplace injuries, general health, musculoskeletal disorders and exposure to antineoplastic/cytotoxic drugs.

Addiction/Substance Misuse

Two studies were found on addiction/substance misuse in healthcare workers. The two studies were part of one overarching study measuring the effect of a substance misuse intervention called Project WISE (Workplace Initiative for Substance Education) (Lapham et al., 2003a, Lapham et al., 2003b) (+). The intervention involved substance misuse awareness training for managers and the use of health risk appraisals (HRAs) and educational videos. The first study found that based on HRAs binge drinking rates were not affected by the intervention although those that completed a health risk appraisal at the intervention were 2.59 times more likely to report a desire to reduce their alcohol consumption (Lapham et al., 2003a). However, the HRAs were more likely to be completed by executive/administrative individuals than those involved in direct patient care. The second study found that Employee Assistance Programme referrals for substance misuse increased after the intervention possibly due to an increased awareness of substance misuse problems (Lapham et al., 2003b).

Evidence Statement

There is limited evidence from two studies that addiction and substance misuse interventions may raise awareness about misuse issues in healthcare workers (+)

Violence

Six studies on violence in healthcare workers were identified. Four of the studies were cross-sectional studies, one was a cohort study and the last was a quasi-experimental study. The cohort study followed Healthcare Assistants (HCA) and Healthcare Helpers (HCH) for a year after their graduation (Hogh et al., 2008) (++). During their trainee period, 8.7% of HCAs and HCHs had been exposed to physical violence and 24.6% had been exposed in their first year after graduation with younger age groups being exposed the most. The strongest predictor for being exposed to violence in the first year after graduation was previous exposure to violence during the trainee periods indicating that trainees exposed to violence should be educated on avoiding violence in the future.

In the quasi-experimental study written guidelines for providing regular feedback to all staff about violence were provided to the intervention sites (Arnetz et al., 2000) (+). The provision of the guidelines resulted in an increased knowledge of the risks of violence although the overall level of violence was not reduced.
The four cross-sectional studies reported high prevalence rates of violence in healthcare workers. Lanza et al., (2006) (++) found that 21.3% of healthcare workers reported at least one incident of physical violence with the majority of perpetrators (70%) being patients, while 72.8% reported at least one incident of non-physical violence with the majority of perpetrators (62%) being staff. Healthcare workers exposed to non-physical violence were seven times more likely to be exposed to physical violence (Lanza et al., 2006). Over half of healthcare workers, 55%, employed in an emergency department in Vancouver had experienced physical assault in the previous year with 10% reporting more than 20 incidents (Fernandes et al., 1999) (-*).

The majority of incidents were not reported and approximately a quarter of workers reported impaired job performance after a violent incident (Fernandes et al., 1999). In a general hospital in England, 26.9% of workers had been assaulted by a patient and 1.4% by a colleague (Winstanley et al., 2004) (-*). Boz et al., (2006) (-*) reported that 49.4% of workers had been subjected to or witnessed physical violence in emergency departments in Turkey. However the results of all the cross-sectional studies are limited by their use of non-validated, self-reported outcome measures, low participant numbers and poor response rates.

**Evidence Statement**

There is moderate evidence from one study that violence during healthcare assistants and helpers trainee periods predisposes the trainees to violence during their first year of work after graduation (**)

There is moderate evidence from five studies of a high prevalence rate of violence in healthcare workers (**)  

There is moderate evidence from two studies that patients are the most frequent perpetrators of violent incidents (**)  

There is limited evidence from one study that violent incidents are underreported (*)  

There is limited evidence from one study that younger healthcare workers are exposed to more violence than older healthcare workers (*)

**Dermatitis**

Eight papers were identified dealing with dermatitis in healthcare workers. Two large studies reported the incidence of hand dermatitis in healthcare workers using the THOR reporting system containing reports from dermatologists through the EPIDERM reporting system and occupational physicians through the OPRA reporting system (Meyer et al., 2000, Turner et al., 2007) (++*). The incidence rates of work-related skin diseases from 2002 to 2005 for health and social workers are shown below (Turner et al., 2007). Among all of the occupational groups in the health and social work industry, 49.1% of estimated skin disease diagnoses between 2002 and 2005 as reported in EPIDERM were reported for midwives and nurses followed by care assistants (13.3%), doctors and medical students (8.4%), dentists and dental nurses (6.5%), associated medical professions (5.8%), scientists and technicians (5.1%), ambulance staff and paramedics (1.0%). Similar results were found from the reports from OPRA between 2002 and 2005. (Meyer et al., 2000) reported the results of the THOR reporting system from 1993 to 1999 for contact dermatitis. From the EPIDERM reports dental
practitioners had the highest incidence of contact dermatitis (38.6 cases per 100,000 workers) followed by dental nurses (27.6 cases), nurses (19.2 cases) and medical practitioners (11.6 cases). All four of these occupational groups had a higher incidence of contact dermatitis than the general workforce (6.4 cases per 100,000 workers). Nurses had the highest incidence of contact dermatitis according to the OPRA reports with an incidence of 27.9 cases per 100,000 workers, followed by assistant nurses/auxiliaries (11.3 cases) and medical practitioners (11.3 cases) with all three groups having a higher incidence than the general workforce (6.5 cases per 100,000 workers). Both studies show that work-related skin diseases, particularly contact dermatitis are more common in healthcare workers than the general workforce.

<table>
<thead>
<tr>
<th>Skin Disease</th>
<th>EPIDERM (incidence per million)</th>
<th>OPRA (incidence per million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All skin diseases</td>
<td>136.9</td>
<td>193.1</td>
</tr>
<tr>
<td>Contact dermatitis</td>
<td>115.5</td>
<td>134.2</td>
</tr>
<tr>
<td>Contact urticaria</td>
<td>17.1</td>
<td>11.0</td>
</tr>
<tr>
<td>Infective skin disease</td>
<td>3.0</td>
<td>24.0</td>
</tr>
</tbody>
</table>

A large Finnish study using data collected by the Finnish Institute of Occupational Health reported similar to both the THOR studies (Kanerva et al., 1996) (**). Dental assistants had the highest incidence rate of contact urticaria (95.5 cases per 100,000 workers) from 1990 to 1994. Lab technicians and radiographers had the second highest incidence rate at 35.6 cases per 100,000 workers followed by physicians, dentists, nurses, assistant nurses/hospital attendants and technical nursing assistants. In addition, all of these occupational groups were found to have a higher incidence of contact urticaria than the general Finnish workforce with an incidence of 3.7 cases per 100,000 workers.

Gielen et al., (2001) (**) and Crippa et al., (1997) (*) reported on dermatitis caused by allergies in healthcare workers. Both studies used patch tests to determine allergy sensitisation. A positive patch test for at least one drug was found in 61 out of 14,689 participants with 53.7% having a positive test for antibiotics including penicillins, cephalosporins and aminoglycosides (Gielen et al., 2001). Type I-like allergic reactions due to corn starch powder were found in eight out of 154 participants (Crippa et al., 1997).

Two papers investigated the effects of hand washing on dermatitis. The first study was a review albeit not systemic which concluded that alcohol-based hand rubs should be used more frequently than they currently are and that the frequency of hand washing should be reduced (Kampf et al., 2007) (*). The second study was a cross-sectional study in an intensive care unit (Forrester et al., 1998) (-). Occupational-related hand dermatitis was self-reported by 55.6% of respondents. Healthcare workers who washed their hands more than 35 times a shift were 4.13 times more likely to report occupationally-related hand dermatitis than those who washed their hands less frequently (Forrester et al., 1998).

Apfelbacher et al., (2009) (**) conducted an intervention study using the Secondary Individual Prevention course on the presence of skin disease and skin care behaviours. The prevalence of hand dermatitis decreased from 77.2% before the intervention to 68% at the one-year follow-up. Additionally, almost a quarter of healthcare workers with hand dermatitis at baseline did not report symptoms one year later. The
intervention was also found to reduce the frequency of hand washing with 51.5% reporting less frequent hand washing after the intervention. However, the results of the study are limited due to the fact that the presence of hand dermatitis was self-reported at the one-year follow-up as compared to being diagnosed by a dermatologist at baseline.

**Evidence Statement**

There is moderate evidence from three studies that healthcare workers have a higher incidence of dermatitis than other occupational groups (**)

There is limited evidence from one study that corn-starch powdered gloves may cause cases of hand dermatitis (*)

There is limited evidence from one study of hand dermatitis caused by an allergy to drugs, especially antibiotics (*)

There is limited evidence from two studies that frequent hand washing increases the prevalence of hand dermatitis (*)

**Shift work and Fatigue Management**

Three studies were found on the effects of shiftwork on sleep and fatigue in healthcare workers. All three studies were cross-sectional studies and all used reliable, validated outcome measures (Barnes-Farrell et al., 2008, Conway et al., 2008, Costa et al., 2007) (+**). Barnes-Farrell et al., (2008) found that healthcare workers on the fixed day shifts reported better health than workers on either the fixed afternoon shift or the fixed night shift. In addition, workers on the fixed night shift reported poorer physical health than workers on the fast rotating shifts, the slow rotating shifts and the unpredictable shifts. In the study by Conway et al., (2008), healthcare workers on shiftwork including night shifts were 1.74 times more likely to report poor sleep than workers on day shifts. The final study reported on the work ability of nurses (Costa et al., 2007). Female nurses in all age groups had a lower work ability index score for both day shift and particularly shiftwork compared to their male colleagues, however the findings were not significant.

**Evidence Statement**

There is moderate evidence from two studies that poorer physical health is related to working the night shift compared to other shifts (**)

There is limited evidence from one study that female nurses have lower workability index scores than male colleagues particularly in those on shiftwork (*)
Workplace Injuries

Two cohort studies, both retrospective and with large sample sizes, were found on workplace injuries in healthcare workers (Alamgir et al., 2007, Alamgir et al., 2008) (**). Alamgir et al., (2008) found that 81% of injuries in registered nurses (RN) were due to musculoskeletal injuries (MSI). Among RNs, casual workers had a 30% reduced risk for all injuries and MSIs compared to full-time workers. In addition, part-time workers had a 30% reduced risk of all injuries compared to full-time workers (Alamgir et al., 2008). In care assistants, 83% of all injuries were due to MSIs. As in RNs, casual workers had a 40% reduced risk of all injuries and MSIs compared to full-time workers. In addition, among full-time workers, care assistants working in the long-term care sector were at a three times higher risk for all injuries and MSIs compared to RNs working in acute care (Alamgir et al., 2008). In the second cohort study, care assistants had the highest rate of injuries overall especially in long-term care with a rate of 37 injuries per 100 FTE (Alamgir et al., 2007). Licensed Practical Nurses (LPNs) had the highest rate of injuries in the acute care setting with a rate of 30 injuries per 100 FTE. For all three settings – long-term care, acute care and community healthcare – and for all three occupational groups – care assistants, LPNs and RNs – the majority of injuries were due to MSIs (Alamgir et al., 2007).

Another two cross-sectional studies looked at injuries in healthcare workers. According to the Duke University Healthcare surveillance system, nursing personnel filed 42% of all back injury claims with approximately three-quarters of the claims being filed by women and 44% being filed by African Americans (Dement et al., 2004) (**). Among Canadian air medical crew, 24% reported back injury incidences in the previous month (Sibley et al., 2005) (*). Additional reports of sprains were reported for the head/neck, shoulder/arm, wrists/hand, ankle, knee and neck. Unfortunately this study provides limited evidence of injuries in air medical crews as the researchers did not use a standardised questionnaire, relied on self-reports of injuries and had a poor response rate.

Evidence Statement

There is moderate evidence from two studies that the most common type of workplace injury is musculoskeletal injuries (**)

There is moderate evidence from two studies that the highest rates of injuries are seen in long-term care facilities (**)

There is moderate evidence from one study that causal and part-time healthcare workers are less prone to injuries than full-time workers (**)

There is moderate evidence from two studies that back injuries are the most frequent type of injuries in healthcare workers (**)

General Health

Five studies were identified concerning general health problems in healthcare workers. Two cross-sectional studies reported on respiratory diseases including occupational asthma (Delclos et al., 2007, Ross et al., 1998) (**). According to reports collected in the SWORD reporting system from chest physicians and occupational health
physicians, the incidence of respiratory disease in the human health industry is 147 cases per million per year with an estimated 239 new cases diagnosed in year 1997 (Ross et al., 1998). Biomedical scientists had the highest incidence of occupational asthma with 76.5 cases per million per year compared to all occupational groups followed by chiropodists, dental nurses and technicians and nursing staff and auxiliaries (Ross et al., 1998). Delclos et al., 2007 found that nurses have the highest prevalence of occupational asthma (7.3%) compared to respiratory therapists, occupational therapists and physicians. However, the highest prevalence of bronchial hyper responsiveness was found in occupational therapists (33.7%) followed by respiratory therapists, nurses and physicians. Asthma was found to be associated with being a nurse, instrument cleaning, building surfaces and the use of adhesives/glues/solvents in patient care. Bronchial hyper responsiveness was associated with being an occupational therapist, being a nurse, being a respiratory therapist, instrument cleaning, building surfaces and aerosolised medicines (Delclos et al., 2007).

A cohort study by Huang et al., 2009 (+**), found that nurses had fewer all cause visits to a physician compared to other medical staff with an adjusted rate ratio of 0.98. Compared to other female medical staff, nurses had fewer physician visits for MSDs, neoplasms and injuries; however, the nurses made more physician visits for infectious/parasitic diseases, circulatory diseases, genitourinary diseases and complications in pregnancy or childbirth. Compared to general female workers, nurses made fewer physician visits for diseases of the digestive system, injuries/poisonings and respiratory diseases. Nurses visited a physician more frequently for complications in pregnancy and childbirth, infectious/parasitic diseases, diseases of blood and blood forming organs, diseases of nervous system and skin/subcutaneous tissue diseases compared to general female workers. The reasons for these differences were not investigated in the study but could be due to differences in the nature of their work, increased awareness of diseases in nurses, better healthy behaviour in nurses and more frequent self-treatment by nurses.

**Evidence Statement**

There is moderate evidence from two studies that nurses have a high incidence and prevalence rate of occupational asthma compared to other occupational groups (**)  

There is limited evidence from one study that nurses visit physicians less frequently than other medical staff (**)  

There is limited evidence from one study that biomedical scientists have the highest incidence rate of occupational asthma compared to other occupational groups (*)  

**Musculoskeletal Disorders**

Five studies were identified on MSDs and healthcare workers. A cohort study by Koehoorn et al., 2006 (+**) found that 33% of all injuries reported by healthcare workers were sprain or strain injuries with 454 reported injuries of the lower body. Risk factors for injuries and injury rates were related to medium to high biomechanical demands and medium to high rates of departmental absenteeism (Koehoorn et al., 2006). A cross-sectional study of eight Dutch hospitals found a 12 month prevalence of 59.8% for shoulder and neck pain among operating room nurses, intensive care nurses, nurse assistants and X-ray technologists with the highest prevalence in
operating nurses (69.4%) (Bos et al., 2007) (++)). The prevalence of low back pain was 75.9% with 12.1% reporting severe low back pain. Low back pain was associated with force exertion in all nurses, with ergonomic load in intensive care nurses and with dynamic load in X-ray technologists (Bos et al., 2007). In addition, Bru et al., (1996) (+*) found that back pain was found to be associated with psychosocial and organisational factors particularly when psychosocial loading and ergonomic loading are increased.

A large cohort study utilising the Duke Health and Safety Surveillance System reported a crude prevalence rate of 2.8 workers’ compensations for MSDs per 100 FTEs, with 53% of claims resulting in restricted workdays and 15% resulting in lost workdays over a seven year period (Pompeii et al., 2008) (++)). Injury rates declined from 3.3 claims per 100 FTEs in 1997 to 2.4 claims per 100 FTEs in 2003. However, black workers consistently had injury rates 2.5 times higher than other workers possibly because more black workers are involved in physically demanding roles. Women consistently had injury rates 1.8 times higher than men over the seven years. Of female and male patient care providers, nurses’ aides had the highest rates of injuries – 12.1 claims and 11.8 claims per 100 FTEs, respectively – compared to other occupational groups. In addition, patient handling and lifting, pushing or pulling of work equipment each accounted for 31% of all injury claims.

Charney et al., 2006 (++) conducted a descriptive study on the effects of a zero lift policy in 31 Washington, USA hospitals on the frequency of patient-handling back injury claims. Over a six year period, the frequency of back injury claims decreased by 43% from 3.88 claims per 100 FTEs in 1999 to 2.23 claims per 100 FTEs in 2004. The frequency of time lost due to back injury claims also decreased from 1.91 days lost per 100 FTEs to 1.03 per 100 FTEs. In addition, the total incurred loss per claim decreased between 1999 and 2004 from $6,510 per claim to $4,991 per claim, although in 2003 the cost per claim was $30 higher than in 1999 since the costs fluctuate substantially each year. Overall, zero lift policies reduce claim rates for back injuries; however, the policies used by the hospitals were not standardised.

**Evidence Statement**

There is moderate evidence from three studies of a high prevalence of musculoskeletal disorders in healthcare workers (**)

There is moderate evidence from two studies that back pain is the most frequently reported musculoskeletal disorder (**) 

There is moderate evidence from two studies that higher biomechanical demands and ergonomic loads are associated with higher prevalence rates of musculoskeletal disorders (**) 

There is limited evidence from one study that black and female healthcare workers have higher rates of musculoskeletal workers compared to their colleagues (*) 

There is limited evidence from one study that nurses’ aides have higher rates of musculoskeletal disorders than other direct patient care providers (*) 

There is limited evidence from one study that a zero lift policy reduces back injury claims, time lost due to claims and costs incurred per claim in healthcare workers. More research is needed to identify the key components of the zero lift policy (*)
Exposure to Antineoplastic/cytotoxic drugs

Two recent studies, a case-control study and a cross-sectional study, investigated the effects of antineoplastic drugs on healthcare workers. The case-control study used matched controls for age and smoking status while the cross-sectional study lacked a reference group.

The level of DNA damage was assessed in the cross-sectional study using the sister chromatid exchange (SCE) assay, which measures the number of sister chromatids exchanging pieces of DNA (Kopjar et al., 2009) (**). The more DNA damage there is in a cell, the more sister chromatids will exchange DNA. In addition, the percentage of high frequency cells (HFCs) – percentage of cells with nine or more sister chromatid exchanges – was analysed. Nurses with a longer duration of handling antineoplastic drugs, duration of occupational exposure ranged from less than 6 months to more than 30 years, had both a higher SCE value and a higher percentage of HFCs than nurses with shorter exposure durations. The overall SCE and HFC values for all exposed healthcare workers were higher than the values for the general population reported in a previous study; however, no statistical analyses were preformed to confirm that the increase was significant.

The case-control study used multiple biomarkers to assess DNA damage due to the handling of antineoplastic drugs (Kopjar et al., 2008) (***). The damage was analysed using comet assay, identification of structural chromosome aberrations, SCE assay, lymphocyte proliferation kinetics and cytokine-blocking micronuclei assay. In all of the assays, the amount of DNA damage was found to be higher in exposed healthcare workers than in non-exposed controls (p<0.001). In addition, two of the assays revealed that a longer duration of exposure leads to higher levels of DNA damage while another two assays revealed that increased use of personal protective equipment reduced DNA damage due to antineoplastic drugs.

Evidence Statement

There is moderate evidence from two studies that increased DNA damage in healthcare workers is due to exposure to antineoplastic drugs (**)

There is moderate evidence from two studies that a longer duration of exposure to antineoplastic drugs is associated with increased DNA damage in healthcare workers (**)

There is limited evidence from one study that increased use of personal protective equipment reduces DNA damage (*)
### Table 2 Health Issues in Health Care Workers

<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lapham et al., (2003a)</td>
<td>Health Care Workers involved in an intervention on binge drinking. For the intervention site, n=215 and post n=558; for the comparison site n=183, post n=351.</td>
<td>Case-Control Study - *</td>
<td>3-year study to evaluate an enhanced substance artic early intervention programme on binge drinking. Involved awareness training for managers, use of health risk appraisals and educational videos. Compared health risk appraisals between sites.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Study Outcomes: Binge drinking rates were not affected by intervention. But of those who completed the HRA at the intervention site, they were 2.59 times more likely to report a desire to reduce alcohol consumption.</td>
</tr>
</tbody>
</table>

Lapham et al., (2003b)

Health Care Workers involved in an intervention on binge drinking. Used databases including referral to EAP, in-patient visits, non-inpatient visits.

Case-Control Study - *

EAP referrals, in-patient and outpatient visits

EAP referrals increased due to an increase in awareness? Small significant decrease in non-SM out patient utilisation after the intervention.
<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winstanley <em>et al.</em>, (2004)</td>
<td>General hospital in north-west England, Sample of 1141 healthcare workers, response rate 33% N=375. 91.5% female.</td>
<td>Cross-sectional study</td>
<td>Questionnaire about participants in previous 12 months (physical assault, threatening behaviour, verbal abuse) was created by author. The questionnaire was piloted</td>
<td>304 physical assaults in previous year. 26.9% of respondents were by a patient and 1.4% were by a visitor. Medical departments more likely to be (p&lt;0.001) than other staff, also more likely to be more than once (p&lt;0.001) than other staff. More middle grade nurses were than other staff grades (p&lt;0.001) and they were at greater risk of being more than once (p&lt;0.91).</td>
</tr>
<tr>
<td>Hogh <em>et al.</em>, (2008)</td>
<td>Part of cohort study of nearly all Danish healthcare assistants (HCAs) and helpers (HCHs) who graduated in 2004. Sample of 6365 students, response rate at baseline 89.5% N=5,696 (30.6% HCA, 69.4% HCH). 94.4% female. Response rate follow-up 65% N=3,708. Used 2,847 in analyses (included only those employed)</td>
<td>Cohort study + **</td>
<td>1-yr follow-up of violence. Evaluated personal resources with Setterlind’s Sense of Coherence scale at baseline, at both baseline and follow-up asked about violence and threats, at and follow-up evaluated health with the Vitality scale and the Mental Health scale both from SF36</td>
<td>Baseline = while a student, Follow-up = first year as HCA or HCH employed in healthcare setting. At baseline 31.5% had been exposed to violence or threats previously with 8.7% exposed during trainee periods. At follow-up 24.6% were exposed to violence during first year at work after graduation – 29.7% HCAs and 21.5% HCHs. 98.4% of violent events caused by clients/patients, 1.3% by relatives of clients/patients and 0.1% by colleagues. More respondents in the youngest age group exposed to violence in first year (18-29 = 28% vs 50-59 = 21.7%). Respondents with previous exposure to violence more likely to be exposed to violence a year later (exposure daily/monthly in follow-up – 6.9% (previously exposed) vs 3.6% (not previously exposed); exposure now and then in follow-up – 26.0% (previously) vs 17.4% (not previously). Previous exposure during trainee periods was strongest predictor of violence in follow-up year (exposure daily/monthly OR 3.63 (2.28-5.78) and exposed now and then OR 2.14 (1.60-2.60) compared to group that was not exposed at baseline). Being exposed to violence during trainee periods seemed to have some impact on victims’ health at follow-up but the results were not sign</td>
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<tr>
<td>Study Authors</td>
<td>Sample Description</td>
<td>Study Design</td>
<td>Methodology</td>
<td>Results/Findings</td>
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<td>Boz <em>et al.</em>, (2006)</td>
<td>79 randomly chosen health care workers in emergency departments in Turkey. 47 physicians, 23 nurses and 9 support workers</td>
<td>Cross-Sectional Study</td>
<td>Questionnaire but no further details given</td>
<td>88.6% had been subjected to or had witnessed verbal abuse, 49.4% had been subjected to or had witnessed physical violence. Reasons for violence included alcohol (31.4%), long waiting time (24.8%), and financial problems (17.0%). The perpetrator was the patient (26.1%) or patient’s companions (73.9%).</td>
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<td>Arnetz <em>et al.</em>, (2000)</td>
<td>47 health care workplaces, randomly assigned to either intervention (24) or control (23). 1560 questionnaires distributed with a response rate of 77%, n=120. Intervention n=585 and control n=368.</td>
<td>Quasi-experimental Study</td>
<td>Baseline questionnaire given to all staff, 19-items. All workplaces registered violent incidents and for those in the intervention, given written guidelines for regular feedback with all staff. One person given responsibility for feedback sessions. At 12 months a second questionnaire used.</td>
<td>63% had experienced violence in the previous year. A total of 684 violent incidents were registered, 409 by the intervention group and 271 by the control group. Staff at the intervention site reported significantly more violent incidents (OR 1.49, 95% CI 1.07-2.06), the intervention appeared to increase knowledge of risks of violence in the intervention group (p&lt;0.05).</td>
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<td>Fernandes <em>et al.</em>, (1999)</td>
<td>Emergency department Sample of 163 ED staff in 1998, response rate = 65% N= 106. 47 nurses, 19 protection services personnel, 13 physicians, 8 admitting clerks, 7 social workers, 5 licensed practical nurses, 4 unit coordinators, 2 ward aides, 1 porter</td>
<td>Cross-sectional Study</td>
<td>Non-standardised questionnaire measuring levels of violence (both physical and non-physical) also asked respondents to provide their own definition of violence</td>
<td>55% had experienced physical assault in previous year with 10% experiencing &gt;20 incidents. Occupations with highest proportion of respondents experiencing physical assault were nurses and protection services personnel. 54% never or rarely reported physical assault, 66% never or rarely reported verbal abuse, 44% of those injured due to physical assault never or rarely reported incident. 38% considered job outside of healthcare because of violence, of those that had left healthcare, 67% left at least partly due to violence. 25% reported impaired job performance for rest of shift after violence, 24% impaired performance for rest of week, 19% impaired for longer period. 27% took days off work due to violence. Support was mainly sought from colleagues</td>
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<td>Lanza et al., (2006)</td>
<td>603 employees in 2 healthcare settings (both veterans hospitals), response rate 24.76%</td>
<td>Used survey developed by Hodgesen et al and the Workplace Aggression Research Questionnaire to develop violence questionnaire, also evaluated demographics</td>
<td>21.3% reported at least one incident of physical violence, 72.8% reported at least on incident of non-physical violence. Younger (20-29) exposed more than older (&gt;60) for non-physical violence. Nurses more likely to be assaulted for both types of violence. Correlation between physical and non-physical violence (sign p&lt;0.01) 20% reporting both types of violence. 94% of physical violence responders also reported non physical violence (7 times more likely to report physical violence if had reported non-physical violence) Physical violence perpetrators – 70% patients, 25% staff, 5% others; non-physical violence perpetrators – 31% patients, 62% staff, 6% others. Sign relationship between physical vs non physical violence and perpetrator. Non-physical violence perpetrated by staff seemed to be related to physical violence committed by patients as well as staff.</td>
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### Dermatitis

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<tr>
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</table>
| Apfelbacher et al., (2009) | 253 individuals who participated in the Secondary Individual Prevention course in Germany - nurses, geriatric nurses, dentist/physician's asst | Observational study + * | Observational study of the effect after one year of an SIP course on presence of disease and skin care behaviours  
Comparing baseline (at the SIP course) to one year follow-up.  
Baseline participants and examined by dermatologist, used atopy score developed by Diepgen et al to evaluate atopic skin diathesis  
Follow up – structured telephone interview, focusing on current skin disease, affect on occupation and life, current skin care/cleaning behaviours; relied on self-reporting of skin dx | Follow-up rate 81.4% (206 out of 253), 37.4% nursing, 30.6% geriatric nursing, 12.6% physician's/dentists assistant  
Baseline – 77.2% with skin lesions  
Follow-up – 68% with skin lesions, 20.4% skin lesions unchanged, 71.8% skin lesions improved, 7.8% condition worsened  
Baseline – 66 individs with severe lesions, self-graded at follow-up only  
5 of the 66 had severe lesions, cumulative incidence of self reported severe lesions = 15  
23.9% with dermatoses at baseline had no skin lesion at follow-up  
8.7% left occupation due to skin disease  
35% reported intensified skin care behaviour  
Fewer wore gloves irregularly, significantly fewer wore gloves rarely (p<0.04)  
Significantly more wore no gloves at follow-up (p<0.001)  
51.5% reduced hand washing in one year  
54.4% retrospectively said quality of life impaired at baseline, 27.7% QL impaired at follow-up (P<0.001)  
14.1% reported sick leave in pervious year due to skin disease at follow-up  
44.2% reported ever been on skin leave due to skin dx prior to course (P<0.001)  
Overall course reduced the prevalence of skin lesions and impacted on skin care behaviours of HCWs |

Observational study

Used data from THOR (The Health and Occupation Reporting) network to determine incidence of occupational skin disease. THOR made up of EPIDERM (reports from dermatologists) and OPRA (reports from occup physicians). For EPIDERM used gender-specific means of Labor Force Survey data as denominators. For OPRA used most recent available UK survey as denominator.

Average annual incidence rates of work-related skin disease in general work pop reported through EPIDERM = 91.3 per million (95% CI: 81.8-101.1)

Average annual incidence rates of work-related skin disease in general work pop reported through OPRA = 316.6 per million (95% CI: 251.8-381.3)

For general work force, contact dermatitis most common diagnosis (EPIDERM 68.0 per million; OPRA 259.7 per million (200.8-318.6)

Health and Social workers EPIDERM: all skin dx 136.9 per million; contact dermatitis 115.5 per million; contact urticaria 17.1 per million, infective skin disease 3.0 per million

Most frequently reported suspected agents: soaps & detergents, latex, wet work, PPE, sterilizing agents, thiuram/mercapto

Health and Social workers OPRA: all skin dx 193.1 per million; contact dermatitis 134.2 per million; contact urticaria 11.0 per million; infection 24.0 per million – suspected agents: latex, PPE, wet work, soaps & detergents, sterilising agents, scabies

Estimated diagnoses over 2002-2005 by occupational group of all health and social workers:

EPIDERM – nurses & midwives 49.1%, care assistant 13.3%, doctors and medical students 8.4%, dentists and dental nurses 6.5%, associated medical professions 5.8%, scientists and technicians 5.1%, ambulance staff and paramedics 1.0%

OPRA – nurses &midwives 43.1%, care assistant 15.1%, doctors and medical students 6.6%, dentists and dental nurses 5.4%, ambulance staff and paramedics 0.2%, associated medical professions 10.0%, scientists and technicians 8.9%
Kampf et al., (2007) review developing evidence based procedures, not actually systematic Review + * Review of risks and benefits of hand disinfection compared to hand washing Developing evidence-based procedures for HCWs

Northern Bavaria annual incidence rate of hand dermatitis = 7.3 cases per 10,000 HCWs
Contact dermatitis most frequently irritant dermatitis, not allergic
Irritation most frequent cause – hand washing and work in occlusion caused by wearing gloves
Prefer alcohol-based hand rubs to hand washing with water & detergents
Predominant mechanisms of irritation are frequent wet work, work with occlusive gloves and contact with I surface disinfectants
Primary prevention – development of low irritant disinfectants, correct use of hand disinfectants (should be learned during training)
Overall hand hygiene compliance approx. 50%, almost 50% HCWs wash hands
Crucial to teach healthcare workers that for routinely decontaminating hands a well formulated alcohol-based hand rub should be used instead of hand washing

Kanerva et al., (1996) Work force in Finland between 1990-1994 Observational study + ** Prevalence based on cases reported (required to report) by physician or insurance company
Finnish Institute of Occupational Health compiles the statistics each year
Based on a work force of about 2 million in Finland
Number of cases of occupational contact urticaria more than doubled from 1989-1994 from 89 cases in 1989 to 194 cases in 1994
815 cases between 1990-1994
Contact urticaria (all cases per 100,000 employed workforce):
dental assistants 95.5; laboratory technicians, radiographers 35.6; physicians 33.0; dentists 23.4; nurses 21.2; assistant nurses/hospital attendants 10.2; technical nursing assistants 4.2
For the entire Finnish workforce 3.7 cases per 100,000 employed workers (excluded occupations with less than 3 cases between 1990-94)
Natural rubber latex second most common cause (23.7% of all cases)
Latex cause more common in women (171 cases vs. 22 cases)
Overall contact urticaria more common in women (567 cases vs 248 cases)
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<tr>
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<th>Data Sources and Methods</th>
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<tbody>
<tr>
<td>Meyer et al., (2000)</td>
<td>Observational study</td>
<td>Used data from THOR (The Health and Occupation Reporting) network to determine incidence of occupational skin disease. THOR made up of EPIDERMS (reports from dermatologists) and OPRA (reports from occupational physicians). For both used Labor Force Survey data as denominators.</td>
<td>Dermatologist reports Feb 1993-Jan 1999: Dental practitioners (38.6 per 100,000 workers; causative agents: rubber (61.7%) glues/paints (20.0) wet work (6.7)); Dental nurses (27.6 per 100,000 workers; rubber (26.9) aldehydes (19.2) nickel (19.2) epoxies/resins (7.7) soaps (5.8) bleach (5.8) solvents (5.8) cobalt (5.8)); Nurses (19.2 per 100,000 workers; rubber (31.9) wet work (24.1) soaps (11.3) bleaches/sterilants (9.8) nickel (7.3) fragrances/cosmetics (7.0) aldehydes (5.9) drugs (5.3)); Medical practitioners (11.6 per 100,000 workers rubber (59.8) wet work (10.8) bleach (8.8)).</td>
<td>Occupational physicians: annual incidence occup contact derm – 6.5 cases per 100,000 employed.</td>
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<td>Forrester et al., (1998)</td>
<td>Cross-sectional study</td>
<td>Site visit to evaluate potential dermatitis causes. Self administered questionnaire (demographics, presence of hand dermatitis, severity of rash, history of atopy, aggravation conditions, frequency of hand washing, duration of employment in ICU).</td>
<td>55.6% (70) reported occup-related hand dermatitis. 8 visited physician for treatment and 1 missed work because of severity. 66 (52.4%) reported washing hands 35 times or more per shift. Those reporting hand washing at least 35 times per shift found to have sign. increased OR (4.13) of occup hand dermatitis (p=0.002) compared to less than 35 times. 85.7% female, mean age 29.58 (6.65), nurses 81%, nursing assistant 8.7%, physician 4%, lab technician 3.2% respiratory therapist 1.6% nonclinical 1.6%</td>
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<td>Gielen et al., (2001)</td>
<td>Cross-sectional Study</td>
<td>Examined in dermatology clinic, patch tests carried out using recognised methodology. Occupational history and individual history also taken.</td>
<td>Of 14,689 presenting at the Unit, 7,857 (53.3%) showed contact allergy to 1 or more substances. 33 patients were diagnosed with occupational allergic contact dermatitis from drugs. 61 had a positive patch test for at least one drug. Most come drugs were the antibiotics (penicillins, cephalosporins, aminoglycosides) seen in 57.3% of 61 positive tests. 16.4% positive patch test for propacetamol hydrochloride. 26 cases were nurses, 4 veterinarians, 2 pharmacists, one medical doctor.</td>
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Observational study + Exploratory study. Clinical examination of the skin complaint including allergological tests
27 out of 154 (17.5%) diagnosed with allergic type IV contact dermatitis. 31 (20.1%) diagnosed with type I allergic reactions. And 23 (14.9%) diagnosed with irritant contact dermatitis due to gloves. Approx 75% of irritant contact dermatitis caused by powdered gloves. 8 cases of type I-like allergic reactions due to corn starch powder (usually from poor quality gloves with large quantities of lubricant powder). 4 patients were reacted to maize and 4 patients were reactive to maize and latex.

Sleep/Fatigue Management

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<tbody>
<tr>
<td>Barnes-Farrell et al., (2008)</td>
<td>Health Care Workers N=906 in Australia, Brazil, Croatia and USA</td>
<td>Cross Sectional study</td>
<td>Study assessed physical health using the Healthy Days Physical Scale. Also assessed mental wellbeing, work-family conflict, artic worked</td>
<td>The number of days worked per week accounted for 3.7% of the variance (p&lt;0.01). Those on fixed days reported better health than those on fixed afternoon shifts (p&lt;0.05) or those on fixed nights (p&lt;0.001). Those on fast rotating shifts (p&lt;0.01), slow rotating shifts (p&lt;0.001) and unpredictable shifts (p&lt;0.01) all reported better physical health than those on fixed night shifts.</td>
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<td>Conway et al., (2008)</td>
<td>Sample = 2412, response rate 76.4%, N=1842; 81.8% were female and 33.1% were over 45 years</td>
<td>Cross Sectional study</td>
<td>Measures included work scheduling, Effort-reward Imbalance Questionnaire, Over commitment Scale, Work Ability Index, Standard Shiftwork Index</td>
<td>37.7% reported poor or moderate work ability. For medically diagnosed illnesses, 39.9% reported musculoskeletal problems, 23.9% reported gastrointestinal problems, 16.6% reported cardiovascular problems, 22.4% reported chronic fatigue and 10.3% reported job dissatisfaction. Poor sleep was associated with shifts including night work (OR=1.74, 95%CI 1.18-2.56). Cardiovascular problems were associated with being over 45 (OR=3.62, 95%CI 2.62-5.00). Musculoskeletal problems were associated with being over 45 years (OR=1.58, 95%CI 1.22-2.04) and over commitment (OR=1.51, 95%CI 1.18-1.94). Sick leave was associated with high effort reward balance (OR=1.52, 95%CI 1.08-2.14).</td>
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<td>Costa <em>et al.</em> (2007)</td>
<td>Examination of 1449 workers including 877 health care workers.</td>
<td>Cross Sectional study</td>
<td>Periodic health checks including the Work Ability Index</td>
<td>For the health care workers, an association with decrease in WAI score with increasing age for nurses (p&lt;0.001) but no significant differences in other groups. For nurses, analysis was made of WAI score, day shift versus shiftwork and gender; this identified that women in all age groups had a lower score, both as day shift but this was greatly increased for women working shifts.</td>
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Workplace Injuries

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<tr>
<td>Alamgir et al., (2008)</td>
<td>Registered nurses in acute care and care aides in long term care in British Columbia in 3 health regions.</td>
<td>Cohort study + **</td>
<td>Retrospective cohort study using WHITE a web-based surveillance system in British Columbia. Extracted data on all injuries resulting in time loss from work or requiring medical aid and compensated by workers’ compensation board over 1 year period</td>
<td>Of 8640 RNs – 37% full time, 24% part time, 25% casual. Male RNs (428) – 51% FT, 10% PT. Female RNs (8208) 36%FT, 25% PT 25% casual (rest reported multiple classifications and were excluded(14%)). With increasing age more RNs FT and less casual. 343 injuries reported by RNs (over total of 5318 person years) – 81% musculoskeletal injuries. RNs - - all injuries FT 7.4 per 100 person years, PT 5.3 per 100 p-y, 5.5 per 100 p-y. prevalence MSI FT 5.9 per 100 p-y, 4.6 per 100 p-y, 4.1 per 100 p-y. Casual workers sign. lower risk of all injuries and MSIs compared to FT (RR 0.7 (0.5-1.0) and RR 0.7 (0.5-0.9)). PT sign. lower risk of all injuries compared to FT (RR 0.7 (0.6-0.9)). PT female RNs lower risks associated with injuries compared to female colleagues, female casual RNs lower risk of MSI compared to FT colleagues. CAs - - Of 2967 CAs, 30% FT, 20% PT and 40% casual. Male (218) FT 30% casual 48%, female (2747) FT 30%, PT 21%, casual 40%. Rest reported multiple classifications and were excluded (10%). 378 injuries in CAs over 1672 person years – 83% MSIs. Prevalence all injuries: FT 25.8 per 100 p-y, PT 22.9 per 100 p-y, casual 18.1 per 100 p-y. prevalence MSI: FT 20.8 per 100 p-y, PT 19.3 per 100 p-y, casual 15.2 per 100 p-y. casual lower risk of all injuries and MSI compared to full time (0.6(0.5-0.8) and 0.6(0.5-0.8)). Female casual workers lower injury and MSI rates compared to FT. Cas in long-term care sector 3 times higher risk for all injury and MSIs compared to RNs in acute care among FT workers (next most vulnerable PT). Among RNS similar trend of lower injury rates for both injury types for PT and casual workers compared to FT.</td>
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<td>Study</td>
<td>Methodology</td>
<td>Outcome Measures</td>
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<tr>
<td>Alamgir et al. (2007)</td>
<td>Used occupational database for 1 year study period in Canada. N=2784 incidents including 355 in community care, 1697 in acute care and 732 registered artic</td>
<td>Cohort study</td>
<td>Care assistants had higher injury rates in nursing homes (37 per 100 FTE); licensed practical nurses had higher injury rates within acute care (30 per 100 FTE) and registered nurses had injury rate of 21.9 per 100 FTE in acute care. Musculoskeletal injuries were the highest across all groups. Study suggests care assistants are most at risk of injury due to tasks required in job.</td>
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<td>Dement et al. (2004)</td>
<td>All employees of the Duke University Health System from 1997 onwards covering 70,000 individuals. In 2001 N=14,567</td>
<td>Cross Sectional study</td>
<td>Development and evaluation of surveillance system. The system included: Duke University Health System with information defining demographics, occupations, work history, potential exposures, and health outcomes. Also used human resources data, job-exposure matrix, worker's compensation, employee health insurance benefits, health risk assessments performed by employees. Used the surveillance system to evaluate: 1. relationship between work-related stress and health service utilization 2. evaluate a hearing conservation programme 3. assess blood &amp; body fluids exposure 4. Investigate distribution &amp; risk of back injuries in HCWs using workers’ comp claims, private health outpatient claims and human resources. From the surveillance system found: nursing personnel filed largest proportion of all back injury claims 42% (447 out of 1060 claims) – majority of claims filed by women (76% vs 24%) and 44% were filed by African-Americans. Used medical insurance claims to find that outpatient utilisation was highest among inpatient nurses (22.2/1,000 workers) compared to all other workers (16.1/1,000). When adjusted for age and race – inpatient nurses 1.5 (95%CI 0.8-2.9) times more likely to file a claim than all other types of workers. In stratified analysis found sign higher crude rate of utilization among black nurses age 50 yrs or older (72.8/1,000 workers) compared to white nurses in same age group (25.1/1,000). Overall the surveillance system is a good resource to have but need to consider carefully about confidentiality and how compatible the data is from different sources.</td>
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<td>Reference</td>
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<td>Data Overview</td>
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<td>Sibley et al.,</td>
<td>261 Canadian Air Medical Health (not flight)</td>
<td>Cross-Sectional study</td>
<td>106 (40.6%) responded. Non-standard self-report of ‘injuries’ including sprains &amp; strains as well as lacerations, etc., in a 12 month period. Also collected information about exposure to ‘adverse job events’ including needle stick, motion sickness, exposure to violence, contact with patient bodily fluids, etc. 25 (24%) reported 44 back injury incidents in the 12 months. Other ‘sprains’ were: head/neck 11/16; shoulder/arm 9/16; wrist/hand 5/12; ankle 4/7; knee 2/2; neck 1/1 (distinction between head/neck &amp; neck not clear). Data excludes 2 subjects who had massive injury rates (e.g., 100 leg lacerations and 20 shoulder sprains). No distinction between acute ‘wrench’ or more chronic onset. Most injuries stated as minor with only 6 respondents needing more than 7 days off work for an (unspecified) injury.</td>
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### General Health

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<tr>
<td>Ross et al., (1998)</td>
<td>SWORD 1997 for respiratory diseases, broken down by occup category. Surveillance of chest physicians and Occ. Health physicians</td>
<td>Observational study</td>
<td>Reports from chest physicians and occup. Health physicians (either once a month or one month out of year), cases of respiratory disease broken down by disease type and occupation type in 1998</td>
<td>In human health industry – estimated total of 239 new cases of respiratory disease (88 asthma, 110 inhalation accidents, 1 allergic alveolitis, 12 infectious disease, 28 other). Overall prevalence rate of 147 per million per year. Prevalence occup asthma in nursing staff and auxiliaries high 15.2 per million per year</td>
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<td>Delclos et al., (2007)</td>
<td>Risk of Occupational asthma in a random sample of US health workers. 5600 in sample, response rate of 65% leading to N=3650. Respondents were 941 nurses, 968 occupational therapists, 741 physicians and 879 respiratory therapists.</td>
<td>Cross Sectional study</td>
<td>Bronchial symptoms questionnaire with additional questions on physician diagnosed asthma. Development of an asthma risk job exposure matrix. All methods trialled and validated before the study</td>
<td>Prevalence rates of asthma were 4.5% in occupational therapists, 7.3 % in nurses, 5.6% in respiratory therapists and 4.2% in physicians. Prevalence rates for bronchial hyper responsiveness were 18% in physicians, 29.2% in nurses, 30.3% in respiratory therapists and 33.7% in occupational therapists. Associations were found between reported asthma and being a nurse (OR 1.89, 95% CI 1.18-3.003), instrument cleaning (OR 2.07, 95% CI 1.29-3.33), building surfaces (OR 1.87, 95% CI 1.14-3.05) and the use of adhesives/glues/solvents in patient care (OR 1.67, 95% CI 1.01-2.77). Associations were found between bronchial hyper responsiveness and being an occupational therapist (OR 2.32, 95% CI 1.8-2.98), being a nurse (OR 1.95, 95% CI 1.51-2.52), being a respiratory therapists (OR 1.82, 95% CI 1.16-2.85), instrument cleaning (OR 1.40, 95% CI 1.09-1.79), building surfaces (OR 1.74, 95% CI 1.34-2.26), medicines (OR 1.57, 95% CI, 1.22-2.01) and adhesives/solvents/gases used in patient care (OR 1.86, 95% CI 1.42-2.44). The authors suggest more research is required to confirm these results.</td>
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Huang et al., (2009) 27,624 female nursing staff in Taiwan's National Health Insurance Scheme of 19,549 other female medical personnel and 39,088 active non-medical working women. Cohort study + ** Visits to physician (‘ambulatory health care visit’) against ICD-9-CM codes Calculated adjusted rate ratios (ARR) based on log-linear model adjusted for age & other confounders. Nurses made fewer all cause visits than other medical staff (ARR=0.98). Compared to other female medical staff Nurses had reduced ARR for MSD (0.73); neoplasm (0.83) and injury (0.84). Nurses had increased ARR for infectious/parasitic diseases (1.11); mental disorders (1.12) circulatory diseases (1.14); genitourinary disease (1.2) complications in preg or childbirth (1.07). Compared to general female workers Nurses made fewer all risk visits (0.74). They had fewer diseases of digestive system (0.32); injury/poisonings (0.56); respi disease (0.74). Nurses had more preg/child comps (1.26); infectious/parasitic diseases (1.22) diseases of blood & blood forming organs (1.15) diseases of nervous system (1.02) and skin/subcutaneous tissue diseases (1.07).

Musculoskeletal Disorders

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<tr>
<td>Koehoorn et al., (2006)</td>
<td>Sample = 3836, of which 1166 were eligible for inclusion in the study</td>
<td>Cohort study + **</td>
<td>Retrospective cohort design using personnel records of lower body injuries between 1992 and 1995. Study used injury reports, job content questionnaire and a biomechanical assessment based on occupational groups</td>
<td>33% of injuries reported were sprain or strain injuries. 454 injuries were for the lower body and were involved in compensation claims. The analysis identified that risk factors and injury rates were related to medium to high biomechanical demands (OR 2.12-3.86, 95% CI 1.42-6.05), departmental absenteeism rates being medium to high (OR 1.71 to 2.19 95% CI 1.25-2.98).</td>
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<tr>
<td>Bru et al., (1996)</td>
<td>689 sampled, response rate of 85% N=586 – 55 incomplete responses</td>
<td>Cross Sectional study + *</td>
<td>Nordic Musculoskeletal Questionnaire (with dichotomous scoring), Ursin Health Inventory, Cooper Stress Check, RJM scale designed for the study. Ergonomic loading self-assessed</td>
<td>Psychosocial and organisational factors at work are associated with back pain. The associations increase when psychosocial loading and ergonomic loading are increased. Psychosocial factors more associated with neck pain than other pain. Study correlation</td>
</tr>
</tbody>
</table>
### Bos et al., (2007)

| Sample of 3,169 employees across 8 Dutch hospitals. Included nurse assistants, IC nurses, operating room nurses and x-ray technologists | Cross Sectional study | Data collected via the Dutch Musculoskeletal Questionnaire introduced during meetings at work | In the previous 12 months 75.9% reported low back pain and 12.1% severe low back pain. For neck and shoulder complaints, the 12 month prevalence was 59.8% with operating room nurses reporting the highest at 69.4% (P<0.010). Low back symptoms were associated in nurses with force exertion (OR 1.11, 95% CI 1.04-1.18) and job demands (OR 1.09, 95% CI 1.03-1.14); in IC nurses with ergonomic load (OR 1.11, 95% CI 1.00-1.24) and x-ray technologists with dynamic load (OR 1.32, 95% CI 1.09-1.59). No significant associations were found with neck-shoulder symptoms. |

### Pompeii et al., (2008)

| Duke Health and Safety Surveillance System at Duke University Medical Center between 1997-2003 (includes admin staff). Average of 19,487 workers employed per year – 50% FT, only included FT workers N=102,669 FTE workers 66% women. | Cohort study | Calculated time at risk from work time records for each worker from human resources administrative data. Evaluated work related MS injuries & disorders claims from worker’s compensation records and claims filled out by workers either online or in paper format also included information on restricted and/or lost workdays and total number of days lost per worker’s comp claim | Results for all hospital workers including admin: Crude rate of workers’ comp claims for MSDs 2.8% (95%CI 2.7-2.9) claims per 100 FTEs. 53% of claims resulted in restricted work days, 47.6 lost workdays per 100 FTEs. Female workers higher rates of injury [3.3(95%CI 3.1-3.4)] and restricted work days [1.7(95%CI 1.6-1.8)] compared to males – injury [1.8(1.6-1.9)], restricted [0.96(0.86-1.1)]. Black workers five times more likely to incur work-related injury (5.2 vs 2.0) and 3 times higher rate of restricted work days (3.1 vs 0.95) compared to whiter workers. Increase in number of days lost from work seen with increasing age. Mechanism of injury: 31% lifting, pushing or pulling of work equipment, 31% patient handling, 30% slips, trips & falls, 6% walking or body movement, 4% computer work. Patient handling injuries more common in: nurses aides, occupational therapists, patient transporters. Handling of equipment injury most common in lab animal technicians. Rates of injury over time: rates decline over time from 3.3/100 FTEs in 1997 to 2.4/100 FTEs in 2003. Black workers had injury rates 2.5 times higher than other workers. Women had injury rates approx 1.8 times higher than men over the 7 years. Injury rates in nurse’s aides declined over 50% from 1997 to 2003 (16.4 to 7.8). Rates in nurses and outpatient nurses were consistent. In female workers nurses aids had higher rates of injuries 12.1/100FTEs) compared to other workgroups. Radiology technicians, inpatient nurses and patient transporters had comparable rates (approx 7/100FTEs). Outpatient nurses had considerably less. Restricted days rates followed similar pattern to injuries. Nurse’s aids had highest restricted and lost days and injuries. Lab technicians had high rates |
of injuries (34.6/100FTEs), restricted days (46.8/100FTEs) and lost days (24.9/100FTEs) compared to reference group. In men, highest rates of injury in nurse’s aids (11.8/100FTEs) followed by radiology technicians and patient transporters (approx. 8.0/100FTEs). Male nurse’s aides (344.8/100FTEs rate lost days) and patient transporters (651.8/100FTEs rate lost days) lost a considerable number of workdays. Lab animal technicians had among highest rates of injuries (13.2/100FTEs). Female reference group had injury rate (0.77/100FTEs) and restricted days rate (0.35/100FTEs) more than double male reference group injury rate (0.30/100FTEs) and restricted days rate (0.14/100FTEs).

Charney et al., (2006) Baseline 38 hospitals in Washington state, follow-up 31 hospitals in Washington state Observational Study +

Used workers’ compensation claims from 1999 to 2004 to determine patient-handling back injury frequencies, time lost, and total incurred loss per claim. Injury rates were determined using occupational safety and health admin formula (number of injuries x 200,000 / hours worked).

Greatest reductions seen in frequency rate of injuries and time lost frequency rate. Patient-handling injury claims decreased by 43% from 3.88 per 100 FTEs in 1999 to 2.23 per 100 FTEs in 2004. Time lost frequency rates decreased by 50% from 1.91 per 100 FTEs in 1999 to 1.03 per 100 FTEs in 2004. Total incurred loss per claim decreased by 24% from $6,510 in 1999 to $4,991 in 2004.

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### Exposure to Antineoplastic/cytotoxic drugs

<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Kopjar et al., (2008)</td>
<td>100 female volunteers – 50 occupationally exposed and 50 matched controls (smoking and age). Exposed worked in nine Croatian hospitals. 92% of exposed nurses rest physicians</td>
<td>Case-control Study + **</td>
<td>Questionnaire evaluated detailed medical, family and dietary history. Occupationally exposed were interviewed about working conditions, types and frequency of drug(s) handled and safety precautions taken evaluated with standardised questionnaire proposed by European Society of Oncology Pharmacy. Preformed comet assay (tail length (TL) and long-tailed nuclei (LTN)), SCE.</td>
<td>Older nurses were less likely to use PPE than younger nurses. Comet Assay: Exposed – mean tail length 17.46±0.08, mean LTN comets 54.68±3.93%. No sign difference for TL or LTN with duration of exposure, use of appropriate protective equipment sign reduced TL and LTN. Highest level of damage in those who only wore latex gloves (p&lt;0.01). Controls – mean TL 14.00±0.02 (p&lt;0.001 compared to exposed), mean LTN 1.92±0.35% (p&lt;0.001). Structural chromose aberrations – Exposed: mean value of 4.48±0.33 c’some aberrations per 200 cells, mean %age CA 2.24±0.16%. PPE did not sign. influence levels of CA. Duration of occup exposure positively correlated (p=0.019) with onset of more complex aberration types in lymphocytes. Controls: mean value of 0.86±0.09 CA per 100 cells</td>
</tr>
</tbody>
</table>
| Hospital personnel engaged in medical care of cancer patients. N = 402 from 22 Croatian hospitals (392 females, 376 nurses rest physicians) | Cross Sectional Study | Based selection of standardised questionnaire about occupational, family, medical and dietary history. Sister chromatid exchange assay results from medical check-ups between 1997-2007. Evaluated types, production and preparation of cytostatics and personal protective equipment usage with standardised questionnaire proposed by European Society of Oncology Pharmacy | Mean value of SCE was 5.63+/−2.28 SCE per cell. Average percentage of HFCs was 9.65% (Control pop from literature SCE: 4.42+/−11.32 SCE per cell and 5.46+/−0.83% HFC but no direct comparison done). Concurrent exposure to other occupational mutagens (ionising radiation, radioisotypes or ultrasound) increases SCE (p=0.0339). Also increase HFC but not sign. In exposed female nurses mean SCE was 5.63+/−2.29 and HFCs 9.61%. Duration of occupational exposure sign. contributed to SCE values in lymphocytes (p=0.005 by ANOVA by ranks and p=0.0139 by Median test). Duration of occupational exposure sign. increased HFC values with longer duration (p=0.0038 ANOVA, p=0.0493 median test) from <6 mons to >30 years. Female nurses with combined occupational exposure to cytotoxic drugs and other occupational mutagens had mean SCE of 5.88 +/−2.25 and HFC 11.50%.

Kopjar et al., (2009) | Hospital personnel engaged in medical care of cancer patients. N = 402 from 22 Croatian hospitals (392 females, 376 nurses rest physicians) | Cross Sectional Study | Based selection of standardised questionnaire about occupational, family, medical and dietary history. Sister chromatid exchange assay results from medical check-ups between 1997-2007. Evaluated types, production and preparation of cytostatics and personal protective equipment usage with standardised questionnaire proposed by European Society of Oncology Pharmacy | Mean value of SCE was 5.63+/−2.28 SCE per cell. Average percentage of HFCs was 9.65% (Control pop from literature SCE: 4.42+/−11.32 SCE per cell and 5.46+/−0.83% HFC but no direct comparison done). Concurrent exposure to other occupational mutagens (ionising radiation, radioisotypes or ultrasound) increases SCE (p=0.0339). Also increase HFC but not sign. In exposed female nurses mean SCE was 5.63+/−2.29 and HFCs 9.61%. Duration of occupational exposure sign. contributed to SCE values in lymphocytes (p=0.005 by ANOVA by ranks and p=0.0139 by Median test). Duration of occupational exposure sign. increased HFC values with longer duration (p=0.0038 ANOVA, p=0.0493 median test) from <6 mons to >30 years. Female nurses with combined occupational exposure to cytotoxic drugs and other occupational mutagens had mean SCE of 5.88 +/−2.25 and HFC 11.50%.

SCE assay (SCE and HFC), lymphocyte proliferation kinetics (proliferation rate index (PRI)), cytokinese-block micronucleus assay (MN per cell, MN cells)

(p<0.001), mean percentage CA 0.43±0.05%(p<0.001)

SCE assay – Exposed: mean value 5.81±0.04 SCE per 50s metaphases, mean value HFC 29.28±2.21%, positive correlation between SCE/HFC and duration of occup exposure but not sign. Controls: mean SCE 3.62±SCE per 50s metaphases (p<0.001), mean HFC 2.84±0.42% (p<0.001).

Lymphocyte proliferation kinetics – Exposed: mean PRI 1.97±0.12. in exposed smokers, stat sign negative correlation between PRI and use of PPE (p=0.005). Control: mean PRI 2.03±0.01 (p<0.001), lower PRI may be due to DNA repair.

CBMN assay – Exposed:average 16.32±0.85 MN per 1000 BN cells, average 15.08±0.72 micronucleated BN cells per 1000 BN cells. Duration of exposure sign. contribution to frequency of MN and micronucleated BN cells (p<0.001). Controls: average 7.14±0.33 MN per 1000 BN cells (p<0.001), average 6.72±0.29 micronucleated BN (p<0.001) cells per 1000 BN cells. overall more DNA damage in exposed than controls and some of the tests found a relationship between duration of exposure and level of DNA damage
3.2.2 Biomedical Scientists

Three studies were identified that evaluated health in Biomedical Scientists. Two of the studies reported on dermatitis while the other study reported on musculoskeletal disorders.

Dermatitis

The two studies on dermatitis investigated the incidence of hand dermatitis in biomedical scientists in the UK and Finnish workforce. The UK-wide study used data reported through The Health and Occupation Reporting (THOR) system which consists of reports from dermatologists and occupational physicians (Meyer et al., 2000) (**). The Finnish study used data reported to the Finnish Institute of Occupational Health covering the entire workforce in Finland (Kanerva et al., 1996) (**).

Both of the studies reported a higher incidence of hand dermatitis in biomedical scientists as compared to the general workforce. The Finnish study reported an incidence of contact urticaria of 35.6 cases per 100,000 workers compared to 3.7 cases per 100,000 workers in the general workforce (Kanerva et al., 1996). The dermatologists in the THOR study reported a hand dermatitis incidence of 13.4 cases per 100,000 workers and the occupational physicians reported an incidence of 22 cases per 100,000 workers compared to rates of 6.4 cases per 100,000 workers and 6.5 cases per 100,000 workers, respectively, in the general workforce. The main causes of hand dermatitis were rubber, wet work, solvents, nickel, soaps, aldehydes and other biological substances (Meyer et al., 2000).

Evidence Statement

There is moderate evidence from two studies that biomedical scientists have a higher incidence of hand dermatitis than the general workforce (**)

Musculoskeletal Disorders

Kilroy et al., (2000) (*) investigated the effect of an educational and ergonomic intervention on the prevalence of MSDs in 14 biomedical scientists. The intervention consisted of a seminar including advice on preventing MSD symptoms and ergonomic principles of workstation arrangement. In addition, several ergonomic adjustments were made to each workstation including adding adjustable chairs and foot stools, adjustment of computer-screen heights and the provision of wrist rests and document holders. The prevalence of MSDs in the biomedical scientists decreased from 79% before the intervention to 59% after the intervention. In addition, the level of self-reported overall bodily discomfort decreased after the intervention. The RULA score for many of the worktasks carried out by the biomedical scientists decreased after the intervention, with no tasks scoring at a level 5 or 6 as compared to approximately a quarter of all tasks scoring a level 5 or 6 before the intervention. However, as only descriptive statistics were performed, no firm conclusions can be made as to the effectiveness of the intervention.

Evidence Statement
There is limited evidence from one study that an education and ergonomic intervention reduce musculoskeletal disorders (*).

There is limited evidence from one study that biomedical scientists have a high prevalence rate of musculoskeletal disorders (*).
**Table 3 Health Issues in Biomedical Scientists**

<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meyer et al.,</td>
<td>UK workforce between 1994-1999</td>
<td>Observational Study</td>
<td>Used data from THOR (The Health and Occupation Reporting) network to determine incidence of occupational skin disease. THOR made up of EPIDERMS (reports from dermatologists) and OPRA (reports from occup physicians). For both used Labour Force Survey data as denominators.</td>
<td>Dermatologist: annual incidence occup contact dermatitis - 6.4 cases per 100,000 employed occupational physicians: annual incidence occup contact derm - 6.5 cases per 100,000 employed. Dermatologist reports Feb 1993-Jan 1999: Dental practitioners (38.6 per100,000 workers; causative agents: rubber (61.7%) glues/paints (20.0) wetwork (6.7)); Dental nurses (27.6 per 100,000 workers; rubber (26.9) aldehydes (19.2) nickel (19.2) epoxies/resins (7.7) soaps (5.8) bleach (5.8) solvents (5.8) cobalt (5.8)); Nurses (19.2 per 100,000 workers; rubber (31.9) wet work (24.1) soaps (11.3) bleaches/sterilants (9.8) nickel (7.3) fragrances/cosmetics (7.0) aldehydes (5.9) drugs (5.3)); Medical practitioners (11.6 per 100,000 workers rubber (59.8) wet work (10.8) bleach (8.8)). Occup physician reports May 1994-Jan 1999: Nurses (27.9 per 100,000 workers; rubber (42.6) soaps (17.9) wet work (17.2) bleaches/sterilants (16.0) aldehydes (5.6)); Assistant nurses/auxiliaries (15.0 per 100,000 workers; rubber (41.8) soaps (16.4) wet work (12.9)); Medical practitioners (11.3 per 100,000 workers; rubber (41.3) wet work (15.0) aldehydes (15.0).</td>
</tr>
<tr>
<td>(2000)</td>
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<tr>
<td>Kanerva et al.,</td>
<td>Work force in Finland between 1990-1994</td>
<td>Observational Study</td>
<td>Prevalence based on cases reported (required to report) by physician or insurance company. Finnish Institute of Occupational Health compiles the statistics each year.</td>
<td>Based on a work force of about 2 million in Finland. Number of cases of occupational contact urticaria more than doubled from 1989-1994 from 89 cases in 1989 to 194 cases in 1994. 815 cases between 1990-1994. Contact urticaria (all cases per 100,000 employed workforce): dental assistants 95.5; laboratory technicians, radiographers 35.6; physicians 33.0; dentists 23.4; nurses 21.2; assistant nurses/hospital attendants 10.2; technical nursing assistants 4.2. For the entire Finnish workforce 3.7 cases per 100,000 employed workers (excluded occupations with less than 3 cases between 1990-1994.</td>
</tr>
<tr>
<td>(1996)</td>
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</table>
94) Natural rubber latex second most common cause (23.7% of all cases) latex cause more common in women (171 cases vs. 22 cases)
Overall contact urticaria more common in women (567 cases vs 248 cases)

### Musculoskeletal Disorders

<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilroy et al., (2000)</td>
<td>14 biomedical scientists in a regional hospital in Ireland, pre-intervention all 14, post-intervention N=13, drop-out rate 7%</td>
<td>Cross-sectional Study</td>
<td>Video taped to determine RULA grand score, modified Nordic MSD questionnaire (piloted with modifications), Body discomfort chart recorded every two hours for 5 days</td>
<td>In pre-intervention, 59% of RULA grand scores at level 4, none at levels 1 or 2 and about a quarter at levels 5 and 6. In post-intervention, majority of tasks now at level 3 and 11% at level 2 with none at levels 5 and 6. Overall improvement. 3 month prevalence of MSD before intervention was 79% (low back 57%, neck 43%, shoulder 29%) and after intervention was 54% According to body discomfort chart - reported discomfort was reduced in the post intervention phase particularly for daily discomfort and multiple areas of discomfort</td>
</tr>
</tbody>
</table>
3.2.3 Chiropodists

Five studies were reviewed in relation to chiropodists and health. Three of the studies were rejected as they did not fit the inclusion criteria.

Two small cross-sectional studies were identified in relation to chiropodists and general health issues (Gatley, 1991) (+**), (Abramson et al., 1992) (+*). Respiratory and eye symptoms were the main reported health issues of chiropodists. (Gatley, 1991) found that the use of a non-vacuum drill was significantly associated with increased reports of wheezing, eye symptoms and chest tightness compared to never using a non-vacuum drill. The pilot study by (Abramson et al., 1992) found that 52% of chiropodists surveyed reported clinical reactivity with 75% reporting rhinitis, 48% reporting conjunctivitis and 31% reporting asthma. Of the chiropodists surveyed by (Gatley, 1991), 16.5% had a positive skin prick test for any trichophyton and those with a positive test for trichophyton were significantly more likely to report throat symptoms and the presence of more than two symptoms. Although 12.9% of the chiropodists had an abnormal lung function test, there was no evidence of work-related falls in lung function and no cases of occupational asthma were identified in the study population (Gatley, 1991).

Evidence Statement

There is limited evidence from one study that the use of non-vacuum drills increases respiratory and eye symptoms (*)

There is limited evidence from one study of a high prevalence of respiratory and eye symptoms in chiropodists (*)
Table 4. Health Issues in Chiropodists

<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Gatley, (1991)</td>
<td>Respiratory symptoms in chiropodists. Sample = 327, response rate 51.4% (168). 85 attended for respiratory measures, 117 women, 26 more than 49 yrs old, 28 asked to do self-testing PEFR, response rate 24%</td>
<td>Cross-sectional + **</td>
<td>Self-administered questionnaire based on standard Medical Research Council respiratory enquiry and personal details, year starting chiro work, type of work performed including use and type of drills. Attendance at Occupational Health department for respiratory measures (lung function - FEV1, FVC, PEF and FER) and skin prick test. Small proportion self-testing of lung function throughout day</td>
<td>Eye symptoms (p&lt;0.05) and chest tightness more common in staff who always used non-vacuum drills compared to never. Sign. increase in wheezing in those using non-vacuum drill sometimes compared to never (p&lt;0.025). 11 with abnormal FEV1, 2 abnormal FVC, 6 abnormal FER. 16.5% positive skin prick test for any trichophytan. those with positive trichophytan test had more throat symptoms (p&lt;0.005) and the presence of more than 2 symptoms (p&lt;0.05). Of PEFR self testing none showed evidence of work related falls in PEFR or diurnal variations greater than 15%. overall nail dust does not seem to have big impact on resp symptoms.</td>
</tr>
<tr>
<td>Abramson et al., (1992)</td>
<td>Population of n=84, n=95 podiatrists and n=90 student controls. In total N=300, response rate of 76%, n=227</td>
<td>Cross-sectional Study + *</td>
<td>Self-report questionnaire, serum measures and antigen measures</td>
<td>This was a pilot study which identified 52% of participants reporting clinical reactivity; 75% reporting rhinitis, 48% reporting conjunctivitis and 31% reporting asthma.</td>
</tr>
</tbody>
</table>
3.2.4 Chiropractors

Within the review process, only one paper was identified in relation to Chiropractors' health. The study was a small scale questionnaire survey of 1000 randomly selected chiropractors in the USA (Holm et al., 2006). The study aimed to examine the prevalence of work related injuries and asked respondents to record their 3 most serious injuries. The survey identified that 40.1% of respondents had experienced at least one injury. The majority of injuries were musculoskeletal occurring when performing chiropracty or positioning patients. The study also identified that most injuries occurred before the 5th year of practice and this suggests that more experienced practitioners have adjusted their way of working either through injury or through experience and there is a need to educate practitioners in injury prevention during their training.

Evidence Statement

There is limited evidence from one study that chiropractors experience musculoskeletal injuries in the first few years of practice. Further larger scale research is required to corroborate these findings. (*)
<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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</thead>
</table>
| Holm et al., (2006) | 1000 randomly selected chiropractors, response rate 42.2% N=422, 397 usable questionnaires 39.7% | Cross Sectional study  - * | Evaluated 3 most serious injuries, and circumstances surrounding those injuries - type, body area affected, tasks performing, when, time off work, changes made as result of injury - and demographics. Piloted the survey and made improvements before sent out | 40.1% experienced injury while chiropractor. Upper-extremity injuries most commonly reported: wrist/hand/finger 42.9%, shoulder 25.8%, elbow 11.9%, 24.6% low back injury (not sign associated with table height). 66.7% of all injuries occurred while performing manipulation. 11.1% occurred while positioning patient. Shoulder and low back injuries (p<0.001) more likely to be caused by adjustments to lumbosacral spine. 37.3% of injuries occurred in first 1-5 yrs of practice. 16.7% took off 1 week+ due to injury, 2.4% resulted in permanent disability. Shoulder and low back (p<0.001) sign more likely to have been caused by adjustments performed with patient side lying.
3.2.5 Dental Hygienists

Twenty-two papers were reviewed with regard to health issues among dental hygienists. Seven papers were rejected as they did not fit the inclusion criteria.

**General Health**

One poor quality study surveyed dental hygienists with regard occupational health problems (Jacobsen et al., 1995) The study identified that 37% of self-reported dermatoses of the hands which was attributed by respondents to wet work and unspecified sources, 13% reported respiratory reactions and 16% reported sensory reactions. However the study lacked detail on the methodology used and presentation of the results was lacking.

**Musculoskeletal Symptoms**

Twelve papers were included in the review that examined different aspects of musculoskeletal problems. (Acheson et al., 2000, Anton et al., 2002, Hernias et al., 2006, Salamander et al., 2000, Salamander et al., 2001a, Salamander et al., 2001b, Landforms et al., 2006, Less et al., 1995, Osborn et al., 1990, Werner et al., 2002, Yee et al., 2005, Lipan et al., 1999)

For practising dental hygienists a number of papers have identified the prevalence of symptoms, again the research was mostly cross-sectional questionnaire surveys. For prevalence of general musculoskeletal symptoms this was found to range between 81 and 93%. (Anton et al., 2002, Lindfors et al., 2006) Prevalence rates for different body areas were also measured and for the neck found to range between 28.5-74.7%, (Akesson et al., 2000, Lalumandier et al., 2001a, Liss et al., 1995, Werner et al., 2002, Yee et al., 2005) for shoulder symptoms the range was 26.1-60.7%, (Akesson et al., 2000, Lalumandier et al., 2001a, Werner et al., 2002, Yee et al., 2005), for elbow symptoms 19-29.1% (Akesson et al., 2000, Werner et al., 2002, Yee et al., 2005), hand and wrist symptoms 34-69.5% (Akesson et al., 2000, Liss et al., 1995, Werner et al., 2002, Yee et al., 2005) and lower back 23.5% to 65% (Lalumandier et al., 2001a, Liss et al., 1995, Werner et al., 2002, Yee et al., 2005) Predictors for the development of musculoskeletal symptoms included increasing age, general health problems, high physical loading and the physical work environment. (Lindfors et al., 2006)

Cherniak et al (2006) identified that 47% of hygienists reported numbness and tingling in their hands. However, from self-report studies, reporting rates of 75% for hand problems were identified. (Lalumandier et al., 2000, Lalumandier et al., 2001b)

Carpal tunnel syndrome was also investigated in several studies. Using questionnaire based data, it was estimated that between 39% and 57% of respondents had probable CTS (Lalumandier et al., 2000, Osborn et al., 1990, Werner et al., 2002). However one study identified that 7.6% of respondents had been diagnosed with CTS. (Liss et al., 1995) Risk factors identified for CTS included working as a hygienist for between 5 and 14 years, increased length of practice and high levels of scaling (Liss et al., 1995, Ylipaa et al., 1999)
Sickness Absence

Patterns of sickness absence reporting were examined by Petren et al (2007) (**). The questionnaire survey asked respondents to self report sickness absence, number of co-workers, work demands and perceived musculoskeletal pain. The results identified that sickness absence was associated with those reporting musculoskeletal symptoms, longer clinical hours and treating more patients daily. However, psychosocial factors including role ambiguity were found to have a greater effect on sickness absence than physical work factors. Thus, within this study, psychosocial factors were an important predictor for sickness absence.

Evidence Statements

There is moderate evidence from twelve studies that dental hygiene work is associated with increased self-reported musculoskeletal symptoms (**)

There is moderate evidence that dental hygiene work is linked to an increase in carpal tunnel syndrome reporting (**)

There is moderate evidence from one study that sickness absence in dental hygienists is affected by both psychosocial and physical work factors. (**)

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<thead>
<tr>
<th>General Health</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
</tr>
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<tbody>
<tr>
<td>Jacobsen et al., (1995)</td>
<td>Mailed questionnaire to all members of the Norwegian Dental Hygiene Association. 189 returned representing a response rate of approximately 50%</td>
<td>Cross Sectional study</td>
<td>Questionnaire survey including demographic, occupational and multiple choice questions on health impacts</td>
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<thead>
<tr>
<th>Musculoskeletal</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tbody>
<tr>
<td>Akesson et al., (2000)</td>
<td>All Dental Personal in public dental health services in Blekinge Sweden, N=257, included Dentists n=72, Dental Hygienists n=32, Dental Assistants n=115 and Specialists n=38. Two reference groups were used, medical nurses n=30 and general population n=81</td>
<td>Cross Sectional study</td>
<td>The Nordic Musculoskeletal Questionnaire, blood samples for mercury and selenium analysis and creatinine analysis. Demographic and personal information</td>
</tr>
</tbody>
</table>
Anton et al., (2002)  
All 109 attending a USA DH conference. 13 nonDH were excluded and 1 male DH (95). A further 6 left before physiol measures could be obtained (86).  
Cross Sectional study  
Nordic for general MSDs, generic demographic and job factors. CTS1 defined in terms of general symptoms; CTS2 CTS1 + nocturnal symptoms; CTS3 + nerve conduction plus generic confounders (BMI etc)  
General MSDs: W/H 69.5%, neck 68.5%, shoulders 60.0%, upper back 67.4%, low back 56.8%. CTS1 44.2%, CTS2 23.2%, CTS3 8.4%. (NB CTS1 required symptoms in 2 or more fingers rather than 1 used elsewhere). Crude analyses showed CTS3 related to age (p=0.0004), weight (p=0.0002), BMI (p=0.0017), and %fat (p=0.07). Also years as DH (p=0.004). For CTS2 weight (p=0.06) and BMI (p=0.08) approached sig. For CTS2, hard calculus patients per week was sig (p=0.01) and patients per day approached (p=0.07). In a multiple reg of CTS3 crude assoc were found with age (OR=1.23), BMI (OR=1.43), years worked (OR=1.14), patients per day (OR=1.35) and per week (OR=1.06) were sig. After adj. age (OR=1.38), BMI (OR=1.48), & daily patients (OR=1.73) remained

Cherniack et al., (2006)  
Random sample of 94 experienced dental hygienists and 66 student hygienists  
Cross Sectional study  
Physical examination, measurement of vibrotactile perception threshold, nerve conduction measurement and grip strength measures  
47% of experienced hygienists reported numbness and tingling. The study suggests that vibration years (OR=1.77, 95% CI 1.12-2.80), cumulative vibration hours (OR=1.21, 95%CI 1.01-1.45) associated with those described as weak in the study. In summary high levels of paraesthesia were identified and "appear" to be associated with sensory nerve demyelination, at the carpal tunnel and dysfunction of fingertip mechanoreceptors.

Lalumandier et al., (2001a)  
6,230 questionnaires to employees in US Army Dental Service. 5,115 returned (80.9%). 193 sent to dental hygienists, 177 back (91.7%).  
Cross Sectional study  
Non-standard quest of 8 symptoms associated with CTS. 1 positive taken as 'hand problem'; 2, possible CTS, 3 probable CTS, 4 'classic' CTS.  
In total sample, 44.8% had a hand problem (1 symp) cf 75.1% of DH. 25.4% had 3 symps cf 56.5% DH. Dental therapy assistants (73%), secretaries 38%, technician 35%, dentist 28%, receptionist 27%, clerk 21%, radiography tech, 13%. Having a majority of patients (>50%) with heavy calculus sig incr. risk of CTS (OR=2.3, p=0.0203). Years of practice incr risk of CTS (OR=1.9, p=0.0317)

Lalumandier et al., (2001b)  
6,230 questionnaires to employees in US Army Dental Service. 5,115 returned (80.9%). Replies broken down by specialty but individual response rates not given.  
Cross Sectional Study  
Non-standard quest of MSD symptoms in neck, arms, shoulders, back & legs  
Results reported for 8 different classes of dentist plus 3 classes of dental auxiliary. No overall means reported. Back pain 21.7%-42.6%; neck 19.1%-31.3%; shoulder 14.7%-26.1%; leg 8.3%-20.8%; arms 4.2%-19.3%. Some interesting patterns e.g orthodontists highest for back but lowest for neck and shoulder. Dentists 10m:1f, auxil 10f:1m. No formal analyses of potential related factors.
<table>
<thead>
<tr>
<th>Study (Year)</th>
<th>Sample</th>
<th>Response Rate</th>
<th>Study Design</th>
<th>Data Collection</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lalumandier et al. (2000)</td>
<td>6320 mailed surveys to dental personnel in civilian and military occupations. n=5115</td>
<td>80.9%</td>
<td>Cross Sectional Study</td>
<td>Questionnaire developed to identify hand symptoms including pain at night, tingling etc. Number of symptoms then used to determine the likelihood of having CTS.</td>
<td>For civilian dental hygienists, 75% reported a hand problem with 57% reporting probable carpal tunnel syndrome. Unable to decipher military titles for comparison.</td>
</tr>
<tr>
<td>Lindfors et al. (2006)</td>
<td>Sample of 1795, response rate of 96%, n=1300 Dental health workers</td>
<td></td>
<td>Cross Sectional study</td>
<td>Data collected included demographic data; assessment of physical work environment, psychosocial component measured using a 6-point scale. Fatigue, general health and musculoskeletal problems. No mention of a validated measure.</td>
<td>Significant predictors of upper extremity disorders were age (p&lt;0.0001), general health problems (p&lt;0.0001), physical loading (p&lt;0.0001) and physical work environment (p&lt;0.021).</td>
</tr>
<tr>
<td>Liss et al. (1995)</td>
<td>2142 Dental hygienists, 1066 questionnaires (50% response), 951 usable. 305 Dental assistants 154 q's (50.5% response) 109 usable.</td>
<td>50%</td>
<td>Cross Sectional study</td>
<td>Questionnaire based on Nordic, plus additional Q's on physician diagnosis, piloted with both groups.</td>
<td>DH sig older than DA. Almost all female (4 male DH). Symptoms and CTS(Q) MUCH more common in scaling hand. Age adjusted: told had CTS OR 5.2 (p&lt;0.1); CTS(Q) OR 3.7 (p&lt;0.01; hand-wrist symps 12m/7d, ORs 2.5/2.6 (p=0.021); shoulder symps 12/7, ORs 2.8/2.5 (p&lt;0.0001); neck 12/7, ORs (p&lt;0.01); low back ORs 0.9/0.9 ns. Neck modify work OR=2.4 p&lt;0.05. Length of practice (p=0.05) and heavy scaling (p=0.05) predictive of CTS(Q), also operating 'clock' position - 10.00 worst (forehead 12.00). Length of practice (p=0.001) and heavy scaling (p=0.0001) predictive of 12m wrist/hand symps also trunk rotation (p=0.05) and multiple instrument types used (p=0.001). Days worked per week (p&lt;0.0001) patients per day (p&lt;0.01) and heavy scaling (p&lt;0.05) predictive of 12m shoulder symps also trunk rotation (p&lt;0.0001) (also hrs typing (p&lt;0.05)). Multiple regression showed Age, heavy scaling, clock position (10.00+12.00) and years practice to be sig factors for CTS(Q); Age, heavy scaling, trunk rotation, years practice and 3rd instrument sig factors for 12m wrist/hand; Age, history of injury, type of practice, days per week, trunk rotation, years of practice to be sig factors for 12m shoulder.</td>
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</table>
Osborn et al., (1990) 493 USA DHs invited, 443 (90%) response, 46 (9.3%) not in clinical practice; 3 (0.6%) not in CP because of CTS; & 1 not in CP because of CTS & other musc pain. Not clear of the 46 were excl from analysis.

Cross Sectional study

Non-standard questionnaires on CTS & musculoskeletal pain.

252 (63%) rep at least 1 symp assoc with CTS; 27 (7%) rep diag of CTS (NB: "2 of the most frequently reported symptoms [for CTS] occurred least frequently in the symptom group). 22 (6%) rep impact on work of which 16 (73%) had CTS diag. Little else of value.

Werner et al., (2005) 305 USA DH volunteers at conf (303 f). Not known total at conf.

Cross Sectional study

non-standard questionnaires on CTS, nerve cond, phys exam for other ULDs

24% obese (BMI>29); 39% CTS symps; 12% prev dia of CTS; 3% met most stringent CTS criteria (electro + symps) cf 2.9% Swedish fem; 2.7 Swedish gen pop, & 2.9% male US dentists using same diag (all ns). Tendency for higher ULDs (e.g. shoulder 13% v 2% clerical workers) but only 'any tendinitis' (23% v 12%) sig p=0.006, cf data from other studies. Those with median slowing were more likely to be overweight (p=0.02) but effect not shown in subset with CTS diag. This could be due to small sample (37) with diag CTS.

Yee et al., (2005) Sample = 1418, response rate 37.3%, N=529 US Dental Hygienists

Cross Sectional study

Mailed questionnaire survey previously piloted including 158-items and the Nordic Musculoskeletal Questionnaire

Participants often worked in more than one office. For musculoskeletal discomfort in the last 12 months percentages were neck 74.7%, upper back 61.1%, lower back 62.6%, shoulders 60.7%, elbows 29.1% and wrist/hands 67%. The discomfort report was associated with handedness.
Ylipaa et al., (1999) 575 Swedish DHs, 86% response (98.4% fem).

Non-standard Q covering demog; lifestyle; phys & psychol work factors; social support @ work; work-related attitudes & ehave; job sats; global (self-rated) health; mental well-being; general & work-related MSDs. Not stated how distinction between general and work-related was made.

Mixture of factor analysis and single items in regression. Good general health increased by ‘clinical practice fraction’ (OR=2.1, p=0.004); active leisure (OR=2.0, p=0.001); management support (OR=1.9, p=0.02) & decr by work/family overload (OR=0.6, p=0.001). Well-being increased by ‘mastery of work’ (OR=1.3, p=0.032) & mgmt support (OR=1.7, p=0.05). General MSDs increased by work/family overload (OR=1.3, p=0.05) & scaling work (OR=1.1, p=0.001) decr by active leisure OR=0.7, p=0.004). work-related MSDs incr by work/family overload (OR=1.6, p=0.002), scaling work (OR=1.1, p=0.001), & decr by more hours worked per week (OR=0.5, p=0.03). weeks worked per year (OR=1.9, p=0.064) & job diss (OR=1.1, p=0.065) approached sig.

Detailed analysis of ‘general MSDs’ showed: neck probe incr by scaling work (OR=1.2, p=0.001), work/family overload (OR=1.3, p=0.02) & decr by problem clients (OR=0.8, p=0.001). Shoulder prob incr by scaling work (OR=1.2, p=0.001) & work/family overload (OR=1.3, p=0.02); upper back probs incr by scaling work (OR=1.1, p=0.001) & work/family overload (OR=1.5, p=0.017) & decr by active leisure (OR=0.6, p=0.015); elbow prob incr by scaling work (OR=1.1, p=0.001) & smoking (OR=1.6, p=0.04); low back probs incr by work efficiency (OR=1.1, p=0.04); & decr by personal commitment (OR=0.8, p=0.036); hand/wrist prob incr by scaling work (OR=1.1, p=0.001); finger prob incr by scaling work (OR=1.1, p=0.001) & years in profession (OR=2.1, p=0.024). For work-related MSDs, risks of neck symps incr by scaling work (OR=1.1, p=0.001); good work relationships (OR=1.0, p=0.03), & work/family overload (OR=1.4, p=0.002) & decr by having uncooperative clients (OR=0.09, p=0.021); Shoulder prob incr by scaling work (OR=1.1, p=0.001); Upper back prob incr by scaling work (OR=1.1, p=0.001), work/family overload (OR=1.4, p=0.02), weeks worked per year (OR=2.0, p=0.03) & decr by active leisure (OR=0.7, p=0.03), more hours worked per week (OR=0.6, p=0.04), & having more pride in organisation (OR=0.6, p=0.02); Elbow prob incr by scaling work (OR=1.1, p=0.001). Both having diff clients (OR=1.1, p=0.055) & more years in prof (OR=1.6, p=0.057) appr sig. Low back probs incr by scaling work (OR=1.1, p=0.003). More years in prof (OR=1.5, p=0.05| appr sig. Low back prob decr ‘clinical practice fraction (OR=0.7, p=0.073) appr sig. Hand/wrist prob incr by scaling work (OR=1.2, p=0.001) & decr by having uncoop clients (OR=0.9, p=0.01). Finger prob incr by scaling work (OR=1.1, p=0.001).
<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tbody>
<tr>
<td>Petren et al.,</td>
<td>Sample of 577 randomly selected dental hygienists responded to a questionnaire. After selection for full time work and other variables n=252.</td>
<td>Cross Sectional study</td>
<td>Self-reported sickness absence, number of employees in workplace, demands at work, work efficiency, perceived pain in the musculoskeletal system. Participants were classified as severe musculoskeletal symptoms (n=14), low well-being (n=43), both low-wellbeing and musculoskeletal (n=12) and a main group (n=183). Sick leave was categorized as 0, 1-3, 4-8 and over 8 days absence. Questionnaire covered work environment, health, psychosocial working conditions and occupational history.</td>
<td>In the study, sick leave was significantly higher in the musculoskeletal group compared to the main group (P&lt;0.001), the musculoskeletal group worked more clinical hours and treated more patients daily than the reference group (p&lt;0.01). Psychosocial management factors were associated more with sick leave rather than musculoskeletal or physical work factors.</td>
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</table>
3.2.6 Dental Nurses and Dental Assistants

Four papers were identified that examined health issues in dental nurses and dental assistants. Jaakkola et al. (2007) (++) carried out a cross-sectional study in dental nurses to examine work-related respiratory and skin symptoms. The study identified work-related symptoms including hoarseness (15.1%) and work-related cough (15.1%). Furthermore, 4.4% had adult-onset diagnosed asthma with 10.5% bronchitis. The multivariate analysis identified that the daily use of methacrylates was associated with increased risk of adult-onset asthma, nasal symptoms, and work-related cough. However, this was a cross-sectional study and further research is required to confirm the findings.

Alanko et al. (2004) (-) examined dermatitis and respiratory symptoms in dental nurses. From this cross-sectional study, 51% reported dermatitis, with 12-month prevalence rates of 38% repeatedly, 7% continuously. The most common stated attribution was from methacrylates and rubber chemicals for allergic contact dermatitis and hand washing for irritant contact dermatitis.

Two cross-sectional studies (Lalumandier et al., 2000, Lalumandier et al., 2001b) (-) examined the prevalence rates of musculoskeletal symptoms in dental assistants. The studies identified that musculoskeletal pain reporting in dental assistants was similar to other dental professionals and they estimated that 35% had probable symptoms of carpal tunnel syndrome. Both papers were rated as poor quality studies and this was mainly due to the lack of information regarding data collection.

Evidence Statements

There is limited evidence from one paper that respiratory symptoms are associated with exposure to methacrylates by dental nurses. Further research is required to corroborate this (*)&

There is limited evidence from one study that dermatitis in dental nurses is associated with methacrylates and rubber chemicals causing allergic contact dermatitis and hand washing with irritant contact dermatitis. Further research is required to corroborate this finding. (*)

There is moderate evidence from two studies that dental assistants self-report levels of musculoskeletal symptoms are high. (***)
Table 7 Health Issues in Dental Nurses and Dental Assistants

<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tbody>
<tr>
<td>Alanko et al., (2004)</td>
<td>In Helsinki. 923 eligible dental nurses, response rate 87% N=799, 328 invited to interview with occup physician, response rate 75% N=245. 133 invited for clinical investigation response rate 80%, N=107</td>
<td>Cross Sectional study</td>
<td>Evaluated dermatitis, respiratory symptoms, self-reported association of symptoms to work, atopy, work history and current work, handling of chemicals and other materials through a telephone interview (CATI) using slightly modified supplemented standard questionnaire Tuohilampi. Respondents invited to interview with occup physician if reported work-related dermatitis on hands, forearms or face lasting for at least 2 weeks or occurring repeatedly. Of those respondents with suspected undiagnosed occup skin dx selected for further clinical examinations with prick and patch testing</td>
<td>51% reported dermatitis on hands/forearms for at least two weeks - 38% repeatedly, 7% continuously, 30% during past 12 months, 12% at present, 22% related to dental work. Respondents reporting never having had atopic skin or respiratory symptoms reported sign. less hand or forearm dermatoses compared to atopic respondents (p&lt;0.001). 21% had facial dermatitis for at least 2 weeks - 7% due to dental work. Frequency of facial dermatoses sign. associated with atopy (p&lt;0.001). 195 stated using gloves aggravated hand dermatitis follow by frequent hand washing, dental restoration &amp; cleaning office. Most common for face = wearing paper mask. From clinical examinations - diagnosed 22 new cases of occup skin disease. most common diagnosis = allergic contact dermatitis. Most common causes - (meth)acrylates &amp; rubber chemicals. Frequent hand washing main cause of irritant contact dermatitis.</td>
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## Respiratory Symptoms

<table>
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<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Jaakkola et al., (2007)</td>
<td>Study of dental assistants exposed to methacrylates. N=923, Response rate 87%, n=799. Respondents were 602 Dental Nurses, 149 Dental Hygienists and 46 Specialised Dental Nurses.</td>
<td>Cross Sectional study + **</td>
<td>Trained interviewer carried out structured interviews on respiratory and skin symptoms. Also health history reviewed and occupational history</td>
<td>Work related nasal symptoms were reported by 35% of participants, work related hoarseness by 15.1%, work related cough by 15.1%. 4.5% reported doctor diagnosed asthma in the previous year, 4.4% had adult-onset doctor diagnosed asthma and 10.8% bronchitis. Daily use of methacrylates was associated with increased risk of adult-onset asthma (OR 2.65, 95% CI 1.14-7.24), nasal symptoms (OR 1.69, 95% CI 1.08-2.71) and work related cough (OR 1.69, 95% CI 1.08-2.71). There appears to be a dose-response relationship with those over 10 years exposure reporting increased risk of nasal symptoms and hoarseness.</td>
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## Musculoskeletal

<table>
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<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tbody>
<tr>
<td>Lalumandier et al., (2001b)</td>
<td>6,230 questionnaires to employees in US Army Dental Service. 5,115 returned (80.9%). Replies broken down by specialty but individual response rates not given.</td>
<td>Cross Sectional study - *</td>
<td>Non-standard quest of MSD symptoms in neck, arms, shoulders, back &amp; legs</td>
<td>Results reported for 8 different classes of dentist plus 3 classes of dental auxiliary. No overall means reported. For dental assistants, back pain reported by 26.1%, neck pain by 24.8%, shoulder pain by 22.4%, leg symptoms by 14.6% and arm pain by 12.1% No formal analyses of potential related factors.</td>
</tr>
</tbody>
</table>
Lalumandier et al., (2000) conducted a study involving the mailing of surveys to dental personnel in civilian and military occupations. Out of 6320 surveys mailed, 80.9% responded, with a total of 5115 responses. The study was cross-sectional in nature.

A questionnaire was developed to identify hand symptoms, including pain at night and tingling, among others. The number of these symptoms was then used to determine the likelihood of having Carpal Tunnel Syndrome (CTS).

For civilian dental assistants, 55% reported hand problems, and it was estimated that 35% had probable CTS.
3.2.7 Dental Technicians

Five papers were identified that examined health in dental technicians.

Musculoskeletal symptoms were assessed in the four studies. (Jacobsen et al., 1993, Jacobsen et al., 1996b, Nakladalova et al., 1995, Uveges et al 1995) Self-reported prevalence rates of musculoskeletal disorders ranged from 68% to 39% reporting musculoskeletal symptoms. Jacobsen et al (1993) (-*) identified that 35% reported pain in the neck and shoulders, 18% pain in the lower back, 18% had pain in the arms, elbows, waists, hands or fingers. Attribution was also sought from respondents in this paper and participants identified that fine muscular movements, prolonged poor posture, long hours and stress were associated with the development of musculoskeletal symptoms.

Dermal reactions were also identified by Jacobsen et al (1993, 1996). There were reported by 28% and 34% of participants respectively and were associated by respondents with acrylic-resin related work and plaster related work. No further details were obtained in either paper. Further work by Uveges and Grimwood (1995) (+*) in military dental technicians identified that out of 449 surveyed, 169 had a positive history of hand dermatitis. The study identified that the majority of dermatitis found was irritant contact dermatitis as opposed to allergic contact dermatitis and was found at levels consistent with other studies.

Respiratory reactions were also reported in the studies by Jacobsen et al (1993, 1996), where 16% and 31% reported symptoms including mucosal reactions, throat reactions and sinus and lung reactions. Again self-reported attribution was identified as from grinding dust and air quality. These data have not been corroborated with any further studies.

Fabrizio et al (2007) (-*) used a self-administered questionnaire to identify pyramidal symptoms in dental technicians. This small study involved neurological examination of 14 technicians, four of whom were identified with tremor and one with a diagnosis of Parkinson’s disease. The authors suggest this is due to exposure to toxins but further research is required to corroborate this finding.

Evidence Statements

There is limited evidence that dental technicians suffer from musculoskeletal symptoms as a result of the work environment (*)

There is limited evidence that dental technicians report hand dermatitis at rates consistent with other dental professionals. (*)
<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tbody>
<tr>
<td>Fabrizio et al.,</td>
<td>27 dental technicians working in Rome dental school, all answered questionnaire, 14 underwent exam</td>
<td>Cross Sectional study</td>
<td>Self-administered questionnaire on extra pyramidal symptoms which is used in general population to diagnose Parkinsonism cases. Evaluated psychiatric disorders with General Health Questionnaire. Clinical neurological exam during which provided detailed occupational history</td>
<td>Of 14 that underwent neurological exam - 4 had postural tremor (tremor mild, low amplitude, barely perceivable or intermittent) and 1 diagnosed with Parkinson’s disease. 12 of the 27 responded positively to at least 4 questions in the self-administered questionnaire on extra pyramidal symptoms</td>
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<td>(2007)</td>
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<td>Jacobsen et al.,</td>
<td>67 Laboratories contacted with 100 men and 101 women completed questionnaires</td>
<td>Cross Sectional study</td>
<td>Questionnaire developed for the study for self-completion</td>
<td>39% reported musculoskeletal symptoms, 35% had pain in shoulders and neck, 18% had pain in the lower back, 18% had pain in the arms, elbows, waists, hands or fingers. 28% reported dermal reactions and 16% reported respiratory symptoms. Ergonomics and work specific factors identified as attributing to symptoms.</td>
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<tr>
<td>(1993)</td>
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<tr>
<td>Jacobsen et al.,</td>
<td>Mailed questionnaire listing 7 groups of health symptoms sent to 1297 technicians. Response rate of 56.4%, n=731</td>
<td>Cross Sectional Study</td>
<td>Questionnaire surveying work-related health complaints including demographic information, occupational information and health symptoms</td>
<td>Symptoms reported included musculoskeletal (68%), dermal (34%), respiratory (31%) and neurological (26%). Dental technicians reported more musculoskeletal, dermatologic and neurological symptoms compared to other working populations (p&lt;0.005)</td>
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<td>(1996a)</td>
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<td>Study</td>
<td>Population</td>
<td>Methodology</td>
<td>Findings</td>
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<td>Nakladalova et al., (1995)</td>
<td>120 Czech Dental Technicians (111 men). Apparently clinic attendances although basis for selection/attendance not given. Seems to be case-series rather than formal cross-section.</td>
<td>Case Studies</td>
<td>Collated case reports. Tabulation of subj probs shows 17 (14.2%) no probs; 63 (52.5%) vertebral complaints; 57 (47.5%) paraesthesia in fingers; 32 (26.6%) elbow pain; 13 (10.8%) shoulder pain; 8 (6.6%) wrist pain; 8 (6.6%) hand joint pain. 4 diagnosed with clinical CTS. Part of study looked for HAVS - no reliable evidence although hyg survey showed some high levels of vib.</td>
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<tr>
<td>Uveges et al., (1995)</td>
<td>480 Qs to all dental personnel at 2 USAF medical centres. 449 returned (93.5%); 333m, 114f; 142 dentists, 231 dental assist/hyg, 43 dent techs, 33 admin.</td>
<td>Cross Sectional study</td>
<td>169 (37.6%) reported positive response (107m). 120/169 (71%) contacted for interview &amp; exam (all apparently agreed unless this is just agreement). 27 patch tested, rest diagnosed with 'irritant contact dermatitis'. Of 27 only 3 had positive responses to patch tests. 2 sens to both Balsam of Peru &amp; eugenol. 1 to both ethyleneglycol dimethacrylate &amp; 2-hydroxyethyl methacrylate (lab tech). No contact urticaria.</td>
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3.2.8 Dentists

General Health

Thirty-five papers were reviewed but sixteen were excluded as they did not fit the inclusion criteria. The health issues identified within the review were broken down into general health, cancer risks, dermatitis and musculoskeletal symptoms.

Six authors examined general health symptoms in dentists. (Baldwin et al., 1999, Gijbels et al., 2006, Kay et al. 2008, Leggat et al., 2007, Puriene et al., 2007, Puriene et al., 2008) These were a mixture of cross-sectional surveys and reviews. At a general level dentists are reporting symptoms of musculoskeletal disorders, (Gijbels et al., 2006, Leggat et al., 2007, Puriene et al., 2007, Puriene et al., 2008) dermatitis, allergies and hearing loss. (Gijbels et al., 2006) The studies included do cover areas discussed below.

Kay et al. (2007) (+*) carried out a survey of UK dentists where the main objectives were measures of stress and wellbeing. As part of the survey it was identified that 67% of the dentists who responded, reported having good or excellent health. However, 42% reported that they were free from pain or discomfort.

Thus there is very little data available on the general health of dentists.

Evidence Statement

There is currently limited evidence from one cross-sectional study that the majority of dentists report being in good or excellent health (*)

Cancer Risks

One paper was identified that was a literature review of the cancer risks for dentists. (Simning et al., 2007) (**) This review study assessed the epidemiological literature on mortality and incidence risks. In summary the paper identified that there was no evidence of an increased risk of lung cancer or neoplasms; but there was an elevated risk for brain, skin and some reproductive cancers for dentists. However, the review did identify a number of methodological problems with the papers contained in it including difficulties in defining occupation and exposures.

Evidence Statement

There is limited evidence from one study that dentists may be at an increased risk of certain cancers. Further research is required to corroborate this finding (*)

Dermatitis

Dermatitis in dental personnel was covered by one paper and the study included 142 dentists (Uveges et al., 1995) (+) The study included a questionnaire survey, followed by 120 interviews and 27 patch tests. The authors identified that as they were not able to patch test all participants who responded positively that this is a potential source of bias. However the study did identify that there was 0.67% rate of allergic contact dermatitis in dental personnel suggesting a low rate within this population
Evidence Statement

There is limited evidence one study that dental personnel do not show higher rates of allergic contact dermatitis.

Musculoskeletal Symptoms

One cross-sectional study examined musculoskeletal symptoms in dentists. Thornton et al., (2008) (++) Sixty-one % of 590 dental students reported discomfort related to work. In terms of prevalence by body area, 48% reported neck symptoms, 31% shoulder symptoms, 44% back symptoms and 20% hand symptoms. Although the study identifies that symptoms increase between 1st and 4th year, no data was actually provided. Although students are reporting symptoms, this poor quality study does not inform particularly well.

For practising dentists, Brown (2004) (-*) reports a lifetime prevalence of 70% in orthodontists. When examining musculoskeletal symptoms by dentists lifetime prevalences of between 70-87.2% are reported. (Brown, 2004, Lalumandier et al., 2001b ) When examining musculoskeletal symptom by body area, prevalence rates for the neck range from 28.1-57.5%, for the shoulder 21.3-53.3%, for the back 35.1-53.7% and for the hand 52%. (Droeze et al., 2005, Lalumandier et al., 2001b, Leggat et al., 2006, Lehto et al., 1991)

Carpal tunnel syndrome has also been raised as a potential health impact in dentistry. Lalumandier (2000) (-*) reported from a questionnaire survey that 19% were likely to have CTS. Brown (2004) (-*) reports that 9.2% of US physicians had been diagnosed as having some type of upper limb disorder. A further study within this review identified that 28% of dentists reporting symptoms were found to have CTS. Mamatha et al (2005) (--) identified that 32% of dentists surveyed reported CTS symptoms with 25% reporting pain and 7% tingling and numbness.

Risk factors found to be associated with musculoskeletal symptoms in dentists include being female and being less experienced (Leggat et al., 2006 Rudencrants et al 1991) However as the research is cross sectional it should be treated with caution.

One intervention study was identified within the review that involved implementing ergonomic recommendations. (Droeze et al., 2005) (--) The study was of poor quality but did identify a reduction in musculoskeletal symptom reporting after making workplace changes including work postures, lighting, planning of work and organising work differently. Where individuals did not make changes this was found to be due to barriers including old routines, work pressures and motivation. Although a poor quality study it has highlighted some of the barriers to improving the work routine of dentists.

Evidence Statements

There is limited evidence from one study that dental students report a high level of musculoskeletal symptoms (**)

There is moderate evidence from several studies that dentists suffer from a high number of musculoskeletal symptoms (**)
**Sickness Absence**

Sickness absence rates were self-reported by recent graduates in Scotland. (Baldwin et al., 1999) The study identified a mean sickness absence rate of 2 days absence in the previous 12 months but also that respondents had gone to work for an average of 5 days when not fit to do so. These measures are self-reported but do indicate presenteeism among the sample.

**Evidence Statements**

There is limited evidence from one study that recent dental graduates attend work when unwell (*)
<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baldwin et al., (1999)</td>
<td>Sample of 232 Scottish graduates, 5 years and 2 years post-graduation 77% response rate N=183</td>
<td>Cross Sectional study</td>
<td>Questionnaires including the Attitudes to Work, GHQ 28, Alcohol consumption and sickness absences</td>
<td>Taken a mean of 2 days absence in the previous 12 months, had come to work unfit for a mean of 5 days Alcohol units for the previous week ranged from 0 to 60+ but a mean of 13 units.</td>
</tr>
<tr>
<td>Gijbels et al., (2006)</td>
<td>Questionnaire survey of 500 dentists in Belgium. Response rate 78% N=388</td>
<td>Cross Sectional study</td>
<td>Questionnaires assessed self-perceived auditory function, sensory function and self reports on symptoms</td>
<td>Main disorders were low back pain (54%), vision problems (52.3%), Allergies (22.5%) and auditory disorders (19.6%). The study reported hearing loss in the 4000 Hz range in the left air but significance not reported.</td>
</tr>
<tr>
<td>Kay et al., (2008)</td>
<td>Self-perceived health in dentists. Questionnaire sent to 1200 dentists, response rate of 55%, n=545.</td>
<td>Cross Sectional Study</td>
<td>Self-perceived general health, drug use, wellbeing sexual health, occupational health, physical activity and nutrition.</td>
<td>67% reported very good or excellent health. 42% were free from pain or discomfort.</td>
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<tr>
<td>Study</td>
<td>Methodology</td>
<td>Symptoms reported</td>
<td>Notes</td>
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<tr>
<td>Leggat et al., (2007)</td>
<td>Review of occupational health</td>
<td>12 month prevalence of neck pain, 58%; 12 month prevalence of shoulder pain 53%. Negative correlation between years since graduation and MSDs. Dermatitis a problem both contact and atopic; higher prevalence in females and younger dentists. Most managed by self-prescription, prescribed medication and changing gloves. Respiratory hypersensitivity raised as an issue relating to latex, MMA, chloramines.</td>
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<tr>
<td>Puriene et al., (2007)</td>
<td>Questionnaire survey of 2,249</td>
<td>3% reported poor health. Predictors for physical disorders included being female and musculoskeletal disorders (OR 1.58, 95%CI 1.16-2.27), working hours were related to head aching (OR 1.02, 95%CI 1.44-3.04); hand problems associated with age (OR1.03, 95%CI 1.02-1.04)</td>
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<td></td>
<td>licensed dentists in Lithuania.</td>
<td>Cross Sectional study</td>
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<td></td>
<td>Response rate 68.2% N=1670</td>
<td>Questionnaire survey of dentists. Questionnaire development not adequately described and outcome measures included structured questions and Likert scales.</td>
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<tr>
<td>Puriene et al., (2008)</td>
<td>Review of general health of</td>
<td>Prevalence of MS complaints is high, with low back pain being the most prevalent MS complaint (Greek study 46% back pain, Australian 53.7%). Work in sitting position more severe low back pain compared to alternating with sitting/standing. Hand/wrist complaints second most common especially in dental hygienists - result in sign higher chronicity than any other complaint. MSD comorbidity high (62% with at least one, 35% at least two, 15% at least three, 6% all four MS complaints in past year). Back pain associated with reports of hand/wrist pain. Older people and women suffer more from neck pain. Working w/o breaks sign factor for shoulder pain. comorbidity elevated among those with higher physical load, lower job control and longer working hours. &gt;70% dental students of both sexes report pain by 3rd year. those with symptoms experienced their work load as being more unsatisfactory, more burdened by anxiety, poorer psycosomatic health and less confidence in future.</td>
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<tr>
<td></td>
<td>dentists</td>
<td>Review of general health of dentists</td>
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### Cancer Risks

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<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tbody>
<tr>
<td>Simning et al.,</td>
<td>Review of cancer mortality in dentists</td>
<td>Systematic Review</td>
<td>Mortality rates and cancer incidence</td>
<td>Presently little evidence of an increased risk for dentists but the studies reviewed had methodological problems</td>
</tr>
<tr>
<td>(2007)</td>
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### Dermatitis

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<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Uveges et al.,</td>
<td>480 Qs to all dental personnel at 2 USAF medical centres. 449 returned (93.5%); 333m, 114f, 142 dentists, 231 dental assist/hyg, 43 dent techs, 33 admin.</td>
<td>Cross Sectional study</td>
<td>Questionnaire screening, followed by interview/exam &amp; (where appropriate) patch testing.</td>
<td>169 (37.6%) reported positive response (107m). 120/169 (71%) contacted for interview &amp; exam (all apparently agreed unless this is just agreement). 27 patch tested, rest diagnosed with 'irritant contact dermatitis'. Of 27 only 3 had positive responses to patch tests. 2 sens to both Balsam of Peru &amp; eugenol. 1 to both ethyleneglycol dimethacrylate &amp; 2-hydroxyethyl methacrylate (lab tech). No contact urticaria.</td>
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<td>(1995)</td>
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Musculoskeletal

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<th>Author</th>
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<th>Study Outcomes</th>
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<tbody>
<tr>
<td>Brown, (2004)</td>
<td>Review of MSD, carpal tunnel syndrome, hand dermatosis and allergy in dentists and orthodontists. Used data from New York Life disability-insurance programme to support review (cross-sectional survey)</td>
<td>Systematic Review - *</td>
<td>New York Life disability-insurance programme to determine type of diseases claiming disability for. Literature review on MSD, carpal tunnel syndrome, hand dermatoses and allergies</td>
<td>MSDs- US army study: general dentists - 35.1% back pain, 28.1% neck, 21.3% shoulder, 9.2% legs, 6.3% arms; orthodontists - 42.6% back, 19.1% neck, 14.7% shoulders, 14.7% legs, 8.8% arms (not representative of gen pop) Finnish dentists (147) and orthodontists 981) - 70% dentists reported lifetime prevalence of MSD, 72% of orthodontists. Carpal tunnel syndrome - No specific study on CTS in orthodontists. 1997 ADA survey - 9.2% of dentists diagnosed by physician as having some type of repetitive motion disorder, higher prevalence in females and older workers. In US dentists 36% of all participants self-reported CTS symptoms, 28% of those examined were found to have CTS, prevalence increases with age. Dermatoses &amp; Allergies - Finnish dentists and orthodontists - 21.5% of dentists and 42% of orthodontists reported hand dermatoses, 9% of orthodontists thought that dermatoses related to material used in profession most common materials suspected: methacrylates, natural rubber latex gloves. In Norway 40% of orthodontist had hand and finger dermatoses (complaints were often mild and related to seasonal variations and temperature) AAO data - 3.56% prevalence rate of disability in orthodontists (those that are insured). Most commonly disabled from chronic illnesses, orthodontists appear to be healthier than general population</td>
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<tr>
<td>Study</td>
<td>Sample Description</td>
<td>Methodology</td>
<td>Findings</td>
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<td>Droeze et al., (2005)</td>
<td>80 Dutch dentists, had interventions &amp; were invited to take part, 57 agreed. All 57 replied but 1 dropped as he 'did not have a clear picture of recs' leaving 56. All but 1 self-employed</td>
<td>Quasi-experimental study</td>
<td>Non-standard symptoms quest. Asked about extent of impl recs, barriers to impl, facili of impl, contrib of impl to MSD complaints</td>
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<td>51% neck, 52% shoulder, 45% back, 42% arm main symps. 53% impl rec 'fully or nearly fully'. Recs made and areas of impl varied betw dentists. 72% first or only complaint dimin or disapp; 58% said 2nd 64% third. Work posture most rec followed by 'inventory'. Breakdown of impact of diff interventions given. Figs given for full/nearly fully, partly and hardly/not. Recs(%) posture 34, 50, 16; light 20, 28, 52; inventory 24, 44, 33; Planning 20, 54, 26; Org 15, 55, 30 Sport 25, 38, 38</td>
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<td>Finsen et al., (1998)</td>
<td>99/115 members of the Danish Society for Craniomandibular Disorders in postal survey (86%), mean age 49. 8 in field (observational) study, mean age 49.</td>
<td>Cross Sectional study</td>
<td>Postal questionnaire based on Nordic</td>
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<td>About two thirds’ reported aches, pains or discomfort in the neck or shoulder region with slightly fewer in the back. Numbers only presented graphically. Older dentists seemed to have least problems with no trend for level of exposure identified. Tendency for longer work time with patients to increase neck trouble (p=0.15). Shoulder problems were marginally related to total duration of breaks (p=0.1). No relationships with backs. EMG studies showed differences in muscle load with different muscles and different activities.</td>
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<tr>
<td>Study (Year)</td>
<td>Sample Size &amp; Description</td>
<td>Study Type</td>
<td>Non-standard Question</td>
<td>Results</td>
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<tr>
<td>Lalumandier et al., (2001b)</td>
<td>6,230 questionnaires to employees in US Army Dental Service. 5,115 returned (80.9%). Replies broken down by specialty but individual response rates not given. (see 216)</td>
<td>Cross Sectional study</td>
<td>Non-standard quest of MSD symptoms in neck, arms, shoulders, back &amp; legs</td>
<td>Results reported for 8 different classes of dentist plus 3 classes of dental auxiliary. No overall means reported. Back pain 21.7%-42.6%; neck 19.1%-31.3%; shoulder 14.7%-26.1%; leg 8.3%-20.8%; arms 4.2%-19.3%. Some interesting patterns e.g. orthodontists highest for back but lowest for neck and shoulder. Dentists 10m:1f, auxil 10f:1m. No formal analyses of potential related factors.</td>
</tr>
<tr>
<td>Lalumandier et al., (2000)</td>
<td>6320 mailed surveys to dental personnel in civilian and military occupations. Response rate 80.9% n=5115</td>
<td>Cross Sectional study</td>
<td>Questionnaire developed to identify hand symptoms including pain at night, tingling etc. Number of symptoms then used to determine the likelihood of having CTS.</td>
<td>For civilian dentists 52% reported hand problems with 28% likely to have CTS. For military dentists 44% reported hand problems with 19% likely to have CTS.</td>
</tr>
<tr>
<td>Leggat et al., (2006)</td>
<td>Random sample of 400 dentists, response rate 73.1%, N=285</td>
<td>Cross Sectional study</td>
<td>Postal questionnaire survey, single page of A4. No description of questions</td>
<td>87.2% reported having at least one MSD symptom in the last 12 months. Prevalent symptoms were neck (57.5%), lower back (53.7%), and shoulder (53.3%). Hand pain was reported more by females (P&lt;0.05); neck and upper back pain with younger dentists (p&lt;0.001), and dentists with less years of experience (P&lt;0.001). Interference with daily activities from MSDs in the last 12 months were neck (24.6%), lower back (22.1%) and shoulders (22.1%)</td>
</tr>
<tr>
<td>Lehto et al., (1991)</td>
<td>160 Finnish dentists with a minimum of 10 years in practice, n=131 completed study</td>
<td>Cross Sectional study</td>
<td>Physical examination and two validated questionnaires including the Symptom Checklist and the SOM. Physical fitness was also assessed on the cycle ergonometer</td>
<td>42% had experienced pain and disability from neck and shoulder problems in the previous year. The lower back was 37%. Authors suggest without a lot of evidence that exercise may reduce problems</td>
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<tr>
<td>Reference</td>
<td>Sample Description</td>
<td>Study Design</td>
<td>Questionnaire/Methodology</td>
<td>Findings</td>
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<td>Mamatha et al., (2005)</td>
<td>300 Indian dentists with &gt;5y exp. 195 worked &gt;5h per day, 105 &lt;5 hrs. Not clear if 100% response or rate not given.</td>
<td>Cross Sectional study</td>
<td>Non-standard Questionnaire on CTS symps.</td>
<td>96/300 reported symps (32%). 74 (25%) reported pain; 22 (7%) tingling/numbness</td>
</tr>
<tr>
<td>Rundcrantz et al., (1991)</td>
<td>120 Swedish dentists with cervicobrachial symps &amp; 60 without (from prev study, Q used not stated). 96 (80%) with and 47 (78%) without took part.</td>
<td>Case Control Study</td>
<td>demographics; psychosocial work env; personal harmony; life-satisfaction (Qs devised by Rubenowitz, development not known).</td>
<td>Those with symps were younger (p&lt;0.05); less experienced (p&lt;0.05); work same hours; more likely to be on commission (p&lt;0.01). More senior dentists more likely to be male. 'exp of workload' sig worse in those with symps (p=0.05). Specialists had more personal control over work and more work stimulation than GPs (p&lt;0.001). With &amp; without symps sig diff on relations with staff for Head Dentists (HD) (p&lt;0.05) &amp; specialists (p&lt;0.001) although direction of difference not clear. Specialists with symps lower exper of workload cf spec without symps (p&lt;0.05). Those with symps had less freedom from anxiety (p&lt;0.001); poorer psychosomatic health (p&lt;0.001); less confidence in future (p&lt;0.05) and lower 'personal harmony' (p&lt;0.001) than those without. GPs (p&lt;0.01) &amp; spec (p&lt;0.05) with symps scored lower on personal harmony. Sig diff in psychosom health in those with &amp; without symps: GPs (p&lt;0.01); HDs (p&lt;0.05); &amp; special (P&lt;0.05).</td>
</tr>
<tr>
<td>Shrestha et al., (2008)</td>
<td>68 dental surgeons - 63 from municipal surgery in Dharan and 5 from private practices in Dharan and Biratnagar. 57% male (mean age 29.56yrs) 43% female (mean age 24.93yrs)</td>
<td>Cross Sectional study</td>
<td>Used pretested questionnaires (gender, type of dentistry, frequency of breaks, right posture, neck pain, shoulder pain, back pain, analgesic-use, exercise</td>
<td>73.5% felt musculoskeletal complaints sign contributed to by dental work. 79.4% at least one episode of backache in last year (38 mild pain, 13 moderate pain, 2 severe). 58.8% at least one episode of neck pain last year (29 mild, 8 moderate, 4 severe). 47.1% shoulder pain in last year (27 mild, 4 moderate, 4 severe). 9 with back pain sought medical treatment, 5 sought treatment for shoulder and neck pain - reasons for not seeking medical treatment: 38 pain was mild and self-limiting, 7 resorted to self medication. 25 self medicate for MS complaints (10 non-responders to that question). Sign difference in shoulder pain (p=0.009) between males (33.3%) and females (65.5%). No sign difference in MS complaints with type of dentistry (sitting, standing). No sign difference in MS complaints with frequent breaks</td>
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<tr>
<td>Study</td>
<td>Sample Size</td>
<td>Methodology</td>
<td>Questionnaire Details</td>
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<td>61% reported 'discomfort related to work at dental school'. Higher incidence reported amongst younger students but no apparent allowance for age distribution of sample. 48% of those reporting symptoms reported them in the neck; 31% shoulder; 44% back; 20% hands. 3rd year students reportedly higher than 2nd or 4th- but no comparative data presented. Later phase identified some workplace design issues as associated with symptoms.</td>
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</table>
3.2.9 Doctors

Thirty-one papers were reviewed in relation to doctors and health. Eleven of the papers were rejected as they did not fit the inclusion criteria. The health areas identified in the review were addiction and substance misuse, violence, cancer risks, general health risks, mortality rates and sickness absence.

Addiction and Substance Misuse

Five studies were identified in relation to addiction and substance misuse in doctors, two are cross-sectional studies (Brewster et al., 2008, Wunsch et al., 2007) (+*), Chambers (1992) (+**), one is a review albeit not a systemic review (Marshall, 2008) (-*) and one systematic review (Tyssen 2007) (+**)

Of the first 100 doctors enrolled in the Ontario Physician Health Programme, 51% used alcohol, 37% used opioids and 36% used other drugs. In addition, 38% were current smokers (Brewster et al., 2008). Almost half, 44%, had received substance misuse treatment previously while 36% had psychiatric treatment in the last five years. Eighty-five percent of the first 100 doctors successfully completed the programme (Brewster et al., 2008). Wunsch et al., (2007) found that of 969 impaired physicians, female physicians reported more medical problems (OR 1.81) and more psychiatric problems (OR 1.84). Females were also more likely to report past or current suicide ideation and to have made suicide attempts. This information may improve identification of female doctors with substance misuse problems and help to better treat this population (Wunsch et al., 2007).

In the review, Marshall, (2008) reports that studies from North America have found that alcohol problems in doctors may not be higher than in the general population and that rates of illicit drug use are lower. However, rates of prescription drug use are higher in doctors than in the general population. In the UK, impaired doctors more frequently report using alcohol (42%) and combined drug and alcohol misuse by 31%). The most common drugs used were opiates, barbiturates, benzodiazepines and amphetamines. A recent UK study reported that 43% of impaired healthcare workers, including doctors had a history of psychiatric treatment prior to referral and 27% had previous treatment for depression. Risk factors for the development of substance misuse problems stated in the review include personality problems, non-specific drift into drinking, anxiety or depression, pain, injury or accident, stress at work, family stress and bereavement (Marshall, 2008).

British studies included in the review by Tyssen, (2007) indicated that there may be a higher prevalence of alcohol abuse among doctors especially in female students, doctors under 40 and surgical discipline doctors. Chambers, (1992) found that 10% of male doctors self-reported drinking more than 21 units of alcohol a week while 4% of female doctors reported drinking more than 14 units of alcohol a week

Evidence Statement

There is moderate evidence from two studies that the majority of impaired doctors report using alcohol and a lesser percentage report using prescription drugs (**
There is moderate evidence from two studies that over a quarter of impaired doctors had received psychiatric treatment in the past (**)

There is limited evidence from one study that impaired female physicians are more likely to report medical problems, psychiatric problems, past or present suicide ideation or try to commit suicide (*)

There is limited evidence from one study of a higher prevalence of alcohol abuse in British doctors especially in female students, doctors under 40 and surgical discipline doctors (*)

**Violence**

Four studies were identified concerning doctors and violence in the workplace including three cross-sectional studies (Magin et al., 2005, Magin et al., 2008) (-*), (Binder et al., 1994) (+*) and one review (Morrison et al., 1998) (-*). Two of the cross-sectional studies investigated the prevalence of violence in urban divisions of general practice in Australia. In the previous twelve months, 63.7% of GPs had been subjected to violence with 42.1% subjected to verbal abuse, 28.6% experiencing property damage, 23.1% subjected to threats, 17.1% subjected to slander and 2.7% subjected to physical abuse (Magin et al., 2005, Magin et al., 2008). Higher levels of violence were associated with having more patients with drug related problems, OR 5.77, working more than 40 hours per week, OR 6.26, and conducting home visits during business hours, OR 4.76 (Magin et al., 2005). Unfortunately, neither study used standardised outcome measures and both had poor response rates thereby limiting the relevance of their results.

Binder et al., (1994) found that 1% of physical attacks by a patient in a psychiatric unit over 2.75 years were directed towards medical staff, whereas 74% of physical attacks were directed towards nursing staff. Overall, nurses were more likely to be assaulted than doctors. No significant difference was seen in the levels of violence by gender for either doctors or nurses (Binder et al., 1994). The review by Morrison et al., (1998) reported that approximately 40% of psychiatrists will experience a non-fatal assault at sometime during their career most likely during their residency period or in the emergency department. However, the results of the review are limited since the review was not systematic.

**Evidence Statement**

There is moderate evidence from three studies of a high prevalence of violence particularly verbal abuse towards doctors (**)

There is limited evidence from one study that psychiatrists have a high risk of facing non-fatal assault during their career (*)

There is limited evidence from one study that having patients with drug problems, working more than 40 hours per week and conducting home visits during business hours leads to higher levels of violence towards doctors (*)
Cancer Risks

Maitre et al., (2003) conducted a retrospective cohort study to investigate the incidence of cancer in doctors. Of the 936 physicians, surgeons, anaesthetists, radiologists and physicians working in labs, 21 cases of cancer were detected. Overall, the incidence of all types of cancer was the same in the cohort as in the reference population. Haematological malignancy – cancers of the lymphatic and haematopoietic tissues – was the only form of cancer that doctors were more likely to develop with doctors five times as likely to develop the cancer compared to the reference population (Maitre et al., 2003).

Evidence Statement

There is limited evidence from one study that overall incidence of cancer does not differ between doctors and the reference population (*)

There is limited evidence from one study that doctors have a higher risk of haematological malignancies (*)

General Health

In total nine studies were found about the general health of doctors; however, three of these studies (Chambers, 1993, Forsythe et al., 1999, Kay et al., 2004) reported solely on the health-seeking behaviours of doctors and have been included in a separate section. Six studies were found in relation to doctors and general ill health. Two reviews (Tyssen, 2007) (+**), (Shires, 1993) (--), and three cross-sectional studies (Toyry et al., 2000) (+**), (Pullen et al., 1995, Waldron, 1996) (*) were identified.

The systematic review by Tyssen, (2007) reported that female doctors in the USA report better general health-related behaviours, including smoking, alcohol and exercise, compared to women in the general population. In addition, female doctors in Finland report better health compared to the general population while the health reported by male doctors is as good as the general population. Norwegian studies included in the review reported more health complaints among female doctors than male doctors mainly due to stress-related pain and depressive symptoms (Tyssen, 2007). However, a cross-sectional study by Toyry et al., (2000) found no difference in perceived health between male and female Finnish physicians.

Over half, 62%, of Australian doctors surveyed by Pullen et al., (1995) reported having a medical condition. Chronic conditions were seen to be more common in doctors than in the general population including eczema (Tyssen, 2007), stomach and intestinal disorders, back complaints and mental health problems (Toyry et al., 2000, Tyssen, 2007). Male Finnish doctors appeared to suffer more from asthma and chronic emphysema than the general population (Tyssen, 2007). (Toyry et al., 2000) reported that male doctors reported hypertension more frequently than females while females reported thyroid dysfunction more frequently.

Doctors were less likely than secondary school teachers to take sick leave or to feel exhausted from work (Chambers, 1992). Of doctors who did take sick leave in the study by (Waldron, 1996), the main work-related reasons included infections, violence and mental pressure.
The main occupational health problems in hospitals as identified by Shires, (1993) are low back pain, adverse foetal outcomes, occupational dermatoses, poor air quality, shift work, ethylene oxide and violence. However, this review provides little evidence as it was not systematic and did not identify health problems by occupations.

**Evidence Statement**

There is moderate evidence from two studies that doctors suffer more from chronic disease than the general population (**)

There is limited evidence from one study that female doctors report better health than the general population (*)

There is limited evidence from one study that male doctors report the same level of good health as the general population (*)

**Mortality Rates**

Two studies examined mortality rates in doctors. (Juel et al., 1999, Svardsudd et al., 2002) (+**) The studies identified that mortality rates generally were lower in comparison with the general population, specifically for lung cancer, cancers generally and circulatory diseases. However, the SMR for risk of suicide was found to be significantly increased for both males and females. Svardsudd et al (2002) (+**) identified that anaesthetists had an increased mortality rate when compared to other physician groups and it is hypothesised that this may be due to occupational exposures including gases, blood borne viruses, lifestyle factors and occupational stress; however no further analysis is made.

**Evidence Statement**

There is moderate evidence from one study that the mortality rates of doctors generally lower than the general population. (**)

There is moderate evidence from one study that physicians are more at risk of suicide than the general population (**)

There is moderate evidence from one study that mortality rates for anaesthetists are higher when compared other physician groups (**)

**Sickness Absence**

Using a random sample of Norwegian doctors, Rosvold et al., (2001) found that 36.8% of doctors reported not taking sickness absence while infected with influenza followed by respiratory tract infections, 24.6%, and musculoskeletal complaints, 12%. The high percentage of doctors working while infected with influenza and respiratory diseases may be harmful not only to themselves but also to their patients and other staff members.
Evidence Statement

There is limited evidence from one study that doctors tend not to take sick leave while infected with influenza or respiratory diseases compared to other diseases and disorders (*)
<table>
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<tr>
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<tbody>
<tr>
<td>Brewster et al., (2008)</td>
<td>The first 100 doctors at enrollment on the Ontario Physician Health Programme to monitor substance dependence</td>
<td>Cross-sectional study + *</td>
<td>Clinical intake questionnaire and physician measured relapse</td>
<td>90% of participants were male, 66% married. 48% were in general practice. 51% used alcohol; 37% opioids and 36% other drugs. 44% had received treatment previously. 38% were current smokers. 36% had psychiatric treatment in the last 5 years. In total from this sample 85% successfully completed the programme</td>
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<tr>
<td>Chambers, (1992)</td>
<td>Sample 850 GPs on General Medical Register of Staffordshire Family Practitioner Committee, response rate 45% for questionnaire and 66% for health check. Secondary school teachers sample ?, response rate 25% for questionnaire and 88% for health check</td>
<td>Cross-sectional study + **</td>
<td>Self-administered questionnaires on health prevention, lifestyle, sickness absence and healthcare. For teachers used purposive sampling to have gender distribution be the same as doctors. Separate questionnaire for spouse/domestic partner to verify responses about health and lifestyle. Sub-section invited for health check on BMI, blood pressure, body fat percentage, grip strength, spinal flexibility, sit-ups, stepping test, blood test and health questions.</td>
<td>In general, doctors less likely to take sickness absence from work (p&lt;0.001) and less likely to feel exhausted from work (p&lt;0.001) compared to teachers. Self-reported drinking for doctors – 4% females drank more than 14 units alcohol a week, 10% males drank more than 21 units alcohol a week. In face-to-face interview only 1 male admitted to drinking that amount and no females did (although only based on subsection). GPs self-prescribed more than 80% of antibiotics, hypnotics, tranquillisers and ulcer-healing drugs and 50% of antidepressants taken. 14% reported having daily need for alcohol and 50% had sleeping difficulties. Self-reported answers of the GPs closely matched those of their spouses.</td>
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<td>In North America prevalence of alcohol problems in doctors may not be higher than general pop and rates of illicit drug use less but higher rates of prescription drug use (self-medication). In UK study of 144 doctors with substance misuse problems; mean age at referral 43.1 yrs (24-69 yrs), 42% alcohol, 26% drug, 31% drug and alcohol. Drugs used: 30% opiates, 24% barbiturates, 21% benzodiazepines, 15% amphetamines. In more recent UK study with 62 healthcare workers (21 doctors): 59% alcohol use, 41% drug misuse (main drugs: opiates, anesthetics agents), 72% reported use of several drugs, 43% history of psychiatric treatment prior to referral, 27% previous treatment for depression, 41% referred by employer or occup. Health physician. Risk facts for development of problem: personality problems, non-specific drift into drinking, anxiety or depression, pain, injury or accident, stress at work, family stress, bereavement Evidence indicates doctors respond well to specialist treatment, sooner referred on to such treatment the better</td>
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<td>US - better general health-related behaviours (tobacco, alcohol, exercise, etc) in women docs than women general pop. Finland - self-reported health better in female docs than gen pop, male docs as good as gen pop. Chronic conditions more common in docs (eczema, stomach &amp; intestinal disorders, back complaints, mental health problems). Male Finnish docs suffer more from asthma and chronic emphysema than gen pop. Norway - more health complaints among female docs than male docs, mainly about stress-related pain. British - possible high prevalence of alcohol abuse. higher prevalence of drinking in female students, docs under 40, surgical discipline docs. High prevalence of self-treatment. Underuse of primary health services and screening methods. 55% Norwegian female docs have cervical cancer testing every 3rd year sign lower than gen pop. British - 96% registered with GP but 25% of specialists would never consult GP prior to seeking specialist advice, 25% registered with colleague in own practice. Other British studies indicate docs don't have adequate occup health services Finland - docs took sick leave more seldom than others, extensive self-treatment. Norway - 8 out of 10 docs self-medicated. British - refrain from taking sick leave more often then others, more frequently work during illness. Norway - young male docs &amp; those who hadn't consulted GP self-prescribed more often Special treatment programmes - American programs: follow-up studies 5-10 yrs duration -</td>
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75-77% had improved & achieved stable abstinence. Used programmes with AA approach and regular urine checking (shown to have best effect). Most successful initiatives separate medical treatment from disciplinary measures & emphasize self-help groups in confidential treatment programmes.

Overall - Need for more varied and diverse psychiatric treatment measures rather than those that focus exclusively on substance abuse problems (opiate misuse poses greatest risk of relapse).

Wunsch et al., (2007)
969 physicians enrolled on physician health programme, 125 women and 844 men. Cross-sectional
Structured comprehensive interview
Female physicians reported more medical problems (OR 1.81, 95% CI 1.22-2.68) and more psychiatric problems (OR 1.84, 95% CI 1.17-2.91). Females were more likely to report past or current suicide ideation and more likely to have made an attempt. Study suggests that the differences found may help identify and treat for this population.

Violence Aggression or Assault

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<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tbody>
<tr>
<td>Morrison et al., (1998)</td>
<td>Review of aggression and violence</td>
<td>Systematic Review</td>
<td>Perspectives paper with a review in it on aggression and violence towards doctors and uses Bureau of Labor Statistics in US for data</td>
<td>Over 10 years in US, 552 HCWs died of work related injuries, 106 were homicides (including 26 doctors). In 1995, 70% of all 22,000 reported cases of workplace related violence occurred in healthcare and social services industries. Nursing staff at greatest risk (esp. in long-term care facilities, ERs, psychiatric wards). 40% of psychiatrists will experience nonfatal assault at some point in career (many during residency training). Rate of violence towards psychiatrist highest in ER. Of 170 ER directors, 32% reported &gt;1 verbal threat per day, 18% reported weapons were displayed at least once a month. In 1994 of 63 residents &amp; attending physicians 41% assaulted, 16% battered at sometime in career. In Cali almost 25% of all violent episodes from nonpatients. Young physicians and those in training at highest risk (tend to practice in urban environments)</td>
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</table>
Magin et al., (2008)  
1805 urban GPs in Australia. Response rate 49%, n=528.  
Cross-sectional study  
- *  
60 item questionnaire to identify types of service provided, perceptions of risk of violence and apprehension about violence in different services.  
63.7% had been subjected to violence in the previous 12 months. Verbal abuse (42.1%), property damage (28.6%), threats (23.1%) and slander (17.1%). 12.9% had experienced high levels of violence. Risk of violence affected 10.2% of GPs delivery of home visits, 22% of delivery of after-hours home visits. Experience of violence was not significantly associated with provision of home visits.

Binder et al., (1994)  
Psychiatric unit survey included all medical staff (n=83) and nurses (N=120).  
Cross-sectional Study  
+ *  
Violent behaviour assessed on the Overt Aggression Scale completed at the end of each shift.  
Study over 2.75 years with 678 physical attaches on 97 staff by 149 patients. Nurses as a group were more likely to be physically assaulted than doctors (p<0.0001). No significant effect was found for gender/

Magin et al., (2005)  
Survey of 1805 urban divisions of general practice in Australia. Response rate of 49%, n=523  
Cross-sectional - *  
60-item questionnaire mailed to GPs. Data included demographic information, levels of violence and number of events  
42.1% reported verbal abuse, 28.6% reported property damage, 23.1% reported threats, and 2.7% reported physical abuse. Those who experience a high level of violence were found to have an increased risk where they had more patients with drug related problems (OR 5.77, 95% CI 1.56-21.3), worked more than 40 hours per week (OR 6.26, 95% CI 2.16-18.10) and conducted home visits during business hours (OR 4.76, 95% CI 1.49-14.29).

### Cancer Risks

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<tr>
<th>Author</th>
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<th>Outcome Measures</th>
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<tbody>
<tr>
<td>Maitre et al., (2003)</td>
<td>University Hospital in Grenoble, all employed for at least 1 yr, used hospital employment records and cancer registry. Included 940 doctors (28% women). 4 excluded (could not follow-up) N=936</td>
<td>Cohort study + *</td>
<td>Retrospective cohort study, number of cancer cases reported to the Isere cancer registry between 1979 and 1994</td>
<td>Included physicians, surgeons, anaesthetists, radiologists, physicians working in labs. Of the 936 doctors, 21 cases of cancer (16 men, 3 women). Incidence of all types cancer same in cohort as in reference population SIR 0.97 (0.59-1.5). Only type of cancer with significantly higher incidence in physicians was haematological malignancy (lymphatic &amp; haematopoietic tissues) SIR 5.45 (2-11.9)</td>
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<tr>
<td>Author</td>
<td>Population</td>
<td>Study Type and Quality</td>
<td>Outcome Measures</td>
<td>Study Outcomes</td>
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<td>Kay <em>et al.</em>, (2004)</td>
<td>Doctors</td>
<td>Systematic Review + **</td>
<td>Review of doctor's health and their health management</td>
<td>Reviewed 26 papers in relation to doctors health maintenance. Identified doctors are often reluctant to seek advice. Vaccination rates for Hep B ranged from 49-87%. Did carry out cardiovascular checks on themselves, 47-81% reported having a mammogram in the last 2-5 years, pap smears ranged from 44-82%. Prostate screening - 26-51% of doctors over 40 screened. Although 43% reported having a GP fewer than 25% had an independent GP, 5% treated themselves and 13% consulted a partner.</td>
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<tr>
<td>Forsythe <em>et al.</em>, (1999)</td>
<td>Postal questionnaire of 595 UK Consultants, 1138 GPs with a response rate of 64% for GPs and 72% for consultants</td>
<td>Cross-sectional study + **</td>
<td>Postal questionnaire, participants randomly selected in London and counties. Questions included adherence to guidelines, use of occupational health, prescribing habits for self and family and response to vignettes</td>
<td>98% of GPs and 94% of consultants registered with a GP. 63% of GPs and 59% of consultants had not consulted a GP in the last 12 months. 71% of GPs and 76% of consultants self-prescribed. 11% of GPs had access to occupational health; 95% of consultants did but only 25% had used OH services. 12% of GPs and 8% of consultants were happy with the services provided to them.</td>
</tr>
<tr>
<td>Shires, (1993)</td>
<td>Review of health hazards including non-infectious hazards in doctors</td>
<td>Systematic Review - -</td>
<td>Review of health hazards in doctors</td>
<td>Low back pain possibly most prevalence occup health hazard of nurses, good proportion can be prevented with education, ergonomics, back-strengthening exercises and using mechanical lifting devices. 90% who sustain mechanical back injuries can be expected to return to work in less than 10 days after effective therapy with ice packs and rest for first 48 hours, followed by active exercise and heat w/ or w/o prescribed analgesia. Airborne irritant dermatitis and contact dermatitis second only to MSD in order of clinical problems presented by occup health service. Shift work - increased respiratory infections, ischemic heart disease, bowel disorders</td>
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<tr>
<td>Reference</td>
<td>Methodology</td>
<td>Questionnaire Details</td>
<td>Findings</td>
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<td>Waldron, (1996)</td>
<td>Random sample of 200 doctors from the medical register. Response rate of 63%, N=110 as 16 were unable to complete the questionnaire</td>
<td>Pilot study questionnaire no further details given</td>
<td>The majority of doctors had had at least one day off sick in the previous 2 years (52.7%), of those who had taken leave, 13 had been treated in hospital and 36 had received other treatment. 13 identified that sick leave had been caused by working (including infections, violence and mental pressure). Fifty-one reported having access to occupational health but no one had consulted an occupational physician.</td>
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<td>Toyry et al., (2000)</td>
<td>Randomly selected population of 4474 licensed physicians in Finland. Response rate of 74% with n=3313.</td>
<td>Questionnaire developed based on national population data studies questionnaire, included a list of diseases and further questions on treatment and sickness absence</td>
<td>No difference in perceived health between male and female physicians. Males reported more hypertension than female physicians, females reported more thyroid dysfunction. Compared to the general population, doctors report more mental disorders (p&lt;0.001), digestive diseases (p&lt;0.001) and back complaints (p&lt;0.001). Self-treatment often used (80-84%). Sickness absence increased with age of physicians but no difference between physicians and general population. Main reasons for sickness absence were acute infections (65% for men, 69% for women), followed by MSDs. Fewer males (43.6%) than female physicians (69.4%) had consulted a physician in the last 12 months. Study identifies that the usual care is self-treatment and working through illness.</td>
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<td>Chambers, (1993)</td>
<td>Twenty-two GP trainers were trained in questionnaire survey and 59 GPs completed the survey and 65 hospital specialists.</td>
<td>Assessed plan of actions for 10 medical condition scenarios as advised to other doctors and how they would self-treat</td>
<td>GPs were found to advise doctors as a whole to consult their own GPs but hospital specialists would self-medicate (P&lt;0.0001). Hospital specialists more likely to suggest direct consultation with a specialist. Two thirds of GPs thought it was nearly always acceptable to self-investigate urine tests, but never to initiate other tests. GPs found it acceptable to self-medicate for topical anti-fungals and antacids but never for antidepressants, benzodiazepine, anti-hypertensives or opiates.</td>
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<td>Pullen et al., (1995)</td>
<td>Postal survey of 2564 doctors in Australia about their use of medical services. Response rate of 44%, n=1125</td>
<td>Questionnaire including demographic information, stress related problems, medical care and self-medication</td>
<td>42% of the sample had a GP. 26% reported having a medical condition but fell inhibited about consulting a doctor. 76% had self-prescribed anti-biotics, 45% analgesics, 35% NSAIDs and 2% narcotics. Men were more likely to discuss preventive measures with their doctors.</td>
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### Mortality Rates

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<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tr>
<td>Juel et al., (1999)</td>
<td>Historical prospective cohort study of Danish doctors. Study population was 21,293 doctors with 6012 women.</td>
<td>Cohort + **</td>
<td>Standardised Mortality Rates</td>
<td>SMR for suicide was increased 1.6 95% CI 1.4-1.9 for men; 1.7 95% CI 1.1-2.5 for women. Suicides by poisoning for males had SMR 4.35 95% CI 3.55-5.28 and for women was 2.44 95% CI 1.42-3.90. In general mortality rates lower than the general population and lower for lung cancer, cancer, circulatory diseases and other natural causes.</td>
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<tr>
<td>Svardsudd et al., (2002)</td>
<td>Follow-up study of 26086 doctors in Sweden in 1993 followed for 7 years</td>
<td>Cohort + **</td>
<td>Calculation of mortality rates</td>
<td>The study identified that mortality rates for anaesthesiologists were significantly raised compared to other physician groups (RR 1.46 95% CI 1.04-2.05). Study suggest this could be due to exposure to gases, blood borne infections, personality/lifestyle factors and occupational stress.</td>
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### Sickness Absence

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<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tr>
<td>Rosvold et al., (2001)</td>
<td>Random sample of 1476 physicians, response rate 69.9%, 1031 but only 1015 usable surveys returned</td>
<td>Cross-sectional + *</td>
<td>Demographic data, Job Satisfaction Scale and in receipt of medical treatment in the previous 12 months</td>
<td>85.6% Had worked when having an illness they would have sick listed a patient for. During the past 12 months, 80.1% had worked while ill and 48.2% had done this twice or more. Most common illnesses were influenza (36.8%) respiratory tract infections (24.6%) and musculoskeletal symptoms (12.0%). The study concludes that a large number of physicians work while having infectious diseases which is harmful to both physicians and staff.</td>
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3.2.10 Nurses and Midwives

Ninety-six papers were reviewed in relation to nurses and health. Twenty-eight of the papers were rejected as they did not fit the inclusion criteria. The health areas identified in the review were general health risks, shift work/fatigue management, aggression/assault/violence, cancer risks, dermatitis, exposure to antineoplastic drugs, musculoskeletal, risks during pregnancy and risks to fertility. The vast majority of papers were cross-sectional in design with few high quality studies reported.

General Health Risks

One study was identified that examined general health in nurses and one study examined the predictors of leaving nursing. Krusun et al (2005) (++*) evaluated data on annual health checks in a case control study. Using the comparisons between nursing staff and a control group (including office workers and healthcare workers), the study identified that the office workers visited the doctor more and were more obese. However, when comparing those groups who were obese versus non-obese, the results found an increase in measured hypertension, diabetes mellitus and cholesterol in the obese group of all participants. These data were collected during annual health checks which are not a regular part of health care within the UK.

When examining the predictors of leaving work, a longitudinal cohort study from Sweden followed up 1095 nurses from 1992-1995 through to 2003. (Fochsen et al., 2006) (+**) The study identified that at follow-up, 26% of nurses were not employed in nursing care. Health variables that were associated with leaving nursing were musculoskeletal problems of the neck/shoulder (adjusted OR 1.5, 95% CI 1.1-2.0), musculoskeletal problems of the knees (adjusted OR 1.5 95% CI 1.1-2.2) and limited use of transfer devices (adjusted OR 1.5, 95% CI 1.1-2.0). This study indicates both the importance of maintaining musculoskeletal health and the use of lifting aids to reduce musculoskeletal stress.

Evidence Statements

There is moderate evidence from one study that identified that nurses visited the doctor less than a control group. (**)

There is limited evidence from one study that musculoskeletal symptoms and the limited use of lifting aids is associated with leaving the nursing profession (*)

Shift Work and Fatigue Management

Three studies were included in the review, which examined either shift work or fatigue management. Eriksen et al (2008) (++*), evaluated subjective sleep quality in Norwegian nurses. The study identified that there were no physical work factors significantly associated with poor sleep and no work schedule factors associated with poor sleep. However, being over 50 was associated with poor sleep as were a number of psychosocial work factors. It is suggested that negative psychosocial work factors are associated with poor sleep and this may be improved by improving social support and increasing control at work.

Eriksen and Bruusgaard (2004) (++*) evaluated the impact of physical leisure activity on persistent fatigue in 5341 nurses. Post analysis, the results identified that taking
physical exercise for at least 20 minutes once per week was associated with a significant reduction in physical fatigue. The study did use validated measures and although cross sectional it does give some support to physical activity reducing persistent fatigue.

Pisarski et al (2008) (+**) examined the impact of organisational factors on shiftwork, work life content and subjective health. The study identified that physical ill health symptoms negatively affected psychological symptoms and work conflict, team identify and supervisor support all affected physical ill health reporting. Thus psychosocial factors can both positively and negatively impact on ill health and vice versa.

Evidence Statements

There is moderate evidence from one paper that increasing age and poor psychosocial work factors impact on sleep (**)

There is moderate evidence from one paper that physical leisure activity reduces the impact of developing persistent fatigue (**)

There is moderate evidence from one paper that organisational and psychosocial work factors interact both negatively and positively with ill health symptoms (**)

Aggression, Assault or Violence at Work

Thirteen papers were included in the review which researched aggression, assault or violence at work. Within the UK, it has been identified that 29% of UK nurses report frequent violent attacks (Estryn-Behar et al., 2008) and when nurses and nursing assistants are compared to clerks both are at an increased risk of violence. (Chen et al., 2008) Binder and Dale (1994) (+*) identified that in a psychiatric unit, nurses were significantly more likely to be assaulted than doctors.

Violence is reported more frequently by males and by younger nurses. (Camerino et al., 2008, McKinnon et al., 2008, Nachreiner et al., 2007). Place of work has also been associated with increased violence where more frequent attacks occur in psychiatric units, (Camerino et al., 2008, Estryn-Behar et al., 2008, Grenade et al., 1995, Nachreiner et al., 2007), emergency departments (Gerberich et al., 2005) and long term care facilities (Gerberich et al., 2005).

Time of day has also been found to be significant with night shifts being associated with an increased risk. (Camerino et al., 2008, Estryn-Behar et al., 2008, Lin et al., 2005) Time pressure has also been associated with higher frequency of violence. (Camerino et al., 2008, Estryn-Behar et al., 2008)

Verbal abuse has also been studied with 53.9-63.5% of nurses reporting verbal assault. (Farrell et al., 2006, Lin et al., 2005). Perpetrators of verbal abuse reported by Farrell et al (2006) were patients (74.3%), patient or visitor (35.3%), colleague (28.7%) or doctor (27.1%).

In terms of managing incidents, more experienced staff report feeling more competent to manage incidents (McKinnon et al., 2008) and effective sources of support reported are talking to supervisors and colleagues. (Michael et al., 2001a)
While it is apparent that a zero tolerance attitude to violence (verbal or physical) is required, there is still a lack of research on violence reduction methods in healthcare and evidence based guidelines to support staff post incident. When examining rates for violent incidents, the research reviewed lacks consistent measurement or definition of terms.

**Evidence Statements**

There is moderate evidence to show that nurses are more at risk of violence than other occupational groups (**)

There is moderate evidence to show that both male nurses and less experienced nurses are more at risk of violence (**)

There is moderate evidence that there is more risk of a violent attack in psychiatric care (**)

There is moderate evidence that nurses are more at risk of violence during night work and when under time pressure (**).

**Cancer Risks**

Three papers were identified within the review which evaluated risks of cancer within nurses. Lie et al (2007) (***) identified that in comparison with the Norwegian population, there was a significantly higher incidence of breast, ovarian and malignant melanoma in nurses compared to the general population. Hansen (2006) (++) identified that there was a standardised relative risk of 1.2 for nurse developing breast cancer after night and shift work. Schernhammer et al (2004) (++) did not find an association between self-perceived job stress and breast cancer. These studies have been taken further among the general working population where there is an increased risk of breast cancer in females involved in night work. This has been recognised by IARC. (Straif et al., 2007)

**Evidence Statements**

There is an increased risk of breast cancer in females working night or shift work involving nights. (**)

**Dermatitis**

Three papers were included in the review that evaluated dermatitis in nurses. Dulon et al (2008) (++) reported on clinical examination of 2,164 geriatric care nurses. The study identified that the point prevalence of hand dermatitis was 18% and risk factors for developing dermatitis included childhood eczema and dry or itching skin. Sasaki et al (2006) (+*) surveyed midwives to measure self-reported dermatitis. Out of the sample 41% reported occupational dermatitis. This was associated with frequent hand washing (90%) alcohol hand rubs (49%) disinfectant agents (50%) and the use of gloves (35%). However, these data are self-reported and a self-attribute without further evidence being provided. Schmid et al (2005) (++) examined past and present skin symptoms in apprentice nurses using both clinical examination and standardised questionnaire. The results identified that the 12 month period prevalence of self-reported hand dermatitis was 36.5%.
These data suggest that hand dermatitis in nurses is associated with previous eczema and dry or itching skin. Self-attributed causes include frequent hand washing disinfectant agents, alcohol wipes and gloves.

**Evidence Statement**

There is limited evidence that hand dermatitis in nurses is associated with previous eczema, dry or itching skin and self-reported exposure to frequent hand washing and disinfectant agents. Further research is required to corroborate this (*).

**Exposure to Antineoplastic Drugs – need to add in reproductive outcomes study**

Three recent case-control studies investigated the effects of antineoplastic drugs on the DNA of nurses (Laffon et al., 2005, Rekhadevi et al., 2007, Sasaki et al., 2008) (+**) and one case-control study investigated the effects of antineoplastic drugs on reproductive outcomes in nurses (Fransman et al., 2007) (+). The first three studies used the comet assay to assess DNA damage. In addition, two of the studies also used the micronuclei assay to assess damage. In the comet assay, DNA is run through a gel with an electrical current. DNA which has been broken will move further through the gel than intact DNA. The difference between the distance the intact DNA moved and the distance the broken DNA moved is the tail length. The micronuclei assay measures the frequency of micronuclei, which are broken pieces of DNA that are no longer contained within the nucleus of the cell.

The three studies found a significant increase in DNA damage in nurses exposed to antineoplastic drugs compared to the control groups. In addition, (Rekhadevi et al., 2007) found a significant increase in micronuclei frequency in exposed nurses compared to controls while (Laffon et al., 2005) found a non-significant increase in micronuclei frequencies in exposed nurses. However, the study by (Laffon et al., 2005) had half the sample size as the study by (Rekhadevi et al., 2007) and therefore may have lacked the power to detect a statistical difference in micronuclei frequency.

(Rekhadevi et al., 2007) found a dose-response relationship between DNA damage and duration of handling antineoplastic drugs. Nurses exposed for 10 years or more had significantly more DNA damage than nurses exposed for less than 10 years. However, no significant DNA damage was observed over a short period of time, i.e. six months, possibly indicating that the damage occurs over a long period of time (Sasaki et al., 2008).

(Fransman et al., 2007) compared nurses with varying dermal exposures to cyclophosphamide during their first month of pregnancy or while they tried to become pregnant to nurses with no exposures. The nurses in the highest exposure group (>0.74 µg/week) experienced a prolonged time to pregnancy compared to non-exposed nurses with an increase of one month in time to pregnancy. In addition, nurses in the highest exposed group had approximately twice the increased risk of delivering a child with low birth weight, <2500 g, compared to non-exposed nurses. Nurses exposed to more than 3 µg/week were at an increased risk of premature delivery. Unfortunately, the study relied on self reports of frequency of exposure although the levels of exposure were calculated from hospital glove and hand washing samples.
Evidence Statement

There is moderate evidence from three studies that nurses have increased DNA damage due to antineoplastic drugs compared to controls (**) 

There is limited evidence from one study that a dose-response relationship exists between DNA damage and duration of exposure to antineoplastic drugs in nurses (*) 

There is limited evidence from one study that high exposure to antineoplastic drugs in nurses results in low birth weights, premature deliveries and prolonged times to pregnancy compared to non-exposed nurses (*) 

Musculoskeletal Symptoms in Nurses

There were thirty-seven papers included in this section, the vast majority of which were cross-sectional in design with a variety of methodologies used to collect data.

Musculoskeletal disorders in student nurses were assessed by Smith et al 2004 (+*), Mitchell et al 2008, (+**) and Smith et al 2003b (+*). The studies identified a lifetime prevalence of 79% in students and the most common site was lower back followed by the neck, knees and shoulder. An increase in symptoms was found 12 months after beginning employment (Mitchell et al., 2008) and significant associations were found where participants had worked previously in healthcare (Smith et al., 2003b, Smith et al., 2004).

Twenty studies measured through questionnaire survey the prevalence of musculoskeletal symptoms in nurses ((Alexopoulos et al., 2003, Ando et al., 2000, Burton et al., 1997, Cameron et al., 2008, Choobineh et al., 2006, Eriksen, 2003, Lipscomb et al., 2004, Lipscomb et al., 2002, Lusted et al., 1996, Niedhammer et al., 1994, O’Brien-Pallas et al., 2004, Sheikhzadeh et al., 2008, Smith et al., 2003a, Smith et al., 2004a, Smith et al., 2004b, Smith et al., 2005, Smith et al., 2006, Tezel, 2005, Trinkoff et al., 2003a, Trinkoff et al., 2002, Warming et al., 2008, Yeung et al., 2005)) Internationally these studies indicate that self-reported musculoskeletal symptoms among nurses range from 32-86.7% for low back pain, 22.7-39.9% for upper back pain, 17-74.4% for shoulder pain and 24-62.7% for neck pain. The ranges obtained probably reflect the different data collection methods used.

Pheasant and Stubbs (1992) calculated the point prevalence of back pain in nurses and found it to be 17 versus 12.5 in the general population. Furthermore the one-year period prevalence was 43.1% in nurses compared to 40.6% in the general population. The sickness absence rates in days/1000persons/year were found to be 10,984 in nurses versus 18,107 in the general population. These data suggest that for nurse there is an increased risk of back pain but less time is taken off sick.

Two studies report on incidence rates of back pain in nurses, Lorusso et al (2007) (-) carried out a review of low back pain and found 5 year incidence rates of 0.43 per 100 workers and 1.94 per 100 workers in nurses. Laerre et al (1994) report in general hospital work a 1 year incidence rate of 12.94 per 100 workers in healthcare workers.

Only one study (Laerre et al., 1994) (+**), used physical examination to evaluate back pain in the general hospital environment. The study identified that 48.2% of nurses in the general hospital had suffered low back pain symptoms, 29.4% had received an x-
ray or an orthopaedic examination with 19.2% taking sick leave with an average time of 22 days.

From the research reviewed a number of associations have been identified between musculoskeletal symptoms and personal, work and organisational factors. These include an increase in symptoms with age (Cameron et al., 2008, Dulon et al., 2008, Eriksen, 2003). However, as in any investigation of musculoskeletal problems increasing age is usually associated with increased duration of exposure to the risk factor at work.

Psychosocial factors have also been associated with musculoskeletal symptoms including less control at work (Cameron et al., 2008, Elfering et al., 2002), boring work (Smith et al., 2004b) and high levels of mental pressure. (Smith et al., 2004a, Smith et al., 2004b)

Hours worked have also been found to have a significant association with musculoskeletal symptoms including back and neck symptoms being associated with working more than 12 hours per day. (Lipscomb et al., 2002, Trinkoff et al., 2006) Working more than 6 days consecutively was associated with shoulder pain. (Trinkoff et al., 2006) Working shifts other than day shift was associated with back and neck symptoms. (Lipscomb et al., 2002) Overtime was associated with shoulder and back symptoms. (O'Brien-Pallas et al., 2004, Trinkoff et al., 2006)

Patient handling was found to be significantly associated with symptom reporting (Cameron et al., 2008, Goncalves et al., 2001, Peterson et al., 2004, Warming et al., 2008). High physical workload was found to be associated with back pain (Choobineh et al., 2006, Niedhammer et al., 1994) with bending and twisting being attributed (Larese et al., 1994).

The associations identified within the research appear to link a number of different variables to the prevalence of musculoskeletal symptoms. These include, of course, patient handling but also the impact of age, psychosocial factors, hours and shifts worked.

Six studies included in the review evaluated interventions to reduce musculoskeletal symptom reporting (Gray et al., 1996, Hignett, 2003, Jhun et al., 2004, Peterson et al., 2004, Skargren et al., 1996, Trinkoff et al., 2006, Wardell, 2007).

Hignett (2003) (***) carried out a systematic review of interventions to reduce musculoskeletal disorders. The conclusions from the review were that any handling interventions based on training for handling alone have no impact on either working practice or injury rates. Rather taking a multifactorial intervention, including risk assessment, equipment provision, maintenance and design, education and training, work environment redesign, changing work practice and changing policies and goals is effective in reducing injuries from handling patients. Although the review does cite cost effectiveness, this data was from two studies. It estimated between $55,0000 and $65,000 annual saving using a multifactor intervention programme including risk assessment and the lifting team strategy.

Gray (1996) (*) in a small case control study evaluated the knowledge and awareness levels of nurses after a multi-faceted lift and transfer programme. This study only measured scores pre and post the training course in the rather than any other aspects
of the intervention. The results found that individuals who completed the 5 weeks of training scored higher on the quiz.

Jhun et al (2004) (+*) evaluated the impact of a computerised ordering system on musculoskeletal symptoms. There were no changes in general musculoskeletal symptoms but back symptoms significantly increased after the computer system was put in place. The authors suggest the increase in symptom reporting is due to stress caused by the new computing system. The results are unclear.

Peterson et al (2004) (+*) evaluated the impact of a training course either reinforced by the researcher or reinforced by registered nurses on nursing assistants. No differences in musculoskeletal symptom reporting were found between the three groups studied. Although the study reports that participants found the training effective, there is no evidence given as to whether behaviour has changed.

Skargen et al (1996) (+*) evaluated the impact of an exercise programme on musculoskeletal symptoms. The study was a randomised cross-over study with 60 minutes of exercise twice a week for 8 weeks. The study identified that there were fewer musculoskeletal symptoms reported in the exercise group and previous non-exercisers found a greater reduction in musculoskeletal symptoms. Those over 40 showed a clear impact on reduction of symptoms. The study suggests that physical activity in the short term does reduce musculoskeletal symptom reporting.

Wardell (2007) (-*) carried out a pre and post evaluation on completion of a patient handling programme. Using a convenience sample, the paper reported that there were improvements in the use of handling aids (5% to 29%) and a reduction in the number of injuries. However, the injuries measured pre-intervention were found to be 92 over one year compared with 9 over 3 months post-intervention. Thus further follow-up is required to identify if the reduction is maintained.

Evidence Statements

There is moderate evidence suggesting that student nurses report high levels of musculoskeletal symptoms on entry to the profession and symptoms are associated with previous work in healthcare and beginning employment. (**)

There is consistent evidence in multiple studies that musculoskeletal symptoms of the lower back, shoulders and neck are high in nurses and nursing assistants (***)

High physical workload and patient handling have been found to be associated with musculoskeletal symptoms (***)

There is moderate evidence from two studies that musculoskeletal symptoms increase with age (**)

There is moderate evidence that working long hours and mandatory overtime has been found to be associated with musculoskeletal symptoms (**)

There is moderate evidence that psychosocial factors including less control at work, high levels of mental pressure and boredom are associated with musculoskeletal symptoms (**)

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There is strong evidence from one systematic review that Interventions to reduce musculoskeletal symptoms from patient handling should be multi-faceted (***)

There is limited evidence from one paper that physical activity in one study has been found to reduce musculoskeletal symptom reporting (*)

**Risks during Pregnancy**

Three papers were identified that examined risks during pregnancy in nurses or midwives. Axelsson *et al* (1996) (***) surveyed midwives using 2667 pregnancies between 1980 and 1988. The study identified that there was an increased risk of spontaneous abortion in midwives working with frequent shortages of staff before the 13th week of pregnancy. The study was cross-sectional in design and based on self-report data.

Simcox and Jaakkola (2008 (***) evaluated low birth weight deliveries in nurses. The results identified that there was an increased risk of low birth weight deliveries for nurses compared to office workers.

Lawson *et al* (2009 (***) surveyed US nurses and after multivariate analysis in the cross-sectional study identified that working less than 20 hours per week was associated with reduced risk of a preterm delivery and working nights was associated with early (before 32 weeks) preterm delivery. The study also found an association with sterilising agents and increased risk of preterm delivery but this was based on 11 cases.

These three studies highlight potential risks during pregnancy but are based on cross-sectional design and self-report exposure data. Although all are rated as ***, further research is required to corroborate this information.

**Evidence Statements**

There is limited evidence from one study that midwives are at an increased risk of spontaneous abortion linked to high workloads. Further research is required to corroborate this. (*)

There is limited evidence from one small study that nurses are at an increased risk of low birth weight babies. Further research is required to corroborate this. (*)

There is limited evidence from one study that working night shift was associated with preterm delivery. Further research is required to corroborate this (*)

There is limited evidence that exposure to sterilising agents in the first trimester of pregnancy is associated with preterm delivery. Further research is required to corroborate this (*)
Risks to Fertility

One study included in the review examined risks to fertility in midwives using a questionnaire survey (Ahlborg et al., 1996) (**). The study used demographic data, reporting of work scheduling and estimates of nitrous oxide exposure. The analysis identified that reduced fecundity was associated with rotating shifts compared to day shifts. An association was found between more than 31 deliveries using nitrous oxide per month and fertility. The group exposed to this number and type of deliveries was very small.

Evidence Statements

There is limited evidence from one study that working night or rotating shifts reduces fecundity in midwives. Further research is required to corroborate this. (*)

There is limited evidence from one study that high exposure to nitrous oxide by midwives is related to reduced fecundity. Further research is required to corroborate this. (*)&
### Table 11. Health Issues in Nurses and Midwives

#### General Health Risks

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<tr>
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<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tr>
<td>Fochsen et al., (2006)</td>
<td>Cohort study of nursing personnel from two research projects (1992-95) in Sweden. Baseline n=1711, Follow-up 1507 eligible, response rate 73% n=1095, Follow-up done in 2003</td>
<td>Cohort study + *</td>
<td>Baseline questionnaire: physical exertion during work used modified Rating of Perceived Exertion (RPE), MSD symptoms using Nordic questionnaire, sociodemographic characteristics &amp; employment conditions Follow-up: asked one question about present position in labour market &amp; open-ended question about present job</td>
<td>At follow-up 26% of nurses not employed in nursing care. Health variable was associated with leaving nursing. MSD of neck/shoulder adjusted OR 1.5 (1.1-2.0) for leaving, MSD of knees adjusted OR 1.5 (1.1-2.2).</td>
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<td>Krusun et al., (2005)</td>
<td>Assessment of health checks in Thailand. Sample 2040 - controls (office healthcare workers) 801 response rate 75.7% n=606 (61.2%) females vs. cases (nurses) 1239 response rate 82.6% n=1024 (females 94.3%)</td>
<td>Case Control Study + **</td>
<td>Review of health check up results for nurses and office healthcare workers. Clinical measurements of hypertension, impaired fasting glucose (IFG), suspected diabetes (DM), anemia, obesity</td>
<td>Controls visited physicians significantly more than nurses p&lt;0.01 91.2% vs 26.5%. Hypertension suspected: 13.8% controls vs 7% cases (p&lt;0.01). IFG controls 14.3% vs cases 5.5% (p&lt;0.01). Suspected DM controls 6.0% vs cases 3.1%(p&lt;0.02). Anemia controls 26.7% vs cases 21.6% (p&lt;0.02). Cardiomegaly controls 3.6% vs cases 0.5% (p&lt;0.01). overweight (BMI 23-24.99) controls 20.1%, cases 20.2%. obesity (BMI &gt;25) controls 27.0% vs cases 17.2% (sign difference p&lt;0.01). For both cases and controls - sign increase (all p&lt;0.01) in hypertension, IFG, DM, high cholesterol (&gt;200mg/dL), high triglycerides (&gt;150mg/DL) in obese vs. non-obese workers. Obese group also tended to have higher number of atherosclerotic risk factors (all obese had at least 2 risk factors, non-obese over half had 1 or fewer risk factors)</td>
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## Shift Work/Fatigue Management

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<tr>
<td>Eriksen et al., (2008)</td>
<td>12,000 randomly selected nurse's aides in Norway, response rate 62.3%, n=7,478, 5,513 fit inclusion criteria, 4,771 (86.5%) responded to second part 3 months later (96.1% females)</td>
<td>Cross Sectional study</td>
<td>Evaluated subjective sleep quality in previous 3 months with Basic Nordic Sleep Questionnaire. Measured psychosocial work factors and mastery of work and organizational commitment with the General Nordic Questionnaire for Psychological and Social factors at work, demographics</td>
<td>29.7% of nurse's aides reported poor sleep during 3 months before baseline and 37.3% during the 3 months between baseline and follow-up. High strain job (2nd highest category) (demand-control ratio) OR 1.50 (1.11-2.04) p&lt;0.01; high strain job (highest category) OR 1.47 (1.06-2.03) p&lt;0.05 Predictors of poor sleep in successive 3 months: age more than 50 vs. less than 50 OR 1.43 (1.06-2.03) p&lt;0.001; poor sleep previous 3 months vs good sleep OR 13.36 (11.27-15.85) p&lt;0.001; more role conflicts vs less OR 1.32 (1.11-1.57) p&lt;0.01; more control of decisions vs less OR 0.78 (0.66-0.94) p&lt;0.01; more support from immediate supervisor vs less OR 0.77 (0.63-0.94) p&lt;0.01; more exposure to threats and violence at work vs less OR 1.19 (1.01-1.40) p&lt;0.05.</td>
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<td>Eriksen et al., (2004)</td>
<td>6234 working Norwegian nurses.</td>
<td>Cohort Study</td>
<td>Assessed demographic variables, physical activities, sleeping problems using the Nordic Sleep Questionnaire, modified Nordic musculoskeletal questionnaire and assessment of chronic health conditions.</td>
<td>Participants taking part in physical activities for 20 minutes at least once a week were associated with a reduced risk of persistent fatigue at follow-up. Study suggest that physical activity reduces persistent fatigue.</td>
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<td>Pisarski et al., (2008)</td>
<td>Sample = 1492; response rate 36%, n=530, 39 male and 491 female</td>
<td>Cross Sectional study</td>
<td>Physical Health Questionnaire, GHQ, Life Conflict, Team Climate, Control over work environment, Social support, identity scale, trait-based negative effect</td>
<td>Psychological wellbeing was negatively influenced by physical health symptoms (p&lt;0.002). Time based work-conflict, (p&lt;0.001), team identity (P&lt;0.01) had a direct impact on physical health symptoms. Perceptions of control over the work environment (p&lt;0.001), perceptions of work team climate (p&lt;0.01) and supervisor support (P&lt;0.001) had an indirect positive effect on health symptoms by reducing work life conflict. Colleague support also had a significant indirect impact on physical health symptoms (p&lt;0.01)</td>
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<tr>
<td>Author</td>
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<td>Binder et al., (1994)</td>
<td>Psychiatric unit survey included all medical staff (n=83) and nurses (N=120).</td>
<td>Cross Sectional Study + *</td>
<td>Violent behaviour assessed on the Overt Aggression Scale completed at the end of each shift.</td>
<td>Study over 2.75 years with 678 physical attacks on 97 staff by 149 patients. Nurses as a group were more likely to be physically assaulted than doctors (p&lt;0.0001). No significant effect was found for gender.</td>
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<td>Camerino et al., (2008)</td>
<td>NEXT study - 8 EU countries, sample 61,940 response rate 55.1% (34,107), follow-up 13,820 responded, overall response rate 40.5%</td>
<td>Cohort study + **</td>
<td>Questionnaire at baseline and follow-up. Evaluated interpersonal relationships, role conflict/ambiguity, lifting and bending, satisfaction with working time, violence questions developed by study group (tested). Evaluated uncertainty concerning patients' treatment with Nursing Stress Scale, time pressure and perceived health with Copenhagen Psychosocial Questionnaire, organizational commitment questions adapted from Allen &amp; Meyer</td>
<td>Cross-sectional results: prevalence of frequent exposure to violence by patients/relatives (monthly+) 22.7%, reported more frequently by males (28.4%) than females (22%) and by younger nurses (28.2% &lt;30) than older nurses (18.7% ≥45). Reported more frequently in psychiatric, emergency, geriatric, long-term care. Shift work associated with higher exposure to violence (day shift regular hours 12.5%, only night shift 34.1%, shift w/o nights 23.6%, shift w/nights 25.8%). All work-related factors sign. related to violence (all p&lt;0.001 - dissatisfaction with working time, uncertainty of treatment, interpersonal relationships, role conflicts/ambiguity, lifting &amp; bending, time pressure) Strongest relationships between higher lifting and bending scores and higher uncertainty concerning patients' treatment related to higher frequency of exposure to violence. Longitudinal analysis: lower organizational commitment sign. related to more reports of violence. Association between higher frequency of violence and more time pressure (p&lt;0.05)</td>
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<td>Chen et al., (2009)</td>
<td>Taiwan psychiatric hospital, nurses, nursing aides and clerks with direct care of patients, sample 231, response rate 96% N=222</td>
<td>Cross Sectional study + *</td>
<td>Translated version of survey developed by ILO/ICN/WHO/PSI joint programme on workplace violence in health sector - pretested the translated version</td>
<td>For physical violence nurse adjusted OR 8.4 (1.4-49.1) of violence vs. clerks. Nursing aide adjusted OR 7.0 (1.4-34.5) vs. clerks</td>
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Estryn-Behar et al., (2008)
Baseline 10 European countries, follow-up 8 countries
Used stratified sampling procedure, 77,681 eligible, response rate baseline 51% N=39,898; response rate follow-up 41% N=13,920. Analysis performed on 13,527 respondents
Cohort study
Questionnaires sent at baseline and at 1-year follow-up. Quality of teamwork measured with Copenhagen Psychosocial questionnaire. All other questions created by the study team. Asked one question about violence and one about aggression
22% reported suffering from frequent violence (monthly+) from patients/relatives. 29% of UK nurses reported frequent violent events (2nd highest behind France at 39%). Violent episodes sign (p<0.001) more prevalent in psychiatric, geriatric and emergency departments. Workplace factors associated with higher reporting of violent events: higher uncertainty regarding treatment, lower quality of teamwork, monthly+ harassment by superiors, higher time pressure, not satisfied with handover shift, frequent interruptions, higher physical load, full-time work, All shifts except day work regular esp. nights and shift work. Adjusted OR 1.32 (1.17-1.5)(p<0.001) for violence from patients/relatives weekly+ as risk factor for intention to leave nursing. Follow-up: Approximately 60% for each level of violence (seldom, sometimes, often) reported same level at follow-up. 51% of nurses who reported low quality of teamwork at baseline were often confronted with aggressive patients 1 yr later

Farrell et al., (2006)
Population of 6326 Australian nurses response rate of 38%, n=2407.
Cross Sectional study
Following literature review and focus group questionnaire developed to identify types of aggression, perpetrators of aggression, action nurses took following aggression and extent of workplace distress. Respondents were asked to comment on any aggression they had experienced 4 weeks previously
63.5% reported they experience verbal and/or physical abuse during the time period. Average number of verbal abuse incidents reported were 4.1 and physical abuse, 2.6. Perpetrators of verbal abuse were patient (74.3%), patient or visitor (35.3%), colleague (28.7%), doctor (27.1%) and manager (15.8%). For physical abuse 97.2% were the patient, 7.1% were the patient or visitor. Significantly more males were likely to be targets of both verbal and physical abuse (p=0.025). Following incidents, taking no action and talking with the abuser were not found to be helpful. 11% reported that they had left a nursing position because of aggression.

Gerberich et al., (2005)
Survey of 6300 US nurses randomly selected. On basis of responses selected 475 cases and 1425 controls. Response rate of 68% for cases n=324 and 66% for controls n=946.
Cross Sectional Study
Initial survey of months worked in previous 12, demographic information, physical and verbal violence.
Found significant association between department and risk of physical assault for psychiatric/behavioural (OR 2.03, 95% CI 1.05-3.73) and emergency (OR 4.22, 95% CI 1.33-12.79).
Grenade et al., (1995) Sample was 1000 student nurses in Scotland compared with 870 qualified staff in a large teaching hospital and a psychiatric hospital. The study retrospectively reviewed all incident forms (n=372 physical assaults). A semi-structured questionnaire was used on 108 second and third year students, response rate of 86%, n=93.

Cross Sectional study **

Number of physical assaults over a 15 month period. Developed and piloted questionnaire during the study.

372 cases of physical assault over the time period. The rate of physical assaults was higher in student nurses in the psychiatric hospital. The questionnaire data identified that 50 nurses had reported incidents but 13 had not. None sought further help post-incident from occupational health.

Lin et al., (2005) 400-bed hospital in southern Taiwan. Sample of 230 nurses sent surveys, response rate 89.1% n=205. All female registered nurses

Cross Sectional study - *

Questionnaire developed by researcher called the Chinese Workplace Violent Incident, evaluated frequency of violence, source of violence, type of violence and demographics. Developed after review of literature and the content validity was established by 7 experts in workplace violence and was piloted in 165 nurses with internal consistency of alpha=0.75

62% reported experiencing workplace violent event (53.9% verbal and 12.7% physical). All physical violent events were committed by patients - main reason for physical violence was the psychological confusion of patients (8.7%). Incidence of violence highest in night shift mean of 2.14 events (SD=0.84). Experience of workplace violence differed depending on subjects education level (p<0.001), clinical setting at time of workplace violent event (p<0.001) and martial status (p<0.001). Years of nursing, age and training against violence was all not sign.
McKinnon et al., (2008) Two adult acute psychiatric inpatient units and community based teams in Victoria, Australia. Sample of 90, response rate 70% n=63. Cross Sectional study Literature review (not systematic) and questionnaire developed by combining questions from other questionnaires and including new questions (assessed for face validity by panel of nurses). Does not state what is included in questionnaire

Cross Sectional - *

Literature review - nurses one of most exposed occupations to violence at work, sometimes exposed to more violence than police and prison officers especially if they work in psychiatric department

Cross-sectional - 100% of males had been assaulted compared to 83.7% of females. 60% of males had been assaulted >10 times vs. 41.9% of females. 95% of males sustained injuries as a result of violence vs 53.5% of females. Sign difference btw males and females on occupational violence overall (p<0.004), which may due to the way males interact with patients. 11.1% had not experienced some kind of occup violence. 47.6% experienced occup violence >10 times. In past year, 88.9% experienced occup violence (50.8% 1-3 times and 7.90% >10 times). 88.9% of time patients offenders. 81% experienced verbal abuse. 14.3% encountered use of a weapon. 66.7% had been injured at work. 96.8% had been afraid at work, 76.2% feel their safety is compromised as part of work. 14.3% felt safe carrying out work. 49.2% took sick leave as result of injury. 19% reported all incidents. Most common reasons for not reporting: no noticeable follow-up on reports, incident not serious enough. More experienced staff experienced higher levels of occup violence then less experienced (p<0.001) but they also felt more confident to manage it (p<0.001). No sign. difference between inpatient units and community teams for reports of violence. If victim in previous year then those in inpatient unit more likely to have been a victim again than those in community team (p=0.028).

Michael et al., (2001b) Convenience sample of 233 perioperative nurses in Australia Qualitative study Questionnaire survey of the experiences of perioperative nurses after trauma (violence and aggression) 27.5% had been exposed to severe trauma and 30.5 had not. 45% had suffered abuse, 26% had practice issues and 17.5% suffered conflict. 47.5% of the incidents had involved doctors in the operating room.

Michael et al., (2001a) Convenience sample of 233 perioperative nurses in Australia Qualitative study Mixed methods study using the sense of coherence scale and assessment of support received Main source seen as effective was talking to supervisors and co-workers post-incident.
Nachreiner et al., (2007) 6,300 randomly chosen Registered nurses (RNs) and Licensed Practical Nurses (LPNs) in Minnesota. Response rate 78% n=4,918. Response RNs = 80%, response LPNs = 74%. Aug 1998 - Mar 2000

Cross Sectional study

- *

Questionnaire about violence developed by researcher, piloted on 220 nurses.

Majority of RNs and LPNs female (95% and 98%). 477 nurses reported 711 physical assault events. RNs physical violence event rate 12.0 per 100 nurses per year, LPNs rate = 16.4 per 100 nurses per year. LPNs more likely than RNs to be assaulted OR 1.4 (1.1-1.9). 96% of RN and 97% of LPN physical violence events were caused by patients/clients. Physical assaults most often perpetrated by individual impaired because of disease/illness or prescribed meds, and most often male and aged >66 years. Physical assaults primarily in patient rooms and hallways. 7 nurses reported being hospitalized due to injuries. 5% of those experiencing physical violence treated. Exposures with increased risk of physical assault in both RNs and LPNs: working primarily with geriatric patients OR 2.20, working primarily in psychiatric/behavioral dept (compared to medical/surgical) OR 2.35, working in nursing home/long-term care facilities (compared to hospital inpatient) OR 2.13. Both decreased risks when working primarily in clinics/health care provider offices OR 0.12. RNs risk increased when primary activity was providing patient care OR 1.76, were 20-29 yrs old (compared to >60) OR 2.27, had associate degrees (compared to diplomas) OR 1.59, graduated between 1990 and 99 (compared to before 1970) OR 2.46, worked in ED (compared to medical/surgical) OR 2.67. LPNs increased risk when supervising patient care OR 2.81, working with neonatal/pediatric patients (compared to adults) OR 2.91, worked in their dept for >10 years (compared to <5 yrs) OR 1.78. RNs decreased risk when working with neonatal/pediatric patients (compared to adults) OR 0.33, working in public health/school/education/research depts OR 0.40 or operating rooms OR 0.34 (compared to medical/surgical), working in outpatient OR 0.48 or home care/public health facilities OR 0.16 (compared to inpatient hospital). Female RNs had lower risk of physical assault than male RNs OR 0.51.
Senuzun Ergun et al., (2005) Emergency departments in four major hospitals in Izmir, Turkey. Sample of 92 nurses, response rate 72% n=66

Cross-Sectional study * 

Questionnaire created by researchers includes questions on demographics, verbal violence, physical violence and legal processes

93.9% anxious about violence. 19.7% experienced physical violence - 92.3% experience 1-3 times, 7.7% experience 4-9 times. In 38.5% the most recent incident occurred in last 3 months. 15.3% of violent attacks done by patient and 84.7% by family or patient. 77.0% occurred during the night shift. Majority of incidents were not reported. 69.2% of events not reported. None took sick leave. 75.0% of those with physical attacks found reporting not helpful. Reasons for not reporting: reports not considered (11.1%), legal procedures not accomplished (88.9%). Physical violence increased with age (p=0.006) and years working in ED (p=0.001)
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<tr>
<td>Hansen, (2006)</td>
<td>Review of risk of breast cancer after night and shift work</td>
<td>Systematic Review + **</td>
<td>Review of a variety of occupational groups including nurses</td>
<td>Standardised Relative Risk 1.2 (1.1-1.3; n=1664) for nurses versus general population</td>
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<tr>
<td>Lie et al., (2007)</td>
<td>Historical prospective cohort of Norwegian nurses, sample of 49,402 after exclusion n=43,316 women</td>
<td>Cohort study + **</td>
<td>Standardised Incidence Rates compared to female population of Norway. Data from 1953-2002</td>
<td>6193 new cancer cases identified, 30% breast cancer. SIR for total cancer 0.97 (0.95-1.00). Sign. Increase SIRs observed for cancers of breast [1.14(1.09-1.19)], ovarian [1.14(1.04-1.25)], malignant melanoma [1.15(1.04-1.28)] and other skin cancer was borderline sign [1.12(0.98-1.29)]. Sign. lower risk for mouth, esophagus, stomach, liver, gallbladder, pancreas, lung, cervix, kidney and &quot;unspecified sites&quot; most likely due to lifestyle differences. 10-20% increase in SIR for breast cancer for all categories of time since first employment and for all periods of first employment, especially in those who began work before 1940 and had worked for 15-29 yrs [1.8(1.3-2.3)]. Sign. elevation of breast cancer all periods before 1970 but not after 1970. Sign. increase in ovarian cancer if first employed in 1960 or later and ≥15 years employment. SIR decreased for malignant melanoma with more recent period of first employment from 1.4(1.0-2.0) before 1940 to 1.1(0.9-1.2) in 1960-1984. Other skin cancer SIR 1.5(1.2-1.9) before 1940. SIRS for all four cancers increased with increasing employment duration. Main finding, breast cancer, ovarian cancer, malignant melanoma, other skin cancer higher in nurses than gen. pop</td>
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Schernhammer et al., (2004) Nurses’ Health Study. For years 1992-2000, original sample 121,700, in 1992 and 1996 response rate 62%, n=75,453. After exclusion analysis on 37,562 respondents with 287,805 person-yrs follow-up. Cohort study National US study, questionnaire sent out every 2 years. In 1982 assessed self-perceived job stress. In 1992 and 1996 included the Karasek & Theorell's job content questionnaire. 1,030 incident invasive breast cancer cases June 1992-May 2000. More demanding jobs associated with modest decrease in breast cancer risk compared to low strain jobs: High strain job RR 0.87 (0.73-1.04), active job RR 0.83 (0.69-0.99), part-time & high strain RR 0.75 (0.58-0.97). Job strain experienced in past more strongly predicted breast cancer risk than current job strain. Job stress assessed in 1992 and risk of breast cancer in 1998-2000: active job RR 0.56 (0.34-0.91), high strain job RR 0.86 (0.56-1.30) compared to low strain jobs. No association between self-perceived job stress and breast cancer risk. Overall women in high strain jobs appeared to have modestly decreased risk of breast cancer in comparison with women in low strain jobs.
Dermatitis

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<tr>
<td>Dulon et al., (2008)</td>
<td>Paper covers dermatitis and musculoskeletal in geriatric care nurses. Sample of 3,390 nurses, completed documents for 2,164 participants.</td>
<td>Cross Sectional study</td>
<td>Clinical examination was carried out including assessment of severity of eczema and orthopaedic examination. Self-administered questionnaires were also completed including demographics and work history.</td>
<td>18% of the respondents had skin changes based on OHSI criteria. For musculoskeletal symptoms, 18% of participants reported pain in the area of the lumber spine and 10% in the neck/shoulder region. Risk factors associated with low back pain were being over 50 (OR 1.8, 95%CI 1.2-2.8), more than 10 years nursing (OR 1.4, 95% CI 1.1-1.9), never/seldom altering the bed (OR 1.4 95%CI 1.0-1.7), treatment for a back disorder (OR 2.6, 95%CI 1.9-3.6), rather low work ability (OR 1.9, 95%CI 1.4-2.4), rather low psychological resource (OR 1.8, 95%CI 1.3-2.4) and BMI above 25 (OR1.3-1.5). Neck and shoulder disorders were associated with being female (OR 2.0, 95% CI 1.2-3.5), being over 50 (OR 3.8, 95% CI 2.0-7.2), having rather low work ability (OR 2.3, 95% CI 1.6-3.4), rather low psychological resources (OR 1.5, 95% CI 1.0-2.1) and having a BMI over 25 (OR 1.6, 95% CI 1.0-2.4).</td>
</tr>
<tr>
<td>Sasaki et al., (2006)</td>
<td>Sample = 1,150 Japanese midwives selected from members of Japanese Nursing Association. Response rate = 72.6% n=835</td>
<td>Cross Sectional study</td>
<td>Self-administered questionnaire</td>
<td>90% suspected that cause of hand roughness was frequent hand washing, 50% for disinfectant agents, 49% for alcohol-based hand rubs and 36% for medical gloves. 41% symptoms of occup dermatitis (26% associated with glove use, 22% with antimicrobial soap). 2% have diagnosed latex allergy. Highest level of dermatitis in people with allergic symptoms other than due to occup exposure more highly related to having urticaria as symptoms (OR 3.7). Age (p&lt;0.01) and tenure (p&gt;0.05) sign. associated with dermatitis. (mean age with dermatitis = 33.2, non-dermatitis = 35.2) (mean tenure w/derma = 9.5 yrs, non-derma=10.7yrs). ICU workers more frequently derma 53%, wards 38% (diff. not sign.). Using latex gloves during enema, shaving, changing pads, washing perineum, receiving newborns, suctioning, handling waste and examination of delivered placenta sign. increased contact derma compared to not wearing gloves (no p value given).</td>
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</table>
Schmid et al., (2005) Apprentice nurses. 148 eligible, response rate 94% n=139, 35 lost to follow-up. 104 used in analysis (70.3%). 85.6% female

Longitudinal study

Standardised questionnaire on occupational history, past & present skin symptoms including skin atopy, history of hand eczema, non-occupational exposures, leisure activities, work tasks, occupational exposure and protection habits. Self-reported incidence of hand dermatitis over preceding 12 months (developed by Smit et al). 3 examinations (baseline, 1yr, 3yrs) with dermatologist or specially trained occupational physician

Used TEWL to measure skin barrier and corneometry.

12-month period prevalence of self-reported symptoms of hand dermatitis was 36.5% (27.3-46.6) at yr 1 and 43.3% (33.6-53.3) at yr 3.

severe/recurring symptoms in 12 months 25% yr 1, 26.9% yr 3. incident symptoms 25% (17-34.4) yr 1, 30.8% (22.1-40.6) yr 3.

incident severe/recurring 13.5% (7.6-21.5) yr 1, 17.3% (9.8-24.9) yr 3. TEWL changed sign. between baseline and yr 1 and btw baseline and yr 3 (p=0.002) (dorsal hand measurement).

those with symptoms at yr 3 had sign. change in TEWL (p=0.008) 10.15g/m2h-13.55g/m2h. no sign. change in those w/o symptoms. severe/recurring symptoms non-sign, increase in TEWL 11.60g/m2h-14.40g/m2h (N=21).

Sign difference in TEWL at yr 3 between those w/symptoms and those w/o symptoms at yr 3 10.70g/m2h vs. 13.55g/m2h p=0.032 (no sign difference at baseline)

From physical exam: point prevalence of mild to moderate symptoms 21.2% (13.8-30.3) baseline, 25% (17-34.4) yr 1, 36.5% (27.3-46.6) yr 3.
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<td>Laffon et al., (2005)</td>
<td>30 Caucasian nurses from oncology units in Portuguese hospitals (20% over 40 yrs old)  Controls - 22 Caucasian nurses from schools not exposed (68.2% over 40 yrs old)</td>
<td>Case Control Study + **</td>
<td>Exposed nurses - self-reported questionnaire on exposure, work practice, safety precautions  Interviewed about lifestyle &amp; consumption habits  Control nurses - interviewed about lifestyle &amp; lifestyle habits  All - Comet assay, cytokinesis-blocked MN assay, genotyping (performed at least twice)</td>
<td>Sign. Difference in mean age (exposure 33.30 +/- 9.20 vs controls 44.04 +/- 8.20 p&lt;0.01). Allele frequencies approx same as other studies.  Increase in cytogenetic and DNA damage in exposed group (only sign for DNA damage) (tail length 46.46 +/- 0.09 vs 42.68 +/- 0.10 p&lt;0.01) (MN 3.53 +/- 0.59 vs 3.09 +/- 0.37). Higher DNA damage associated with time of exposure (&lt;2 yrs 46.48 +/- 0.15, 3-10 yrs 45.50 +/- 0.14, &gt;10 yrs 48.69 +/- 0.19 all p&lt;0.01 compared to control). (MN &gt;10yrs 5.83 +/- 0.98 p&lt;0.01 compared to controls)(daily continuous exposure) No difference genders, Difference in age only in exposed group (&gt;40 yrs 48.06 +/- 0.20 vs &lt;40 yrs 46.05 +/- 0.11 p&lt;0.01). Positive correlation btw age of exposed and duration of exposure. Smokers more damage in both groups (ran analysis again w/o smokers and got same results. Individual susceptibility to DNA damage based on alleles for three DNA repair enzymes (XRCC1, XRCC3, APE1)</td>
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</table>
Rekhadevi et al., (2007) 120 subjects, 2 groups 60 exposed nurses in hospital in Hyderabad, India, eligible if worked for at least 5 years in oncology department 60 control group from gen pop (no history of exposure) controls and exposed only statistically differed in occupational exposure, all were non-smokers and did not consume alcohol, no sign. difference in age (p=0.78, control 37.95+/−5.64, exposed 38.21+/−5.61) Case Control Study + ** Face-to-face questionnaire - demographics, medical, lifestyles, occup, workplace exposure Collected blood, buccal smear and urine (urine from only 52 of exposed no controls) samples last day of 6-day shift. Comet assay, MN assay, urine analysis Tail length increased in nurses (13.66 vs 6.21 p<0.05); tail length increase in >35 yrs vs <35 yrs in exposed and control groups (exposed: >35 yrs 14.64+/−1.93 vs <35 yrs 11.95+/−2.10 p=0.0001; control >35 yrs 6.39+/−0.88 vs 5.90+/−0.92 p=0.04). Tail length increase in nurses ≥10 yrs employment compared to less than 10 yrs (14.57+/−1.97 vs 11.85+/−2.08 p<0.0001). No difference between hours of exposure <4 or ≥4. MN buccal cells - nurses sign. induction of MN compared to controls (2.66+/−0.83 vs 1.86+/−0.62 p<0.05). Both exposed and control sign. difference with age. Nurses with longer years of exposure sign. higher MN frequency (<10 yrs 2.35+/−0.98 vs 2.82+/−0.71 p=0.03. Hours handled not sign. MN frequency showed sign positive association with age and years of exposure (age p<0.006, yrs p=0.01) MN lymphocytes - MN frequency nurses increased sign compared to controls (6.53+/−1.15 vs 3.11+/−1.09 p<0.05. Age difference significant in both exposed and controls. Years worked significant (<10 yrs 5.95+/−0.82 vs 6.82+/−1.19 p<0.0004). Hours handled sign. (>4 hours 7.00+/−1.27 vs <4 6.34+/−1.06 p=0.45) Positive association between MN frequency and age and duration (age p=0.0005, hours duration p=0.0019) urine - Mean cyclophosphamide in 42 subjects 0.44+/−0.26 microgram/ml (sign for age (p=0.02) but not for yrs or hours)

Sasaki et al., (2008) exposed female nurses - sample 128, response 121, controls (female clerks) - sample 51, response 46. 57 nurses prepare of handle antineoplastic drugs for 6 months or more, controls far from clinical depts. Case Control Study + ** Self-rating questionnaire (medical records, work conditions, lifestyles). Blood samples for comet assay and liver enzyme function tests log-transformed tail length in 121 nurses sign longer than controls (nurses: 0.764+/−0.121, controls: 0.711+/−0.089 p=0.020) log transformed tail length in 57 nurses who handled >6mons sign longer than controls p=0.045. No difference between the two nursing groups in tail length or tail moment. No difference between nurses and controls for tail moment although tail moment did tend to be longer in nurses than controls
Fransman et al., (2007)  
Nurses at 83 hospitals in the Netherlands. Sample of 5546, response rate 79%, n=4393. Cases = oncology nurses, controls = orthopaedics, obstetrics/gynaecology, surgery nurses (picked based on similar levels of education, socioeconomic status and occupational conditions)  
Case-control Study + *  
Questionnaire on pregnancies, lifestyle factors and work conditions and characteristics including frequency of exposures. Measured prolonged time to pregnancy, spontaneous abortions, stillbirth, premature delivery, low birth weight, sex of offspring and congenital malformations. Recorded dermal exposure levels of cyclophosphamide in 6 hospitals to obtain dermal exposure per week during first month of pregnancy or period during which tried to get pregnant  
low exposed group = <0.20 µg/week, medium exposure group = 0.20 to 0.74 µg/week, high exposed group = >0.74 µg/week  
Prolonged time to pregnancy for highly exposed nurses compared to reference group (increase of 1 month in time to pregnancy, adjusted hazard ratio = 0.8 (95%CI 0.6-0.9)). Increased risk for delivering a child with low birth weight (<2500 g) among highly exposed nurses (adjusted OR 2.1 (0.9-4.7). 45g lower birthweight compared to unexposed  
Dermal exposure greater than 3micrograms/week lead to increasing risk of premature delivery (OR per unit increase in ln[exposure] = 1.08 (1.00-1.17)) and increasing risk of low birth weight (OR per unit increase in ln[exposure] = 1.11 (1.01-1.21)

Musculoskeletal

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<td>Alexopoulos et al., (2003)</td>
<td>420 Greek Nursing personnel, response rate of 84%, n=351</td>
<td>Cross Sectional Study + **</td>
<td>Demographic data, occupational history, psychosocial aspects at work from the Job Content Questionnaire, musculoskeletal symptoms measured using the Nordic Musculoskeletal Questionnaire</td>
<td>Prevalence of symptoms in the previous 12 months were neck 47%, shoulders, 37% and low back 75%. Manual handling, strenuous back postures and strenuous shoulder movements were significantly associated with low back pain, shoulder pain and neck pain.</td>
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</table>
Ando et al., (2000) National hospital in Nagoya, Japan. 508 eligible nurses, response rate 90% n=457 98% women. In final analysis used n=314 (full-time registered nurses) Cross Sectional study Questionnaire: self-reported severity of workloads, actual tasks performed, self-estimated risk factors of fatigue, MSD present in previous month, demographics (not piloted and not validated) Prevalence of low back pain was 54.7%, shoulder pain 42.8%, neck 31.3%, arm 18.6%. Did not find any sign. Results between low back pain and neck/shoulder/arm pain and any actual tasks or self-estimated risk factors for fatigue

Burton et al., (1997) 1783 Nurses, 1216 Qs (68.2% response) from 7 hospitals categorised as Academic, Catholic or Dutch (no of each not given) in Belgium and Holland. A&C were Belgian. All qs apparently gave usable data. Non-responders reported as coming mainly from those off duty at the material time. Cross Sectional study Origins of musculoskeletal questions not given. Also used 5 instruments for psychosocial aspects, Fear-Avoidance Beliefs (FABQ), Coping Strategies (CSQ), Pain Locus of Control (PLC), Modified Zung Depression Inventory (MZ) & Psychosocial Aspects of Work (PAW). All completed latter 2,only those with symptoms the others. Nurses in C hospitals were sig older (p<0.04), 1.5 years>mean. Mainly female, esp in C, (86% cf 76%A & 78%D). 66.8% reported MS symps, 53.3% rep back symps with 36.9% current. Prevalence sig lower in D for either (p<0.001gen, p<0.01lbp). Sig more D nurses had heavy workloads (p<0.001) but no sig diff in symptoms between workloads. 50-55% attributed MS or LBP symps to work, no diff between A, C or D; ~20% needed absence (no sig diff); ~3% changed work (no sig diff). C nurses sig more likely to have had a 12m work incident (p<0.05). Nurses in D hospitals were less depressed (MZ), more positive about job sati, social supp, & mental stress (PAW) (all p<0.05) catastrophised less, used positive coping (CSQ) and had fewer fear avoidance beliefs for either work or gen phys act (FABQ). Job sati was lower and fear avoidance was higher in heavy work depts. (p<0.05).

Cameron et al., (2008) 500 'older' (>45y) Canadian (SW Ontario) registered nurses. 303 compl qs (+2 incomplete & 4 not delivered), 61.5% resp. Cross Sectional study Non-standard MSD symptoms, impact and work factor questionnaire 57% of nurses reported back pain more than 'rarely' in a 12m period (i.e. at least once per month). Similar figs for neck (51%); shoulder (48%); upper back (40%) - 4 most common sites. All sig negative corr with 'sleep adequacy' (p<0.01 or .001) upper (p<0.05) & lower (p<0.001) back corr with patient handling. Shoulder & 2xback corr with 'control over work'; LBP corr (p<0.001) with both shift hours & type. LBP interfered 'somewhat' (32%) 'quite a lot' (15%) & 'a great deal' (4%) with ability to perform work. Others with 'more than minimal' impact were hands/fingers (40%); lower leg (40%); forearm/elbow (38%) wrists (37%) & shoulder (34%). Neck (28%) had least impact. Interview information included observation that patients were 'increasingly heavy'
(Choobineh et al., 2006) 
Survey of 641 randomly selected nurses in Iran. Cross Sectional Study
Used Nordic Musculoskeletal Questionnaire and Job Content Questionnaire
Musculoskeletal reporting was 54.9% for the lower back, 46.4% for the upper back, 52.1% for the legs/feet, 36.4% for the neck and 39.8% for the shoulders. 84.4% reported MSD symptoms in the last 12 months. Perceived physical demands significantly associated with MSDs but no association between psychological demands and symptoms.

(Elfering et al., 2002) 
186 nurses in early stages of career in USA, 141 Qs returned; 114 returned from these 141 at stage 2, 1 year later. Also subsample (24) used for catecholamine study. Quasi-experimental study
Environmental & physical factors and work characteristics using Instrument for Stress Oriented Task Analysis (ISTA). Psychosocial work-related, social stressors, leisure-time workload used items derived from published scales. Baseline MSDs assessed in back, neck and shoulders using scale by Mohr. Follow-up pain intensity and behaviour used Nordic. Subgroup measurement of urinary catecholamines plus background info on diet etc.
Limited incidence or prevalence data reported and only on low back pain (no neck or shoulders). Not all statistics reported in paper "bivariate correlations [at follow up] between the work characteristics and the indicators of low back pain were low to moderate and in the expected directions". Mult Reg. showed back pain at base line to be best predictor of frequency of LBP (OR not given, p=0.000). "change" in physical strain from baseline also correlated (OR=6.00, p=0.034), [lack of] time control also correlated (OR=4.61, p=0.013). In subgroup, catecholamine release at work was higher in those reporting more frequent back pain (E, p=0.056 [noon], p=0.019 [shift end]; NE, p=0.006 [shift end], and also at home (E, p=0.063 [afternoon]). This subgroup also reported trends towards less control at work (p=0.086) and more exhaustion in evenings (p=0.082).

(Eriksen, 2003) 
Random sample of 12000 nurses aides in Norway, response rate 62.3%, n=7,478, after exclusion used 6,485 in analysis Cross Sectional study
Questionnaire measuring MSD pain during previous 14 days evaluated with a modification of standardised Nordic questionnaire
Prevalence of MS pain in 1 or several locations = 88.8% (88-89.6%). Prevalence of intense pain =51.1%(49.9-52.3%). Prevalence widespread pain = 26.6% (25.5-27.7%). 4 most prevalent regions - lower back 54.9%, neck 53.5%, shoulder 47.1%, head 41.9%. prevalence of pain in extremities increased with increasing age(>59) (p<0.05), prevalence of pain decreases in head and higher back with increasing age (p<0.05), neck, shoulder, elbow, high back, hip pain more prevalent in women than men (p<0.05), prevalence of neck pain increased with increasing number of hours worked (p<0.05).
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<tr>
<td>Goncalves et al., 2001</td>
<td>Cross Sectional Study</td>
<td>All practical nurses at an institute, 83 participated</td>
<td>Work ability index, those reporting musculoskeletal disease or pain were invited to continue with study (n=29). Workplace observations made during 12 hour working shift.</td>
<td>Study identified that day shifts were spent standing (70%), 12% bent over and 13% sitting. Night shifts were spent 51% standing, 46% sitting. Therefore different exposures dependent on shift.</td>
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<td>Gray et al., 1996</td>
<td>Case Control Study</td>
<td>Two ‘nursing units’ of unknown size. One case the other control</td>
<td>Outcome awareness of correct behaviour &amp; satisfaction with training</td>
<td>Those who received 5 weeks of training (4 hours per week) gave more correct answers to ‘quiz’ after course compared to the unit who did not have training (before 50.9 v 62.2 after 58.5 v 82.6, p=0.001). 73% responses (88/120) course was ‘very useful’ or ‘useful’ (no details of number or nature of questions).</td>
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<td>Hignett, 2003</td>
<td>Systematic Review</td>
<td>Review of interventions to reduce MSDs</td>
<td>Evidence statements: +++ multifactor interventions based on risk assessment are successful (10 mod, 4 limited); +++ multifactor interventions (not based on risk assessment) can show improvements (4 mod, 5 limited, 1 HQ none); +++ single factor interventions based on the provision of equipment can be effective (2 mod); +++ interventions using the lifting team approach can be effective (3 mod, 2 limited); +++ interventions based predominantly on technique training have no impact on working practices or injury rates (4 strong, 8 mod, 5 limited); +++ interventions based on technique training can have mixed (positive and negative) short term results (2 mod, 4 limited); ++ interventions based on technique training can have short term positive outcomes (4 mod, 5 limited. all studies had problems)</td>
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<td>Jhun et al., 2004</td>
<td>Cross Sectional study</td>
<td>In pre-survey sample of 251 nurses in university hospital in Korea, response rate = 83.7%(n=210). In post-survey sample of 257 nurses at same hospital, response rate = 84.4%(n=217). 130 (51.2%) responded to both surveys</td>
<td>Before and after evaluation of the adoption of a computerized order communication system. Self-administrated questionnaire given 1 month before adoption and 3 months after. Job stress evaluated with Karaseck's Job contents questionnaire. Musculoskeletal symptoms evaluated with a questionnaire similar to one used by US NIOSH in a telecommunications company (Definition of MS symptoms - one or more MS</td>
<td>Overall MS symptoms were not sign changed (38.5% reported before and 40.0% reported after) (however only 4 months between surveys and the definition of MS symptoms spanned a year). Back symptoms were sign increased after adoption of the OCS (p&lt;0.05) (18.5% before and 27.7% after)</td>
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<tr>
<td>Study (Author(s), Year)</td>
<td>Sample Size and Details</td>
<td>Study Design</td>
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<td>Key Findings</td>
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<td>(Larese et al., 1994)</td>
<td>425 Nurses in Italy</td>
<td>Cross Sectional study</td>
<td>Medical examination including x-ray and/or orthopaedic examination if necessary. Patients asked about MSD symptoms, diagnosis, sick leave, and MSD work injuries.</td>
<td>48.2% of general nurses had described back pain and 29.4% had received treatment. Average number of sick days was 22. Back pain more frequent in those over 40, with more than 10 years employment. The largest category was low back pain (595), followed by upper back and neck (15.4%). The most commonly reported incidents causing back pain were lifting, bending and twisting.</td>
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<tr>
<td>(Lipscomb et al., 2002)</td>
<td>2,000 licensed nurses, 1,000 from each of 2 US states (Ill &amp; NY). 1428 (74%) responses, 1163 used as currently working.</td>
<td>Cross Sectional study</td>
<td>Questionnaire based on Nordic, plus additional Qs on pain severity, plus 8 items from Job Control Questionnaire (JCQ) plus 12 items relating to physical demands on scale from 1-4 and individual responses dichotomised and summed to give composite score.</td>
<td>Prevalences of 20% (neck), 17% (shoulder) and 29% (back). Lower than other surveys possibly because a symptom had to have a pain rating of at least 3 (1-5) to count. Back symptoms sig related to FT status (OR=1.92); working 12 hours or more per day (OR=1.61); working 2-4 weekends per month (OR=1.78); and working shifts other than days only (OR=1.49). Shoulder symptoms sig related to working shifts other than days (OR=1.48). No sig work-schedule factors with neck symptoms. Work schedule items were ‘summed’ (no explanation of how or validity). The resultant ‘index’ was sig related to neck (OR=1.1) shoulder (OR=1.12) and back (OR=1.16) symptoms. Adjustment for both psych and phys demands removed significance except for shoulder (OR=1.14). Working at least 12 hrs per day and at least 40 per week increased risk of neck (OR=2.3) shoulder (OR=2.48) and back (2.67). Working 2 or more weekends per month on day shifts increased the risk of back symptoms (OR=1.61) Working 2 or more weekends per month on other shifts also increased this risk (OR=2.08).</td>
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<tr>
<td>(Lorusso et al., 2007b)</td>
<td>Review</td>
<td>Review</td>
<td>Review of low back pain in Italian nursing</td>
<td>Summarises previous research. Risk factors for MSDs include age, length of employment and physical workload. Incidence of low back pain range from 0.55-6.90 per 100 workers per year.</td>
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</table>
(Lusted et al., 1996) Participants were 56 nurses and nurses aides with 30 taking part in the study. Cross Sectional study Evaluated workplace injuries, musculoskeletal symptoms using the Nordic Musculoskeletal Questionnaire, evaluated workload using HR and the Borg Scale. For musculoskeletal symptoms, 22 reported symptoms in the last 12 months, 63% reported low back symptoms. Shoulder (60%) and neck (43%) symptoms were also reported. Most physical work carried out in the mornings including patient handling tasks. Little other data presented.

(Mitchell et al., 2008) Convenience sample of 1668 student nurses in Australia and 134 graduate nurses. Response rate 54% for students (n=987) and 83%, n=111 for the graduate nurses. Cross Sectional study Nordic Musculoskeletal Questionnaire, questions on occurrence of low back pain, number of episodes, severity, postures and activities. Questionnaires piloted. Courses also reviewed to identify manual handling training opportunities and methods. From the results, lifetime prevalence in the students was 79%, 12 month prevalence 71% and 7 day 31% and were significantly higher after 12 months of employment (lifetime 95.5%, 12 months 90% and 7 day 39%). Back pain attribution was from bending and lifting. Suggests that increased reporting is due to increased occupational exposure when moving to being a graduate nurse.

(Niedhammer et al., 1994) Ten public sector hospitals in France 1980, 6 in entire longitudinal study 1980-90. randomly selected female nurses (acute care) n=469 in 1980, 1985: response rate 89% (5% lost to followup), 1990: response rate 78% (16% lost to followup) Cohort study Self-administrated questionnaire about demographics, sports activities, commute time to work, work interest, night work. Interview with occup physician if still working or by trained interviewer at home or by telephone evaluated personal characteristics, job description, working conditions, work organization, shift work, sleep, nutrition, leisure, home activities, health. 1990 - 57.9% of 310 nurses still working in hospitals had back pain within previous 12 months (23.6% cervical, 23% dorsal, 41.1% lumbar pain, 40.5% chronic or recurring 31.1% been treated, 7.4% taken sick leave). Cross-sectional analysis: back pain in previous 12 months sign. more frequent in nurses who smoked OR 1.97 p=0.04, suffered from psychological disorders (3 or more symptoms) OR 2.82 p=0.01, reported stressful factors related to physical workload OR 2.11 p=0.08. Chronic/recurring back pain associated with symptoms of psychological disorders OR 2.98 p=0.01. Treatment for back pain associated with doing sports OR 0.52 p=0.02, having symptoms of psychological disorders OR 2.55 p=0.01. Longitudinal analysis: Risk factors in 1985 that predicted back pain in 1990 (those that did not suffer from back pain between 1980-85 - associated with smoking OR 1.79 p=0.10, chronic/recurring back pain associated with stress from physical work load OR 2.48 p=0.08.

(O'Brien-Pallas et al., 2004) Registered nurses in Canada (n=8044 in Ontario, n=127 in hospital) Cross Sectional Study Frequency of health problems, number of claims made for lost time. Study identified that 97% of nurses reported good or excellent health. 44% reported one or more occasion of sickness and missing one or more shifts in the last 3 months. 16% reported buttock pain, 17% neck or shoulder pain, 25% reported working with musculoskeletal pain either all or most of the time. Claiming lost time was significantly associated with working more than one hours over time per week (P<0.03). Study very unclear.
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<tr>
<td>(Peterson et al., 2004)</td>
<td>Quasi-experimental</td>
<td>Questionnaire to assess musculoskeletal stress, evaluated the work environment, developed and used a training programme and determining the impact of the training. Used quizzes to identify the impact of understanding the principles of ergonomics and patient handling pre and post.</td>
<td>Risk factors identified were ranked with the most stressful being lifting patient from the floor and least stressful being lifting meal trays. Obstacles identified included the bed being too low or high, the lack of time allowed to care for patients and the use of the gait belt when transferring patients. The results of the quizzes indicated that participants found the training effective and understood it. However no significant differences were found between musculoskeletal risk factors pre and post study and no reduction in pain or discomfort.</td>
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<td>(Pheasant et al., 1992)</td>
<td>Cross Sectional</td>
<td>Measures of prevalence of back pain. Measures of intra-abdominal pressure when carrying out different lifts.</td>
<td>Previous epidemiological research identified that nurses have a point prevalence of back pain of 17 versus 12 in the general population. Sickness absence rates were 1,744/1000 person years for back pain and 16% of all cases of sickness absence. The risk assessment identified that for patient handling the lowest risks were for the Shoulder lift and the draw-sheet lift.</td>
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<td>(Sheikhzadeh et al., 2008)</td>
<td>Cross Sectional</td>
<td>Used a musculoskeletal symptoms survey, job description questionnaire and psychometric evaluation questionnaire. Survey was piloted and then ran. This was followed up by focus groups held with 18 participants to confirm the findings of the questionnaires and identify jobs with a high ergonomic risk.</td>
<td>The results identified that there were a high prevalence of MSDs including lower back (84%), ankle/foot (74%) and shoulder pain (74%). The main causes of absenteeism from work were lower back pain (31%) followed by ankle/knee pain (24%). The focus groups identified a number of workplace issues including environmental factors such as the layout, poorly maintained trolleys and inadequate communication.</td>
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</table>
(Skargren et al., 1996) 106 Swedish nurses or nursing aides invited, 7 excluded at outset, 9 refused leaving 90 subs, 6 of whom dropped out during the study (reasons given) Quasi-experimental study Intervention study to investigate impact of exercise programme on MSD symptoms & other parameters. Nordic used for MSD symptoms, cardiovascular fitness (pred O2 capacity) & muscle strength (quadriceps). Randomised cross-over study with groups merged after preliminary analysis showed no carry-over of effects. Exercise - 60 mins twice a week for 8 weeks. Control - 60 minutes twice a week doing ?? - not stated. Subgroup who did not do at least 50% of exercise periods grouped as ‘nonparticipants’. At onset, MSD symps more common amongst those >40y, O2 cap lower amongst these and ‘nonregular exercisers. Paired t tests showed: fewer MSD symps within ex periods (p<0.01) & within participants (p<0.05); increase in O2 cap (p<0.05) & musc str (p<0.05) amongst participants; previously non-regular exercisers showed more effect with red in MSD symps (p<0.001), incr O2 cap (p<0.01) & appr sig (p<0.1) for musc strength. Similarly those over 40 showed clearer impact on MSD symps (p<0.05), & approach sig (p<0.1) for O2cap.

(Smith et al., 2004) Sample of 284 nursing students in rural Australia (1st yr (27.7%), 2nd yr (41.1%), 3rd yr (31.2%). Response rate = 91.5% (n=260). 89.2% female Cross Sectional study Self-reported occurrence of MSD symptoms at specified body sites over previous 12-month period, demographics, year of study 80% reported MSD at some body site - low back pain most common 59.2% followed by neck 34.6%, knee 25.0%, shoulder 23.8%, feet 16.5%, wrist 12.7%, legs 11.9%, headache 7.7%. MSD of shoulder sign more common in males 39.9% vs females 22.0% p=0.0424. Previous paid employment as a nurse or nursing assistant found to increase risk of upper arm MSD by factor of 10.8 (OR 10.8, 95%CI 1.9-205.8, p=0.0276). Alcohol consumption adn tobacco smoking found to not be associated with MSD

(Smith et al., 2004b) 306 nurses in Chinese teaching hospital, 282 responses (92%), all female. Mean age 34yrs. Cross Sectional study Survey questionnaire based (in part) on Nordic symptoms questionnaire translated into Chinese with added psychosocial questions Overall 12m MSDs 70%, back pain 56%, neck 45%, shoulder 40%, upper back 37%. Boring or tedious work predicted any complaint (OR 2.36, p<0.05); no sig predictors for low back. High mental pressure (OR 1.79, p<0.05) and not enough support (OR 2.52 p<0.05) correlates with neck pain; none with shoulder; Boring or tedious tasks correlate (OR 1.97 p<0.05) with upper back. No correlations with any MSDs and High physical exertion or manual handling. Authors suggest that this is because nurses in China play a more medical role with patient handling, bathing, etc performed by relatives
<table>
<thead>
<tr>
<th>Study Reference</th>
<th>Participants</th>
<th>Study Design</th>
<th>Questionnaire</th>
<th>Outcome Measures</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Smith et al., 2003b)</td>
<td>259 Japanese student nurses, 24 absent or DNR, 13 male excl leading to 222 (85.7%). Drawn from all 4 years ~25% per year.</td>
<td>Cross Sectional study</td>
<td>non standard MSD questionnaire</td>
<td>Any MSD 78.4%, sig higher in surgery (OR=2.1, p=0.02) cf other depts. Other incidences: 59.0% LBP, 46.6% shoulder; 27.9% neck; 16.4% knee.</td>
<td>14.9% shoulder; 13.5%LBP; 9.5% neck; 5% knee. No effect of year but previous hospital work sig incr. shoulder (OR=4.4, p=0.01).</td>
</tr>
<tr>
<td>(Smith et al., 2003)</td>
<td>329 nurses from 3 rural Japanese hospitals. 259 rns (78.7%), 6 male excl, 6 unusable leading to 247 (75.1%). 126, 73 &amp; 48 from 3 hospitals.</td>
<td>Cross Sectional study</td>
<td>Nordic MSD quest.</td>
<td>Any MSD 78.4%, sig higher in surgery (OR=2.1, p=0.02) cf other depts. Other incidences: 59.0% LBP, 46.6% shoulder; 27.9% neck; 16.4% knee.</td>
<td>91.9% MSDs; 82.6% LBP; 61.1% shoulder; 36.8% neck; 29.1% upper back; 23.5% knee. Sig diff for MSDs and LBP betw hospitals (p&lt;0.02) lost when age and yrs empl taken into account. Regular MH gave sig incr LBP (OR= 16.7, p&lt;0.04. No effect of age on LBP risk, no effect of duration of employ on risk of LBP.</td>
</tr>
<tr>
<td>(Smith et al., 2003a)</td>
<td>363 nurses @ rural Japanese teaching hospital. 305 ret (84%) all female?</td>
<td>Cross Sectional study</td>
<td>non standard MSD questionnaire (same as 1047)</td>
<td>Any MSD 78.4%, sig higher in surgery (OR=2.1, p=0.02) cf other depts. Other incidences: 59.0% LBP, 46.6% shoulder; 27.9% neck; 16.4% knee.</td>
<td>Any MSD, 70%; 56.7% LBP; 42.8% neck; 38.9% shoulder/upper back;. Mental pressure 13-30% sig diff betw depts (p=0.03). Sig diff bet depts in no of transfers (p=0.004 Int care higher than others) &amp; no of lifts /shift (p=0.0013 gyn higher) but only overall diff analysed (no multiple comp means) Period pai n gave incr risk MSD (OR=23.8, p=0.008). Mental pressure gave increased risk of MSD (OR=10.5, p=0.0058). Drinking alc decr risk of MSDs (OR=0.1, p=0.0046) Work in gynae decr risk of MSDs (OR=0.1, p=0.024). Work factors not sig, age not sig.</td>
</tr>
<tr>
<td>(Smith et al., 2004a)</td>
<td>214 Chinese nurses, 206 repl, 8 male excl, 18 others excl leaving 180(84.1%)</td>
<td>Cross Sectional study</td>
<td>Nordic MSD quest, non-standard psychosocial.</td>
<td>Any MSD, 70%; 56.7% LBP; 42.8% neck; 38.9% shoulder/upper back;. Mental pressure 13-30% sig diff betw depts (p=0.03). Sig diff bet depts in no of transfers (p=0.004 Int care higher than others) &amp; no of lifts /shift (p=0.0013 gyn higher) but only overall diff analysed (no multiple comp means) Period pai n gave incr risk MSD (OR=23.8, p=0.008). Mental pressure gave increased risk of MSD (OR=10.5, p=0.0058). Drinking alc decr risk of MSDs (OR=0.1, p=0.0046) Work in gynae decr risk of MSDs (OR=0.1, p=0.024). Work factors not sig, age not sig.</td>
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<tr>
<td>Study</td>
<td>Sample Description</td>
<td>Study Design</td>
<td>Methods/Measurements</td>
<td>Results/Findings</td>
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<tr>
<td>Smith et al., 2006</td>
<td>1,162 Japanese nurses in a large teaching hospital, 860 replies (74.0%). 16 males excl 844 (72.6%). Average age 32.9y work av 39.6 h/wk av career 10.0y</td>
<td>Cross Sectional study</td>
<td>Nordic quest plus extras. Only covered neck, shoulder upper back &amp; lower back.</td>
<td>85.5% MSDs. 71.9% shoulder; 71.3% LBP, 54.7% neck, 33.9% upper back. Smoking (p = 0.05) and high mental pressure (p = 0.05) sig assoc with neck pain; manually handing patients (p = 0.05), hard phys work (p = 0.05) PMT (p = 0.05) &amp; high mental pressure (p = 0.05) sig assoc with shoulder pain; bend/twist, hard phys wk, PMT &amp; mental press (all p = 0.05) sig assoc with upper back; man hand patients, bend/twist, hard phys wk, PMT, mental press &amp; not enough staff (all p = 0.05) sig assoc with LBP. All six also sig assoc with any MSD. In mult reg many no longer sig. Any MSD: drinks alc (OR = 1.87) MH (OR = 11.97) hard phys wk (OR = 2.49); neck, smokes (OR = 2.45) has children (OR = 2.53) &amp; high MP (OR = 1.53). Shoulder man hand (OR = 2.07) hard phys wk (OR = 2.09) &amp; high MP (OR = 2.07); upper back PMT (OR = 1.94); LBP MH pats (OR = 2.59) hard Physd wk (OR = 2.76) &amp; PMT (OR = 1.66).</td>
<td></td>
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<tr>
<td>Smith et al., 2005</td>
<td>All 337 nurses in Korean teaching hospital, 330 returns (97.9%).</td>
<td>Cross Sectional study</td>
<td>Nordic MSD quest plus others</td>
<td>Any MSDs 93.6%, shoulder 74.5%, LBP 72.4%, neck 62.7%, lower legs 52.1% &amp; hand/wrist 46.7%. Shoulders (p = 0.0227) &amp; hand/wrist (p = 0.0410) showed sig trend across depts. LBP (49%) &amp; shoulder (40.7%) most likely to last for &gt;1 week. Elbows (28.6%) and LBP (21.3%) most likely to lead to medical treatment. Regress (adj for age, hgt, wgt, work shift &amp; dept) showed man handling patients incr risk of any MSD (OR = 3.3, p = 0.0104). Periodic depression also sig inc risk of any MSD (OR = 2.2, p = 0.0176) shoulder (OR = 2.4, p = 0.0182) and hand/wrist (OR = 3.8, p = 0.0001) incr risk of needing medical treatment.</td>
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<td>Stone et al., 2007</td>
<td>Nurses from 13 NYC hospitals, 2047 surveys returned, response rate 50%, 92.6% female, mean age 44 yr</td>
<td>Cross Sectional study</td>
<td>Self-administered questionnaire (piloted before use) demographics, employment characteristics, organizational climate measure, self-reported occupational health outcomes, burnout measure. Used modified version of Perception of Nurse Work Environment scale for the assessment of organizational climate. Comparing lost work days and musculoskeletal to job organizational characteristics</td>
<td>78.4% (1556/1984) reported lost work day due to illness. 26% (538/1769) reported musculoskeletal injury. Lost work days associated with low nurse/physician collaboration OR 1.53 (1.16-2.03) p &lt; 0.01 and with low nurse management OR 1.37 (1.00-1.88) p &lt; 0.05. Musculoskeletal injury associated with low professional practice OR 1.42 (1.06-1.90) p &lt; 0.05, low nurse physician collaboration OR 1.69 (1.31-2.16) p &lt; 0.001, low nurse management OR 1.80 (1.39-2.32) p &lt; 0.001, low opportunity for advancement OR 1.64 (1.26-2.12) p &lt; 0.001 and low unit decision-making OR 1.37 (1.05-1.80) p &lt; 0.05.</td>
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120 nurses from 6 depts in each of 4 hospitals in Turkey (all female). Equal number were 'selected' (no indication of how) from each Dept. with a req of at least 6m in dept. 100% response, 56% immediate, 32% after a reminder & 12% 'after a visit'.

Cross Sectional study

Nordic MSD quest but used a 6m rather than 12m timeframe. Also asked about 'chronic' i.e. minimal presence of at least 3m. Also asked about work factors on a simple (yes/no) scale.

90% reported at least 1 MSD. 69% LBP, 54% shoulder & 46% neck. Chronic equivalents were 41%, 33% & 25% resp. Chronic data reported as showing corr with Dept but very small cell sizes and numbers don't tally. Thus stated as 15 per Dept but should be 20 (120 div 6D = 20). Sig higher reporting in Surg & Obst/Gyn (both p<0.05). Older nurses said to have more MSDs but no data given.

Random sample of 2000 licensed nurses. 67 ineligible, 1933 in the sample. Response rate of 74%, but only included those who had been in current role for one year, n=1163

Cross Sectional study

Availability of lifting teams, mechanical lifts etc; training on equipment and work posture. Adaptation of the Nordic Musculoskeletal Questionnaire and assessment of lifting technique

Prevalence of neck (24%), shoulder (22%) and back (32%) cases was found. For those with mechanical lifting devices, 57% reported they sometimes used it. For the vignette, most chose the healthiest options. Risk of developing back problems were halved when there was a lifting team available, increased risk using transfer boards/sliding sheets (OR 1.5, 95% CI 1.07-2.10), and adjustable beds (OR 1.67, 95% CI 1.16-2.41). The study identified that training itself combined with use of mechanical devices resulted in being less likely to have a back problem

2000 randomly selected US nurses. 1428 eligible to take part, response rate of 74% n=1428 of those who had been in same job for a period of one year.

Cross Sectional study

Used an adapted Nordic Musculoskeletal questionnaire to assess symptoms. Used NIOSH categories to identify cases, assessed medication use and number of sick days

72.5% reported symptoms, 45.8% neck symptoms, 35.1% shoulder symptoms and 47% back symptoms. MSD cases more likely to be seen by a physician, have missed work, modified work activities and reduced recreation and non-work activities. Inadequate sleep was associated with being an MSD case
<table>
<thead>
<tr>
<th>Study (Year)</th>
<th>Study Design</th>
<th>Study Sample</th>
<th>Methods</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trinkoff et al., 2003a</td>
<td>Cross Sectional study</td>
<td>2000 randomly selected US nurses. 1428 eligible to take part, response rate of 74% of those who had been in the same job for a period of one year.</td>
<td>Used an adapted Nordic Musculoskeletal questionnaire to assess symptoms. Used NIOSH categories to identify cases, assessed medication use and number of sick days.</td>
<td>Neck, shoulder and back MSD cases significantly associated with high physical demands at work.</td>
</tr>
<tr>
<td>Trinkoff et al., 2006</td>
<td>Cohort study</td>
<td>A 3 wave longitudinal survey. 5000 licensed US nurses randomly selected of those 4229 were sent survey questionnaires. Responses at Wave 1 was 2,624, at Wave 2 was 85% and Wave 3, 86%. Unclear on length of study but suggests 6 months between waves.</td>
<td>Measures were working hours, length of work days, the Standard Shiftwork Index, the Adapted Nordic Musculoskeletal Questionnaire and definition a case being a relevant symptom lasting one week or more occurring at least monthly.</td>
<td>Hours worked per week were associated with neck symptoms (OR 1.01, 95% CI 1.00-1.03), shoulder symptoms (OR 1.00, 95% CI 1.00-1.03), and back symptoms (OR 1.01, 95% CI 1.00-1.02). Working more than 13 hours was associated with neck symptoms (OR 1.94, 95% CI 1.38-2.74) shoulder pain (OR 1.92, 95% CI 1.35-2.58) and back pain (OR 1.37, 95% CI 1.37-2.55). Working while ill was associated with neck pain (OR 2.4, 95% CI 1.47-3.91), shoulder pain (OR 1.84, 95% CI 1.21-2.80) and back pain (OR 1.48, 95% CI 1.01-2.17). Working on a vacation day was associated with neck pain (OR 1.89, 95% CI 1.2-2.8), shoulder symptoms (OR 1.89, 95% CI 1.32-2.72) and back symptoms (OR 1.41, 95% CI 1.01-1.97). Mandatory overtime was associated with neck symptoms (OR 1.56, 95% CI 1.00-2.42), shoulder symptoms (OR 2.17, 95% CI 1.46-3.23) and back symptoms (OR 1.55, 95% CI 1.03-2.31). Working more than 6 days in a row was associated with shoulder pain (OR 1.42, 95% CI 1.01-2.00).</td>
</tr>
<tr>
<td>Warming et al., 2008</td>
<td>Cross Sectional study</td>
<td>148 nurses in Denmark.</td>
<td>Completed logbooks over 4 days, 3 days at work and one day at rest. Psychological variables, physical workload and musculoskeletal complaints were assessed but not sure if method was validated. 22 nurses were also observed during the study 10 of whom took part in an inter-method reliability test on the logbook.</td>
<td>64% reported low back pain, 55% reported neck and shoulder pain and 20% reported knee pain on one of the three working log book days. Symptom reporting reduced on the rest day. Pain levels increased over the 3 working days but reduced on the day off to the same level as the first day. Stress (OR 3.99, 95% CI 1.04-15.36) and transfer tasks (OR 7.87, 95% CI 2.31-26.85) were association with low back pain; transfer tasks were associated with knee pain (OR 5.68, 95% CI 1.46-22.16).</td>
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</table>
Survey of caregivers pre and post introduction of the Safe Patient Handling Programme. A convenience sample was used over 3 days. Pre-intervention 40 participants invited, response rate 53%, n=21; post-intervention at 1 month no data given.

Participants asked about patient handling, if they risked assessed the manoeuvre, views on patient handling equipment.

Study identified that pre intervention, participants used patient handling equipment 5% of the time, post intervention to 29% of the time. In the year Pre intervention 92 injuries reported, 3 months post intervention, 9 injuries reported.

97 female nurses from 6 Hong Kong hospitals, 'asked to volunteer' by managers.

Non-standard workload measures, Nordic MSDs. Minimum severity of 4 (1-5) on severity or frequency scales used to define cases.

Complex array of workplace factors subjected to factor analysis before use in analysing symptom data. Prevalences were: LBP 42.3%, Upper back 22.7%; neck 19.6%; shoulders 20.6%; elbows/forearms 7.2%; hands/wrists 17.5%; fingers 7.2%; hips/thighs 20.6%; knee/lower leg 29.9%; ankles/feet 19.6%. Determined Odds Ratios and Risk Ratios (RR based on log binomial because "ORs overestimate risk for prevalent diseases") Sig incr OR for 'Factor 3' and LBP (4.15); upper back (2.96) hand/wrist (3.28); knee/lowleg (3.84), sig decr OR for Factor 2 & upper back (0.43) and knee/lowleg (0.38). Sig incr RR for same 4 (2.02; 2.14; 2.81; 2.40). Sig decr for Factor 2 & same 2 (0.54; 0.56). Factor 3 described as "Acting/Experienced Energy Expenditure" (variables resulting in negative effects that are an integration of work & indiv characteristics); Factor 2 described as "Acting Energy Replenishment/Expenditure (work conditions resulting in integrated positive/negative effects). See paper for factor analysis details.
<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tbody>
<tr>
<td>(Axelsson et al., 1996)</td>
<td>All female members Swedish Midwives Association in 1989 (born in 1940+). 3985 eligible, response rate=84.3% n=3358. Analysis used 2667 pregnancies between 1980-88 and 1587 women</td>
<td>Cross Sectional study - **</td>
<td>Sent questionnaires about pregnancies, work history, exposure to N2O (&gt;50% of all deliveries, &lt;50% of all deliveries), other exposures, potential confounders. Spontaneous abortion - intrauterine death of embryo or fetus before the beginning of 29th week of gestation. Before 13th week referred to as &quot;early abortions&quot;</td>
<td>14.1% of the 2667 preg ended in spontaneous abortion (includes midwives and nurses). In midwives, increase in risk of spont. Abortion in those who reported frequent shortage of staff OR 1.64 (1.09-2.48) - more apparent in part-time staff. N2O showed no association with spontaneous abortion. N2O no association with late or early spont. abortions</td>
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<td>(Lawson et al., 2009)</td>
<td>Data from the US nurses health study. Sample size 101,281, 11,177 had a pregnancy, 9547 were willing to be involved in this study, 8461 responses were received with a response rate of 76%.</td>
<td>Cross-sectional study + **</td>
<td>Self-reported exposure data based on first trimester exposures collected on work schedule, average hours worked per week, how often lifted 25lbs or more, hours per day standing, hour per day exposure to anaesthetic gases, antineoplastic drugs, antiviral drugs, sterilising agents or x-rays. Collected data on risk factors for preterm birth including hypertension. Preterm birth was defined as less than 37 weeks from LMP, early preterm birth as 20 to less than 32 weeks gestation.</td>
<td>Multivariate analysis was carried out. The results identified that working less than 20 hours per week was associated with a lower risk of preterm birth (RR, 0.7, 95% CI 0.6-0.9), working at night was associated with early preterm birth (RR 3.0, 95%CI 1.4-6.2). From 11 cases, the study identified an increased risk after exposure to sterilising agents in the (RR 1.9, 95% CI 1.1-3.4) The authors suggest that this suggests an association between working nights an preterm birth. However, the study is based on self-reported information.</td>
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</table>
(Simcox et al., 2008) Sample = 128 nurses versus 559 office workers as a reference group

Cohort study + **

Outcome measures were low birth weight (<2500g and <3000g) and small for gestational age defined as birth weight in the lowest 10th percentile. Pre term delivery was defined as before 37 weeks.

After adjustment for confounding, OR for small for gestational age in nurses was OR=1.99, 95% CI 1.10-3.59 suggesting an increased risk in nurses.

<table>
<thead>
<tr>
<th>Risk to Fertility</th>
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<tr>
<td><strong>Author</strong></td>
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<tr>
<td>(Ahlborg et al., 1996)</td>
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</table>
3.2.11 Occupational Therapists

Three papers were identified that evaluated health in Occupational Therapists. The first was a cross-sectional study to identify determinants of occupational asthma in health care workers including nurses, physicians, respiratory therapists and occupational therapists in the US. (Delclos et al., 2007) (+ **) The data analysis on the study identified that being an occupational therapist was associated with bronchial hyper responsiveness. Unfortunately the analysis was carried out on the whole sample not just the occupational therapists thus it is unclear of the real impact amongst this occupational group.

A further two studies were identified which examined MSDs in Occupational Therapy Students. (Leggat et al., 2008, Smith et al., 2006) (+ **). The studies of first, second and fourth year students identified that musculoskeletal symptoms appear to be a problem for occupational therapy students. The risk of symptoms was significantly associated with being a fourth year student and computer usage. Unfortunately third year students were on placement at the time of the research and the study would have benefited from identifying their level of symptom reporting. However, the two studies do identify that the level of reporting of musculoskeletal symptoms is high in students and has implications for the burden of symptoms being taken into practice.

Evidence Statements

There is moderate evidence from one paper that there is increased risk of bronchial hyper responsiveness in occupational therapists. Further research is required to corroborate this. (**)  

There is moderate evidence from two papers using the same sample group that musculoskeletal symptoms occur in trainee occupational therapists with increased risk of symptoms over the 4 year study period. (**)


Table 12. Health Issues in Occupational Therapists

<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
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<tbody>
<tr>
<td>(Delclos et al., 2007)</td>
<td>Risk of occupational asthma in a random sample of US health workers. 5600 in sample, response rate of 65% leading to n=3650. Respondents were 941 nurses, 966 occupational therapists, 741 physicians and 879 respiratory therapists.</td>
<td>Cross Sectional study</td>
<td>Bronchial symptoms questionnaire with additional questions on physician diagnosed asthma. Development of an asthma risk job exposure matrix. All methods trialed and validated before the study</td>
<td>Prevalence rates of asthma were 4.5% in occupational therapists, 7.3 % in nurses, 5.6% in respiratory therapists and 4.2% in physicians. Prevalence rates for bronchial hyper responsiveness were 18% in physicians, 29.2% in nurses, 30.3% in respiratory therapists and 33.7% in occupational therapists. Associations were found between reported asthma and being a nurse (OR 1.89, 95% CI 1.18-3.003), instrument cleaning (OR 2.07, 95% CI 1.29-3.33), building surfaces (OR 1.87, 95% CI 1.14-3.05) and the use of adhesives/glues/solvents in patient care (OR 1.67, 95% CI 1.01-2.77). Associations were found between bronchial hyper responsiveness and being an occupational therapist (OR 2.32, 95% CI 1.8-2.98), being a nurse (OR 1.95, 95% CI 1.51-2.52), being a respiratory therapists (OR 1.82, 95% CI 1.16-2.85), instrument cleaning (OR 1.40, 95% CI 1.09-1.79), building surfaces (OR 1.74, 95% CI 1.34-2.26), aerosolized medicines (OR 1.57, 95% CI, 1.22-2.01) and adhesives/solvents/gases used in patient care (OR 1.86, 95% CI 1.42-2.44). The authors suggest more research is required to confirm these results.</td>
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<tr>
<td>(Leggat et al., 2008)</td>
<td>Undergraduate OT students in Australia, years 1, 2 and 4. n=150, response rate 95.7%, n=144</td>
<td>Cross Sectional study</td>
<td>Questionnaire survey using the Nordic Musculoskeletal Questionnaire, plus additional questions on demographics, history of musculoskeletal ill health and time on a computer per week</td>
<td>64.6% reported low back pain in the previous 12 months, 46.9% reported low back pain lasting more than 2 days and 24.5% reported seeking treatment. Fourth year students were more likely to report low back pain (OR 2.26, 95%CI 1.03-5.26), students spending more than 16 hours on the computer were more likely to report low back pain (OR 5.46, 95% CI 1.12-33.14), those involved in team sports were more likely to seek medical treatment (OR 2.65, 95%CI 1.04-6.80). The study raised concern about pre-existing conditions on entry to training as 45.5% of first year students reported back pain in the previous 12 months, 34.1% reported back pain lasting more than 2 days , 29.5% reported affecting daily lift and 20.5% sought treatment.</td>
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Undergraduate OT students in Australia, years 1, 2 and 4. N=150, response rate 95.7%, n=144

Cross Sectional study

Questionnaire survey using the Nordic Musculoskeletal Questionnaire, plus additional questions on demographics, history of musculoskeletal illness, health and time on a computer per week

The 12-month prevalence of MSDs was neck (67.4%), shoulder (46.3%), and upper back (39.5%). 75.5% reported an MSD in at least one of these body areas. Risk factors for musculoskeletal disorders included for the neck, being a fourth year student (OR 10.9, 95% CI 3.2-43.8) and using a computer for more than 5 hours per week (OR 5.0, 95% CI 1.3-21.5). Shoulder symptoms associated with being over 21 (OR 3.7, 95% CI 1.4-10.2) and more than 5 hours computer usage per week (OR 4.7, 95% CI 1.2-9.6). Upper back symptoms were associated with being a fourth year student (OR 3.3, 95% CI 1.2-9.6). Risk factors identified with reporting symptoms in any region were being a fourth year student (OR 8.4, 95% CI 2.3-36.5)
3.2.12 Paramedics

Twelve papers were obtained and reviewed in relation to the health of paramedics. Five papers were excluded from the review due to not fitting with the inclusion criteria.

General Health Risks

General health risks in ambulance personnel were systematically reviewed by Sterud et al (2006) (**). The review identified that ambulance workers had an increased risk of early retirement when compared to manual workers, non-manual workers and nurses. The main causes identified were musculoskeletal disorders, circulatory disorders and mental disorders. The review also reports on a Swedish study that found a higher rate of permanent medical impairment in paramedics however this was a small sample. Further health issues identified from the review included that ambulance personnel have higher blood pressure, self-reported musculoskeletal symptoms and poorer physical health than the general population. With regard to mortality data the review has identified that ambulance workers have a slightly higher standardised mortality rate compared with the general population and a significantly higher risk of ischemic heart disease. Furthermore they are at increased risk of a fatal accident compared to the working population. Although this study is of moderate quality and a systematic review it does highlight the difficulties in summarising international research based on different measurement methodologies. However it does suggest that ambulance personnel are more prone to musculoskeletal disorders, circulatory disorders and mental health problems.

Evidence Statements

There is moderate evidence from one systematic review that ambulance personnel are more at risk of specific health problems including musculoskeletal disorder, circulatory disorders and mental health problems than the general population (**)

Assault Aggression and Violence

Only one pilot study was identified that evaluated workplace violence towards paramedics. (Boyle et al 2007) (--). The study used a convenience sample with an overall response rate of 25%. The results identified that 82.4% had been subjected to verbal abuse and 37.6% physical abuse. Further evidence showed was that 11.5% reported verbal abuse at least once a week and 18.8% reported physical abuse a few times. This study was poorly rated but does give an indication that violence against paramedics does occur.

Musculoskeletal

Musculoskeletal symptoms were examined by four papers identified within the review. Sterud et al (**) surveyed all Norwegian ambulance personnel and compared the data with population level data on health. The results identified that the prevalence of musculoskeletal disorders in the sample was 43.6%; however no further information is
given. The paper also identifies that musculoskeletal symptoms were associated with help seeking behaviour from a physiotherapist or chiropractor, a general practitioner or other physician. The focus of the paper was on mental health symptoms but it does give an indication of the prevalence of musculoskeletal symptoms within this group.

One study was reviewed that examined the relationships between prevalence and incidence of job related illness or injury in emergency medical technicians (Studnek et al 2007) (+**). The study collected both cross-sectional and longitudinal data. The analysis identified that the prevalence of job related illness or injury was 9.4%. The incidence of job related illness or injury at 1 year was 8.1 per 100 staff compared with 2.9 per 100 for nurses and 1.8 per 100 staff for hospital workers. For reported back problems, the injury incidence was 12.5 per 100 workers. From regression analysis, significant associations were found between increasing call volume, a history of back problems and working in an urban environment and reporting of illness or injury.

Hignett et al (2007) (+**) evaluated two different types of occupational health management on musculoskeletal disorders in ambulance personnel. The two management types were EAAT which was policy based approach with in house service and EMAS which was a traditional medical model approach with a contracted out service. The study identified that both services had a haphazard approach to referring patients which impacted on time for treatment in the first 4 weeks post injury. The study highlights issues more with the health service provided than management of musculoskeletal disorders.

Jones and Hignett (2007 (+**) evaluated three different methods of loading ambulances in paramedics using an observational methodology in a field study, postural assessment by REBA and questionnaire survey to identify the main risks in handling patients. The study identified that the use of tail-lifts to load and unload patients was the least risky method. Although the study did not measure the impact on health of loading and unloading patients, the method used identified the best way for both patient and paramedic.

There is a lack of detailed information available regarding the prevalence of musculoskeletal disorders in ambulance personnel, previous research has identified that they are more at risk of musculoskeletal symptoms than the general working population (Sterud et al 2006).

**Evidence Statements**

There is moderate evidence that paramedics are at an increased risk of musculoskeletal symptoms compared to the general working population (**)  

There is moderate evidence that paramedics have an increased risk of injury or illness compared to nurses and other hospital workers (**)  

**Shift Work**

One paper examined the impact of shift work in paramedics. The paper was the development and testing of a model but did not identify any particular health impacts apart from the issue that psychological symptoms impact on health symptoms and vice versa.
### General Health Risks

<table>
<thead>
<tr>
<th>Author</th>
<th>Study Type and Quality</th>
<th>Population</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Sterud et al., 2006)</td>
<td>Systematic Review + **</td>
<td>Searched for empirical literature on: Medline, Mapbase, PsychINFO, CINAHL, ISI Web of Science Including only original studies, after 1966</td>
<td>Systematic Review</td>
<td>Ambulance workers relatively higher risk of permanent medical impairment and early retirement on medical grounds than other occup groups; main causes of retirement were musculoskeletal and circulatory disorders. Three studies reported that amb workers have higher blood pressure, more self-reported MSDs and physical health problems than general population. Three other studies showed higher physiological arousal, salivary cortisol response &amp; noradrenalin and adrenalin levels when on call for more severe compared to less severe incidents. Two studies suggest higher risk of mortality in amb compared to gen. pop esp. ischemic heart disease and all cancers (compared to national avg). Overall could not make a clear conclusion on health status in amb service.</td>
</tr>
<tr>
<td>Author</td>
<td>Study Type and Quality</td>
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<td>Study Outcomes</td>
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<tr>
<td>Boyle et al., 2007</td>
<td>Cross sectional Study</td>
<td>Rural and metropolitan paramedics</td>
<td>Pilot study questionnaire</td>
<td>Verbal abuse (82.4%) - rural 79%, metro 86.9%, female 88.7%, male 80% Theft (14.9%) - rural 12.2%, metro 18.7%, female 14.8%, male 14.9% Intimidation 54.5% - rural 53.4%, metro 56.1%, female 61.7%, male 52.4% Physical abuse (37.6%) - rural 32.4%, metro 44.9%, female 45.9%, male 34.8% Sexual Harassment (16.5%) - rural 10.8%, metro 24.3%, female 37.7%, male 9.5% Sexual assault (4.3%) - rural 1.4%, metro 8.4%, female 11.5%, male 1.6% sexual harassment gender p-value &lt;0.0001; rural vs. metro p-value 0.007 sexual assault gender p-value &lt;0.002; rural vs. metro p-value 0.015</td>
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<tr>
<td>Author</td>
<td>Study Type and Quality</td>
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<td>Study Outcomes</td>
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<tr>
<td>(Hignett et al., 2007)</td>
<td>Qualitative Study + **</td>
<td>East Anglian Ambulance NHS Trust (EAAT) East Midlands Ambulance Service NHS Trust (EMAS)</td>
<td>Assessing impact of two different types of OH management on MSD management: EAAT - policy based on functional-centred approach with in-house OH service; EMAS - traditional medical model with externally contracted OH service Interviews with management (review of policies and procedures - self assessed compliance to faculty of Occup Medicine guidelines Semi-structures (piloted before use) interviews with staff - purposive sampling based on location (rural, urban), injury length of absence, age and sex Analysed with NVIVO</td>
<td>EAAT MSD management concurred with 88% FOM guidelines EMAS concurred with 53% of guidelines EAAT - 3 differences between expected recovery path and experienced 1. expected: initial contact with OH; experienced: self certificate or GP 2. expected: attending functional restoration programme; experienced: seek alternative treatment 3. expected: six session sof physiotherapy; experience: rarely all six and often came months after initial injury EMAS - 4 differences 1. expected: management referral to OH first point of contact; experienced: none referred 2. expected: NHS physiotherapy pathway; experienced: used private specialists none referred for physio by OH 3. expected: absentees recieve return-to-work OH consultation within 10 days experience: setting up meeting could take up to 1 month 4. expected: provision of modified duties upon return to work; experienced: haphazard and varied from station to station Both systems differed from expected and converged due to EAAT staff taking longer to be referred to physio and EMAS staff receiving earlier treatment through private practice For both services: 12% reported absences due to MSDs; median total days off per MSD injury = 17; mean number of periods off work per MSD injury 1.9(EAAT) and 1.3(EMAS) Both should monitor and audit implementation of their guidelines</td>
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</table>
From field data: tail loader had more links per task for unloading and loading (19.3 links tail loader, 11.6 easi-loader, 10.5 hydraulic ramp) unloading (9.7 links tail loader, 7.4 hydraulic ramp, 3.9 easi-loader) issues loading/unloading - ramp and winch (manual handling and posture, equipment misuse and vehicle layout) easi-loader (manual handling, force exertion, posture) tail lift (posutre, control location, equipment misuse, user equipment interface intolerance, user error) Questionnaire outcome: patient and operator safety highest ranking design issue
Average REBA scores: easi-loader (score 8.1, action category 3) tail lift (score 5.8, action category 2) ramp/winch (score 5.7, action category 2)
Overall decided tail lift was best system since performed best on patient and operator safety
(Sterud et al., 2008) Cross Sectional Study

All Norwegian operational ambulance personnel included: officers, middle managers and managers (ambulance work >50% of workload)

Compared to general population (full-time employed 20-60 year olds from Nord-Trondelag County of Norway in HUNT 2 study 1995-97

Karolinska Sleep Questionnaire for sleep disturbance
10-item version of Subjective Health Complaint (only used the item scores, not complaint duration)

Need for Recovery after Work Scale

Help seeking behaviour last 12 months - Ambulance seeks help less than general population except for chiropractors (GP: OR 0.7 (0.6-0.8 p<0.001)); (Other physician: OR 0.9 (0.8-1.1 n.s.)); (Physiotherapist: OR 0.7 (0.6-0.9 p<0.05)); (Chiropractor: OR 2.5 (2.0-3.2 p<0.001)); (Occ. health pract: OR 0.1 (0.05-0.11 p<0.001)

Prevalence MSD - all 43.6 (41.1-46.9); men 44.9 (41.7-48.3); women 43.2 (37.1-48.8) Prevalence disturbed sleep - all 6.3 (4.9-7.7), men 5.9 (4.3-7.4) women 7.8 (4.6-11.0) Mean need for recovery - all 2.5 (2.3-2.7) men 2.5 (2.3-2.7) women 2.4 (2.1-2.8) GP - OR (those with MSD compared to those without adjusted for age and gender) 1.7 (1.5-1.9 p<0.001); Other physician OR 1.5 (1.4-1.8 p<0.001); Physiotherapist/chiropractor OR 1.9 (1.6-2.2 p<0.001); psychologist/psychiatrist OR 1.7 (1.3-1.4 p<0.001); Occ. Health pract OR 0.7 (0.4-1.1) Disturbed sleep: GP OR 1.6 (1.4-1.8 p<0.001); other physician OR 1.3 (1.2-1.5 p<0.001); physio/chiropractor OR 1.2 (1.0-1.4 p<0.01);

psychol/psychiatrist OR 2.2 (1.5-3.3 p<0.001); occ health pract OR 1 (0.7-1.4) Need for recovery: GP OR 1.4 (1.3-1.6 p<0.001); other physician OR 1.4 (1.2-1.5 p<0.001); physio/chiropract OR 1.3 (1.1-1.5 p<0.001); psychol/psychiatrist OR 1.6 (1.2-2.3 p<0.001); occ health pract OR 0.7 (0.4-1.0)

MSD (adjusted for all other symptoms, age and gender) - GP OR 1.5 (1.3-1.7 p<0.001); Other physician OR 1.4 (1.2-1.6 p<0.001); P/C OR 1.9 (1.6-2.3 p<0.001); P/P and occ health pract not sign

Disturbed sleep (same as above) GP OR 1.2 (1.0-1.4 p<0.05); P/P OR 1.9 (1.1-3.2 p<0.05) all others not sign

Need for recovery (same as above) P/C OR 1.2 (1.5-1.9 p<0.05) all others not sign
**USA. Cross-sectional and longitudinal survey. Yearly response rates vary between 28-34%. 7,187 baseline questionnaires - 6,241 eligible, 5,096 with complete data. Response rate for follow-up 34.2% N=2,461 of that 1,862 eligible.**

40-question core survey designed by EMS experts, researchers and educators. Sent out yearly (sample drawn each year from more than 280,000 registered EMTs-stratified random sampling). If not injured at baseline then they were eligible for follow-up 1 year later.

**Cross-sectional results - 9.4% prevalence of job-related illness/injury. Adjusted Ors for risk of injury/illness work-related: Very low call volume [OR 0.50(0.26,0.97)] and low call volume [OR 0.50(0.33,0.76)] associated with decrease in risk compared to moderate call volume and high call volume [OR 1.57(1.10,2.24)] and very high call volume [OR 2.15(1.33-3.49)] assoc with increased risk. Working for more than 5 years compared to never/less than 1 yr associated with higher risk - 5-10 yrs OR 2.59(1.70,3.93), >11 yrs OR 2.11 (1.34,3.32). Risk reduced in those with no reported back problems: OR 0.37(0.28, 0.49) compared to back problems, females had higher risk OR 1.45(1.08, 1.93) compared to males. Lower risk with intention to stay OR 0.60 (0.37,0.97) compared to leaving. Longitudinal results - 1-yr incidence of illness/injury = 8.1 per 100 EMS professionals per year. Four baseline variables predicted increased odds for occurrence of injury in a 2nd consecutive year of follow-up: self reported back pain (no pain OR 0.58(0.61-0.94) compared to yes), community size (urban OR 2.79(1.65-4.72) compared to rural), certification level (paramedic OR 1.59(1.01,2.51) compared to basic), call volume (low call volume OR 2.00(1.08-3.71), high call volume OR 2.18(1.25-3.80), very high OR 3.12(1.40-6.97) compared to moderate).**

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### Shift work Fatigue Management

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<tr>
<th>Author</th>
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<th>Population</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Pisarski et al., 2002)</td>
<td>Cross sectional study + *</td>
<td>Sample = 162, response rate 37%, N=60 Paramedics, 52 males and 8 females all working extended shifts</td>
<td>Physical Health Questionnaire, GHQ, Work-family Conflict Scale, 24item coping scale</td>
<td>Identified within the model that there was a direct pathway from psychological symptoms to physical symptoms (0.39) and from emotion-focused avoidance coping to physical symptoms (0.09)</td>
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</table>
Six studies were identified in the search process with regard to the health of pharmacists. After screening, 2 studies were included in the review. Both studies relate to substance use in pharmacists with one study surveying pharmacists and one reporting on programmes for return to work.

Kenna et al (2004) (+*) assessed drug use in four groups including pharmacists, nurses, dentists and physicians. This questionnaire survey identified that within the pharmacists studied, 58.7% reported using a non-prescribed drug once in their lifetime (including alcohol and cigarettes). This figure was not different in comparison with dentists (60.2%), nurses (63.6%) or physicians (59.6%) but all reported higher use compared to a national household data survey (55.1%). These data were reported as frequencies and no further analysis was carried out. For past year prevalence of drug use, 12.8% of pharmacists reported any use and this was higher than the other groups studied. The study identified that pharmacists reported a greater use of minor opiates, anxiolytics and stimulants compared to other health professionals. Although no major differences in health professional group are identified, the lack of statistical analysis impacts on the quality of this paper.

Mcnees et al (1990) (+*) carried out a postal survey 38 treatment programmes and 13 State Boards involved in treating pharmacists for substance abuse. The study identified that two thirds of pharmacists enrolled in treatment programmes had either been identified by the board or reported by another professional. Further methods of identifying impairment were through voluntary disclosure (19.8%), family or friend (10%) or through law enforcement (5%). The most effective programmes were those that took a multidisciplinary approach including identification of problem, verification, intervention, evaluation and after-care. The paper identified that 49.3% of participants completed the programme, a relapse rate of 12.1% and 88.1% were returned to practice. Although the quality of the study is limited, it did identify that programmes can be developed to return impaired individuals to practice.

**Evidence Statement**

There is limited evidence from one paper that pharmacists use non-prescribed drugs but this does not appear to be significantly higher than other health professionals (*)

There is limited evidence from one paper that multidisciplinary treatment programmes can enable impaired pharmacists to return to work (*)
<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Kenna et al., 2004)</td>
<td>N=697 with a response rate of 68.7%, n=479 nurses (129), dentists (113), pharmacists (133) and physicians (104).</td>
<td>Cross Sectional study</td>
<td>Previously used questionnaire including demographic information, description of drug use including a measure of drug abuse not described</td>
<td>Identified that 58.7% of pharmacists reported using a non-prescribed drug at least once. No difference in pharmacists compared to other health groups for total illicit drug use. However a greater number reported lifetime use of minor opiates, anxiolytics and stimulants. 12-month prevalence of drug use was highest for pharmacists. Study identifies that use of drugs by pharmacists is not different to other health professionals. Suggests more intensive education for pharmacists</td>
</tr>
<tr>
<td>(McNees et al., 1990)</td>
<td>38 representatives for each treatment programme and to 13 state boards for pharmacists. 40 responded to the study</td>
<td>Cross Sectional study</td>
<td>Postal survey summarising information about attendees at treatment programmes</td>
<td>Two thirds of pharmacists in treatment programmes were identified by the board, or another professional (27.5%). Programme effectiveness was found to be best for programmes that were recovery-oriented multidisciplinary consisting of identification, verification, intervention, evaluation, treatment and after-care. Not all programmes did this. For programme effectiveness, 49.3% completed the programme, a relapse rate of 12.1% and 88.1% returned to practice</td>
</tr>
</tbody>
</table>
3.2.14 Physiotherapists

A total of 11 papers were identified in the search processes but on completion of data extraction, 10 were included in the review with regard to the health of physiotherapists. All 10 papers were in relation to musculoskeletal health outcomes.

Nyland et al (2003) (**) examined low back pain in physiotherapy students in Australia. The study identified a lifetime prevalence rate of 69.2% for low back pain in the sample, one-month prevalence of 63% and a 7-day prevalence of 28%. The analysis of the results identified that low back risk increased significantly in final year students. One-month prevalence of low back pain was associated with more than 20 hours looking down most of the time and more than 20 hours treating patients per week. Seven day prevalence was associated with more than 20 hours per week treating patients. The study highlights that low back pain was reported regularly by the sample. The authors suggest that there is a clear need to train undergraduates in low back pain risk reduction and management.

For practising physiotherapists, the research has identified lifetime prevalence rates of between 55-91% for any musculoskeletal problems. (Cromie et al., 2000, Glover et al., 2005, Nyland et al., 2003, West et al., 2001) Further investigation has identified that the 12 month prevalence for low back pain ranges from 22-62.5%, upper back pain 11-41%, neck pain 20-47.6% and shoulder pain, 10-22.9% (Cromie et al., 2000, Glover et al., 2005, West et al., 2001) These variations may be due to the different measuring methodologies used.

One study, Campo et al (2008) (+**) calculated incidence rates from a one year cohort study of US physiotherapists. The total one year incidence rate of any musculoskeletal problems was 20.7%. For specific body areas this was calculated for the lower back as 6.6%, hand and wrist 5.3%, neck 4.9%, shoulder 3.2% and upper back 2.4%.

Thumb problems were evaluated by two papers that identified that the lifetime prevalence of thumb problems in physiotherapists ranged between 23.3-91% (Glover et al., 2005, McMahon et al., 2006, Snodgrass et al., 2003) Risks factors associated with thumb pain included working in orthopaedic out-patients, manual therapy, trigger point therapy and inability to stabilise the thumb. (McMahon et al., 2006) Attributions for thumb pain were identified as the performance of manual techniques and 88% of participants in one study had changed their method of working. (Snodgrass et al., 2003)

Risk factors identified within the research include for low back pain, patient handling, bent or twisted postures and job strain. (Campo et al., 2008) Significant risk factors identified for hand or wrist injuries included joint mobilisation procedures, soft tissue work (Campo et al., 2008, Cromie et al., 2000) and treating more than 10 patients per day. (Campo et al., 2008) When evaluating the period of injury, most injuries reported occur in the first 5 years of professional practice (Glover et al., 2005, West et al., 2001)

When examining the impact of injury versus site of injury, approximately one third sought other professional help for low back pain, 25% for neck pain, 20% for shoulder pain and 15% for upper back pain (Glover et al., 2005, West et al., 2001) However, 61% in a UK survey sought informal treatment from another colleague whereas only 39% sought help from a GP. (Glover et al., 2005)
Attribution for symptom causation was evaluated by Glover et al (2005). The study identified that for low back injuries; the main sources attributed by respondents were bending or twisting the back, lifting or transferring patients, working in the same position for long periods, repetitive tasks and reaching or working away from your body. However the study also identified that few physiotherapists took early retirement or left the profession as a result of injury (1%).

Cromer et al (2002) (-*) carried out a qualitative study to examine the culture of physiotherapy in relation to musculoskeletal injuries. Eighteen participants who had left the profession were interviewed and a number of issues identified. These included the issue of not expecting to be injured as a therapist, perceptions of themselves as caring and hardworking and the conflict between continuing to work as a caring professional even when injured. Although this study is not high quality it does identify some of the background issues occurring between expectations and occurrence of injury.

Evidence Statements

There is moderate evidence from one study that low back pain is regularly reported in physiotherapy students and is associated with increased duration of studying (**)

There is strong evidence that physiotherapists self-report a high level of musculoskeletal symptoms (***)

Risk factors associated with musculoskeletal symptom reporting include handling patients, manual therapy and high patient loads. (**)
<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
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<tbody>
<tr>
<td>(Campo et al., 2008)</td>
<td>Physiotherapists. Randomly sampled from APTA, N=1500 at baseline. Total of 952 fitted criteria and on follow-up at one year, response rate of 93%, n=882.</td>
<td>Cohort study + **</td>
<td>Nordic Musculoskeletal Questionnaire plus further developed questions, exposure assessment made, psychosocial factors reviewed and case definition of over 8 weeks duration of symptoms made.</td>
<td>183 physical therapists reported 243 incident cases (20.7%). Female therapists, older therapists and more experienced therapists were more likely to report an MSD. Risk factors for low back pain were carrying out patient transfer 6-10 times per day (OR 2.40 95% CI 1.03-5.62); bent or twisted postures more than 10% of the working day (OR 3.46 95% CI 1.01-11.81) and job strain (OR 3.52, 95% CI 1.38-4.61). Risk Factors for hand and wrist symptoms included joint mobilisation for 6-10 patients (OR 4.51, 95% CI 1.2-17.00), joint mobilisation for 10+ patients (OR 7.95, 95% CI, 2.18-29.04); and soft tissue work for 6-10 patients (OR 9.22, 95% CI 2.01-4.20) and 10+ patients (OR 13.62, 95% CI 2.91-63.81)</td>
</tr>
<tr>
<td>(Cromie et al., 2002)</td>
<td>Physiotherapists, 18 registered and injured physiotherapists who had changed their career after injury</td>
<td>Qualitative study - *</td>
<td>Interviewed post injury on attitudes and beliefs</td>
<td>Identified that therapists did no expect to be injured in the process of their work, care of patients meant that they often carried out behaviours which were not good for them but good for the patient.</td>
</tr>
<tr>
<td>(Cromie et al., 2003)</td>
<td>Physiotherapists, 18 registered and injured physiotherapists who had changed their career after injury</td>
<td>Qualitative study + *</td>
<td>Interviewed post injury on claiming for workers compensation</td>
<td>Identified that 6 of the participants had claimed workers compensation and found it negative, frustrating and unpleasant. Those who had claimed were concerned about future job prospects and confidentiality.</td>
</tr>
</tbody>
</table>
Physiotherapists. Random sample from all registered therapists (3,296), 25% sampled, N=824, response rate 67.9%, n=536.

Postal questionnaire developed based on Nordic Musculoskeletal Questionnaire. Also measures of symptom severity, attribution, risk reduction measures taken and treatment. 91% of participants reported pain at some point in their lifetime. 12-month prevalence was for low back pain, 62.5%, neck pain 47.6%, upper back pain, 41.0% and thumb pain 33.6%. Significant associations were found between type of therapy practiced and musculoskeletal symptoms.

Physiotherapists, 10% of registered physiotherapists, physiotherapy assistants and trainees, N=3661 members of the CSP. Response rate of 73.4%, n=2593

Career prevalence of MSDs was 68%. 12 month prevalence was 58% with 42% reporting musculoskeletal symptoms lasting 3 days or more. Most significant injury identified was to the lower back (44%), 32% received their most significant injury in the first 5 years after graduating.

Physiotherapists, postal questionnaire survey of 10% of registered Australian physiotherapists. N=1562, response rate = 62%, n=961.

Postal questionnaire of reported thumb problems, questionnaire was developed, piloted and validated during study. 95% reported thumb problems. Risk of thumb problems were significantly associated with working in orthopaedic out-patients (Or 3.2, 95% CI 1.8-5.8), manual therapy between 1-100% of working time; trigger point therapy (OR 2.3, 95% CI 1.7-3.0), joint hypermobility and inability to stabilise the thumbs (OR 4.2, 95% CI 2.9-5.9).

Physiotherapists with and without thumb pain. N=20 in thumb pain group and N=20 in non-pain group.

Participants all worked for 20 hours per week. Measures included demographic data, pain group assessment, working environment, joint laxity, strength and mobilising hand position and force. Those with thumb pain reported a high frequency but low severity of pain. Hand strength was greater in the non-pain group. Thumb mobility was greater in the pain group.
<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Study Design</th>
<th>Data Collection</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nyland et al., 2003</td>
<td>Physiotherapists. Students who enrolled in 2001 in one university in Australia. 28 participants helped develop and test instruments, N=346 in survey. Response rate was 72%, n=250.</td>
<td>Cross Sectional study</td>
<td>Used low-back pain section of Nordic Musculoskeletal Questionnaire, BMI and occupational exposures.</td>
<td>Prevalence rates were 69.2% lifetime, 63.2% in the past 12 months, 44.4% in the last month and 27.6% in the last year. Students in fourth year had a significantly raised risk of low back pain than other groups (P&lt;0.05). Being 20 or 21 years old was associated with all back pain (lifetime etc) as was studying more than 1. One month prevalence of low back pain was associated with more than 20 hours looking down (OR 2.4, 95% CI 1.4-4.1) and more than 20 hours treating patients (OR 1.9, 95% CI 1.1-3.6). Seven day prevalence was associated with more than 20 hours treating patients (OR 2.1, 95% CI 1.1-4.1).</td>
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<td>Rugelj, 2003</td>
<td>Physiotherapists attending an annual meeting. N= 170, response rate of 78%, n=133.</td>
<td>Cross Sectional study</td>
<td>Self-completed questionnaire including demographic information, 5 multiple choice questions on musculoskeletal symptoms.</td>
<td>Lifetime prevalence reported at 73.3% for back pain. Handling of patients was reported to be the main trigger of low back pain occurrence</td>
</tr>
<tr>
<td>West et al., 2001</td>
<td>Physiotherapists, 445 questionnaires mailed in Queensland, Response rate 53%, n=217.</td>
<td>Cross Sectional study</td>
<td>Self-administered questionnaire with part A being demographic information and part B on work-related injuries. No further descriptions given.</td>
<td>55% had experienced a work related injury at some point. This was low back pain (16%), neck pain (15%) and hand 12%. 9% reported knee injuries aggravated but not caused by work. 56% of initial injuries occurred within the first 5 years of beginning physiotherapy. After injury the commonest treatment was to modify techniques (86%) and seek physiotherapy (77%). Job risk factors identified as problematic included working in the same position for long periods (58%), working with static postures (51%), continuing to work while injured or hurt (51%), repetitive tasks (50%), performing manual techniques (50%).</td>
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</table>
3.2.15 Radiographers

A total of 11 papers were reviewed in relation to ill health in radiographers. Five were excluded from the review as they did not fit the inclusion criteria.

From the 6 papers included in the review all were in relation to musculoskeletal disorder. One of papers was a review (not systematic) and five of the papers were cross-sectional in design using questionnaires to assess symptoms. The studies identified that there is a high prevalence of work related self-reported symptoms among radiographers with a 12-month prevalence of low back symptoms (59.6%), shoulders (21.2%), and neck symptoms (19.7%). (Lorusso et al., 2007a) (+**). This study also identifies associations between age and low back pain, high physical exposure and low back pain, neck pain and hand/wrist pain.

Further studies examined the musculoskeletal health of sonographers and identified that a high prevalence of musculoskeletal symptoms within this group but again this was via self-report questionnaire (Crawford et al., 2002, Vanderpool, 1993, Wihlidal et al., 1997) (*). Although the results indicate a high prevalence the studies are beset with methodological issues including poor response rates, low participant numbers and the use of non-validated outcome measures. The research to date does indicate an issue where further high quality research is required.

Evidence Statement

There is evidence that the prevalence of musculoskeletal symptoms for those involved in radiography is higher than other occupational groups and this is associated with age and high physical exposures at work. (**)

There is evidence that there is increased reporting of musculoskeletal symptoms in sonographers. (*)
<table>
<thead>
<tr>
<th>Author</th>
<th>Population</th>
<th>Study Type and Quality</th>
<th>Outcome Measures</th>
<th>Study Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawford et al., 2002</td>
<td>N=14 sonographers in obstetrics and gynaecology</td>
<td>Cross Sectional Study</td>
<td>The Rapid Upper Limb Assessment was used to assess 6 participants during the complete scan process. Nordic Musculoskeletal Questionnaire was used as a structured interview with participants</td>
<td>When scanning patients the sonographers has to twist the neck and trunk in order to view the monitor. 12 month prevalence of symptoms were for the neck (50%), shoulders (57%), wrists/hands (50%) and lower back (50%). 7-day prevalence was for the neck (36%), shoulders (21%), wrists/hands (21%), upper back (36%) and lower back (36%). Small study</td>
</tr>
<tr>
<td>Lorusso et al., 2007a</td>
<td>214 x-ray technologists in Italy. Response rate 94.8%, N=203</td>
<td>Cross Sectional study</td>
<td>Outcome measures were a questionnaire survey including demographic questions, assessment of physical workload, Nordic Musculoskeletal Questionnaire.</td>
<td>Prevalence of musculoskeletal complaints in the last 12 months were low back (59.6%), shoulder (21.2%), neck (19.7%). Association was found between age and low back pain (OR 2.4 95% CI 1.26-4.59); high job demands and neck pain (OR 7.07 95% CI 3.21-15.61); high job demands and shoulder pain (OR 2.38 95% CI 1.17-4.82); high physical exposure and low back pain (OR 3.25 95% CI 1.75-6.04), neck pain (OR 2.48 95% CI 1.03-5.98) and hand/wrist pain (OR 3.59 95% CI 1.17-10.98)</td>
</tr>
<tr>
<td>McCague et al.,</td>
<td>Sample = 49, response rate 73.4%, N=36</td>
<td>Cross Sectional study</td>
<td>Questionnaire survey of sonographers in Ireland. Questionnaire not described.</td>
<td>Outcomes were measured in low symptoms (&lt;10), moderate symptoms (10-19) and high symptoms. Back symptoms associated with scans taking longer than 10 minutes, higher symptoms associated with not taking breaks.</td>
</tr>
<tr>
<td>Morton et al., 2008</td>
<td>Review</td>
<td>Review</td>
<td>Review</td>
<td>Generally 93% of sonographers at least one episode of one or more symptoms. Most common sites are the neck, shoulder, upper arm, upper back, lower back, forearm, elbows and legs. General prevalence in 15 studies ranged from 63% to 98.7%. Review recommends changes in job design, use of risk assessments, change equipment design and raising awareness through education.</td>
</tr>
</tbody>
</table>
Between 1 and 4 musculoskeletal symptoms suffered by 58% of respondents. Only 3% clinically diagnosed.

88.5% reported had experienced or were experiencing work-related symptoms. Women had sign more work-related symptoms than men (r = 0.43 p < 0.05). Younger more work related symptoms (r = -0.22 p < 0.05), shorter height more work-related symptoms (r = -0.24 p < 0.05), lighter weight more work-related symptoms (r = -0.34 p < 0.05). Negative correlation between work-related symptoms and job satisfaction (r = -0.21, p < 0.05) (all 11% dissatisfied had workplace injury). 35 out of 85 with workplace injury received diagnosis from doctors most common diagnosis - tendinitis (45.7%), epicondylitis (25.7%), bursitis (25.7%), other (25.7%), ganglions (17.1%), carpal tunnel syndrome (14.3%). Age positively correlated to ganglions (r = 0.21 p < 0.05). BMI positively correlated to tendinitis (r = 0.25p < 0.05). Scan hand positively correlated to ganglions (r = 0.34p < 0.05) (don't state which hand). Average yrs FT work positively correlated to tendinitis, bursitis, epicondylitis (r=0.27,0.25,0.21, respectively p<0.05), top 3 activities in which levels of involvement and contribution to injury were most strongly correlated - sustained twisting of the neck and trunk (r=0.59), performing mobile studies (r=0.57), repetitive twisting of neck and trunk (r=0.53), two major interventions that helped reduce or eliminate work-related symptoms were treatment (physical therapy, chiropractic care, massage, etc) and adjustment of worksite.
3.2.16 Ill Health Reported in Comparison to the General Population

The review has identified that there has been limited research carried out in comparing the incidence of ill health in health practitioners and the general population. There is evidence that health care workers have a higher incidence of dermatitis than other occupational groups. One paper identified that nurse have a higher incidence and prevalence of occupational asthma than other health care workers and biomedical scientists have a higher incidence rates when compared to other health care workers.

For cancer risks, there was contradictory evidence that incidence is not increased apart from having a higher risk of haematological malignancies. Dentists were found to be at an increased risk of specific cancers. However, these studies were low quality and further research is required to corroborate this information.

Although a lot of research has been carried out in musculoskeletal disorders in health practitioners the vast majority of it is self-reported and validated instruments such as the Nordic Musculoskeletal Questionnaire were not always used. As such care must be taken in interpretation of the results in that there are high levels of reporting of musculoskeletal symptoms but further high quality research is required to both measure musculoskeletal health and identify what workplace interventions can improve this.

Where comparisons have been made with the general population this has been based on clinical diagnosis where there is a clear diagnostic pathway; hence the difficulty in comparing self-report symptoms to the general working population.

3.3 UNIQUE FACTORS THAT CONTRIBUTE TO THE HEALTH PROBLEMS OF HEALTH PROFESSIONALS

The health care practitioners environment is varied as are workplace exposures depending on which health profession individuals are working within. A number of general issues have been identified within the review. These include musculoskeletal issues, shiftwork, exposure to violence and presenteeism in patient care.

With regard to patient handling, specific groups including health care workers, nurses and midwives, occupational therapists, physiotherapists, paramedics and radiographers were exposed. Patient handling and carrying out manual therapy is still attributed as a major contributor to the symptoms reported and the burden of musculoskeletal problems exists on entry to training and increases during training. (Glover et al., 2005, Leggat et al., 2008, Mitchell et al., 2008, Nyland et al., 2003, Smith et al., 2006, Smith et al., 2003b, Smith et al., 2004) Although it is appreciated that different work processes may be used in different countries, the burden of reporting across all nations surveyed is high. The use of equipment and awkward or forced postures also related to musculoskeletal symptom reporting in sonographers and the dental professions.

Although shift work is not specific to health practitioners, the requirements for shift work specifically night work will have an impact on health. These areas have been widely researched both in and outside of healthcare and continued monitoring of cancer risks is ongoing.
Exposure to violence, again, is not unique to health practitioners. The research highlights patterns in this including nurses and younger and less experienced staff being more at risk and departments including psychiatry and emergency having higher incident rates. Thus measurement has identified risk factors but there is little interventional research available to reduce the risk among specific groups.

The issue of presenteeism was also raised by several papers including physicians going to work when unwell and physical therapists treating patients when suffering a musculoskeletal problem. Professionalism within healthcare is required to be at a high level but coming to work when unfit to do so must be addressed. The care of patients is vital to all health practitioners; ensuring fitness for work is an essential component of that care.

Health care workers were identified as having an increased incidence of dermatitis in comparison with the general population. The requirements to maintain cleanliness for infection control are vital in relation to patient safety. Thus clear information and support must be given to staff should symptoms occur and how to treat or manage such symptoms.

Exposure to antineoplastic drugs was identified as a potential risk factor for nurses and perhaps is due to work process rather than general exposure. This area does require further research to assess safe handling of such substances.

Risks during pregnancy were identified as a potential area of risk but what is unclear is whether this is due to shift work or due to the tasks involved in being a nurse. Again further research is required to compare occupational groups and identify any risks for pregnant workers.

Although the research identified has informed the level of specific health risks there is currently very little interventional research that has identified ways of effectively reducing ill health in health practitioners. Furthermore, the lack of interventional research gives little in the way of guidance on what interventions are effective in improving ill health.
3.4 IMPACT OF PRACTITIONERS POOR HEALTH ON SERVICE QUALITY, DELIVERY AND PATIENT SAFETY

No papers were identified that examined the impact of poor health on service quality, delivery and patient safety. Although sickness absence was covered by two papers in the review, this identified that physicians and dentists were more likely to attend work. Data from the CBI in 2008 identifies that the public sector has higher levels of absence than the private sector. (Lusted et al., 2008) This has been broken down into different groups within the public sector including health and social service care where the average was 12.6 days compared to central government where the average was 8.4 days over 12 months. However, these data cover both health care and social care and are not analysed sufficiently to identify the impact in health care. Further details on percentage of sickness absence is available from the Department of Health where in 2005, sickness absence rates ranged from 2.5% to 6% (Department of Health, 2005)

At the current time there is no further information about how poor health within health practitioners impacts on service quality, delivery and patient safety. It is self-evident that higher rates of sickness absence will impact on service delivery either through a reduction in the number of staff available or the use of temporary staff. The impacts have yet to be measured.

3.5 HEALTH SEEKING BEHAVIOURS OF THE HEALTH PRACTITIONER

With regard to health seeking behaviours there was limited data available with the majority of the research being among physicians. Three studies identified that physicians were not always registered with a general practitioner and this ranged from 42% to 95% of physicians surveyed. (Forsythe et al., 1999, Kay et al., 2004, Pullen et al., 1995) However, from the Forsythe paper, 63% of GPs and 59% of consultants had not consulted their GPs in the previous 12 months.

Two studies identified that self-prescription by physicians did occur (73-75%). (Pullen et al., 1995, Rosvold et al., 2002) However, the self-prescribing rates were 76% for antibiotics and 2% for narcotics. (Pullen et al., 1995) When examining following guidelines for their own health, it has been identified that they are not always followed but a reason for this may be inability to access services at the times required. (Forsythe et al., 1999) Two further studies identified that physicians underused screening services available to them (Kay et al., 2004, Tyssen, 2007)

With regard to taking sick leave, there is research to support that health practitioners attend work when ill themselves. (Baldwin et al., 1999, Waldron, 1996) This includes working with colds and respiratory symptoms thus making themselves a source of ill health. When seeking help, Toyry et al (2000) identified that physicians consult other medical professionals less often than other occupational groups. This was also found by Krusun et al (2005) in nurses. When physiotherapists were asked about treatment for musculoskeletal injury, 61% reported that they would seek informal treatment from another colleague or 39% from their general practitioner. (Glover et al., 2005)

Thus there is evidence of physicians self-reporting, self-prescribing and not making use of the services available to them. This may be due to the reason suggested involving access to such services. There may also be issues of concerns of confidentiality in seeking medical help across all health practitioners. Presenteeism does appear to be an issue amongst health practitioners however further research is required to identify if this is within specific occupational groups. The use of informal consultations with
colleagues has also been highlighted and it needs to be identified if this is due to lack of time to access services or again fear of breaches of confidentiality.

3.6 INTERVIEWS WITH THE REGULATORS

Contact was made with each of the nine regulators to request a telephone interview with them regarding management of ill health within their fitness to practice framework. Several attempts were made to contact all nine regulators and semi-structured interviews were carried out with six including the General Medical Council (GMC), the Nursing and Midwifery Council (NMC), the Health Professionals Council (HPC), the Pharmaceutical Society of Northern Ireland (PSNI), the General Chiropractic Council (GCC) and the General Osteopathic Council (GOstC). Both the GCC and the GOstC did point out that the majority of their members did not work within the NHS but some worked in partnership.

3.6.1 Comparison of the caseloads and approaches taken by the regulators

The caseloads of the regulators interviewed are presented in Table 17.

Table 17. Caseloads for Individual Regulators

<table>
<thead>
<tr>
<th>Regulator</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Medical Council</td>
<td>220 in the last year</td>
</tr>
<tr>
<td>Nursing and Midwifery Council</td>
<td>130 in the last year</td>
</tr>
<tr>
<td>Health Professionals Council</td>
<td>59 cases received but only 3 considered by the panel 2005-07 on re-registration</td>
</tr>
<tr>
<td>Pharmaceutical Society of Northern Ireland</td>
<td>3-4 in the last year</td>
</tr>
<tr>
<td>General Chiropractic Council</td>
<td>1 in the last year</td>
</tr>
<tr>
<td>General Osteopathic Council</td>
<td>2 in the last 4 years</td>
</tr>
</tbody>
</table>

As can be seen from the table, the caseload varies for each of the regulators. However, the interviews identified that the referral to the regulator varies by professional group. Where registration is required on a biennial basis and a health declaration required, this allows individuals to come forward with any health concerns. However, the PSNI reported that although most of their cases come forward voluntarily, this is usually at the behest of a colleague. Other regulators report that the majority of investigations are from referrals mainly through employers.

When breaking down the type of health issues, the GMC and NMC identified that these were more likely to be mental health problems rather than physical health problems. For the HPC which requires biennial registration, the health problems identified included seeking advice on a health condition (44%), cancer (11%), musculoskeletal health problems (27%), neurological health problems (16%) and psychological problems (16%).
3.6.2 Areas of good practice

A number of areas were highlighted as good practice from the interviews. The importance of maintaining confidentiality during the investigation process where individuals can continue to work was seen as important. However, where there is a serious risk, interim orders can be used to maintain the safety of patients.

The use of mentors or supervisors during follow-up is seen as a key part of the rehabilitation process. Maintaining contact with the practitioner throughout a period of restriction is vital in the process.

The use of independent medical practitioners to assess health is again seen as very positive practice. In some cases the use of two independent medical reports can ensure that practitioners are given a fair assessment.

Continuous training for those involved in mentoring or supervising practitioners again is seen as good practice. This allows supervisors the opportunity to meet and discuss with others and should allow the development of skilled supervisors or mentors in enabling practitioners to stay at or return to work.

3.6.3 Challenges in handling health concerns within the fitness to practice procedures

The regulators were asked what challenges they found in dealing with health in fitness to practice. A number were identified including the variety of cases they had to deal with. Two of the regulators identified that there appear to be difficulties in deciding where there is a health or a social issue. For example, is alcohol misuse a health matter or should it be dealt with via other streams in fitness to practise.

The interviews also identified the difficulties in dealing with some illnesses which are episodic by nature. This can be a variety of health issues both physical and mental.

There are also challenges found in deciding on the nature of work that individuals are capable of. One example given was that an individual may not be able to work in a busy emergency department but may still be able to work in other areas of medicine.

Finally, one regulator identified issues with the decision making process for fitness for work. Although medical assessors are qualified to make these decisions, there was concern raised about the insights they have with regard to the work that the practitioner was involved in. There has to be clear identification of the specific roles carried out by individuals rather than generic job descriptions to ensure they are fit to practise.

3.6.4 Practitioner confidentiality and safeguarding patient care and public protection

Where a case for health is being taken through the fitness to practice routes, all immediate investigates are kept confidential between the regulators and the practitioner. Where further information is required, permission has to be sought from the practitioner for that information to be obtained. Again, information during the investigation will not be fed back to anyone without permission.
The use of interim orders in more severe cases can be implemented to ensure the safety of the public and maintaining patient care.

3.6.5 Supervision and treatment arrangements

All the regulators interviewed could take the route of setting conditions on practice or suspending registration. Where conditions, undertakings or restrictions are set, there is a need for ongoing supervision of the practitioner. Both the GMC and NMC have systems set in place for this. Using the GMC as an example, supervisors are specifically trained on start-up, attend local meetings with other supervisors and are required to attend regional meetings and report to the GMC. Where there is concern about the abilities of the supervisors they will be replace. The GMC report that the supervisors role is crucial in rehabilitating the physician back to work.

Assessments and tests can also be carried out with the practitioner where they have been required to abstain from substances. Other restrictions might include only working in a specific area, limiting hours.

3.6.6 Training for those treating and supervising health professionals with health problems

In-house training for supervisors was carried out by the GMC and NMC. This was identified as continuous training meeting with other supervisors regularly for case discussion and the requirement to attend regional meetings.

For other regulators, all health assessments are carried out by independent medical practitioners; these were Occupational Physicians, Psychiatrists or other specialists as required. For physical health issues, Occupational Physicians were commonly asked to assess fitness for work in health practitioners.

3.6.7 Information transfer routes

During any investigations of health practitioners, information is kept confidential. However, on completion of any investigation, decisions are publicly available. It was stressed that the detail may not be made public but the overall decision will be. The NMC reported using a circular on restrictions on practice. On further investigation, the majority of the regulators make available fitness to practice decisions on their websites these include health decisions and misconduct decisions.

3.6.8 Requirements for health declarations upon registration

All the regulators required health declarations to be made when entering the profession. In addition, the GMC require a health declaration on completion of medical school with a further declaration from the medical school. This is followed by a health statement at the end of foundation training. The NMC require a declaration of health and good character, good character signed off by educational establishment. The HPC ask member to register every two years and they are asked to submit a health declaration at this point.
3.7 REFERRAL, FOLLOW-UP CARE, REHABILITATION AND REINTEGRATION

Within the review no papers were identified with regard to these issues. This may be due to issues of confidentiality in returning individuals to work on a case by case basis. The vast majority of the research reviewed was based on cross sectional studies that by their design, do not allow a follow-up period.

3.8 EXAMPLES OF GOOD PRACTICE WITH REGARD TO IDENTIFICATION, PREDICTION, PREVENTION AND MANAGEMENT

No examples were identified with regard to prediction, prevention and management of ill health within the research reviewed. This is as the majority of the research is measuring baseline levels in relation to particular workplace exposures and there is little available following this up post any intervention.

3.9 HOW HEALTH CONCERNS ARE CURRENTLY MANAGED

From the review component, no research was identified that examined management of health concerns. At the moment, health issues reported will either be dealt with by the practitioner’s GP or occupational health provider. However, the management of health conditions will be on a case by case basis and further work is required to summarise the levels and causes of ill health in the current health practitioner population.

Where health was found to impact on fitness to practice, this would be dealt with by the regulator of the specific profession. With regard to this process, one vignette has been published from the GMC and this is in Appendix 2.

3.10 PARTICULAR NEEDS OF MINORITY GROUPS

No papers were identified within the review that identified any particular needs of minority groups. Although Dement et al (2004) and Pompeii et al (2008) identified that black and female healthcare workers have higher rates of musculoskeletal workers compared to their colleagues. However, this may reflect how the population is structured within US healthcare where female and black workers are more exposed to occupations with high physical demands.

3.11 PREDISPOSITION AND RISK OF PRACTITIONERS IN TRAINING; HEALTH, DENTAL

There was little research available with regard to predisposition and risk in practitioners in training. High levels of musculoskeletal symptoms were found to be associated with trainees in nursing, physiotherapy and occupational therapy which increased during the training period. However what is unclear from this research is what the burden of musculoskeletal symptoms are on entry to the profession.
4 DATA GAPS

The review has identified a wide range of health issues in health practitioners, some of which have been widely researched (musculoskeletal) and some where potential risks have been identified but more research is required to improve the evidence base. The data gaps identified within the research are summarised below.

There is lack of high quality research in this area including longitudinal studies to identify causal relationships between occupational risk factors and ill health.

There is lack of good quality intervention studies measuring either health outcomes or economic benefits.

There is no evidence to evaluate the impact on quality of service or patient care through ill health in health practitioners.

There is minimal sickness absence data.
5 REFERENCES


Hignett S. (2003). Intervention strategies to reduce musculoskeletal injuries associated with handling patients: a systematic review. Occupational and Environmental Medicine; 60:


Michael R, Jenkins HJ. (2001a). Recovery from work-related trauma by perioperative nurses: the effects of social and personal resources. Collegian (Royal College of Nursing, Australia); 8: 8-13.

Michael R, Jenkins HJ. (2001b). Work-related trauma: the experiences of perioperative nurses. Collegian (Royal College of Nursing, Australia); 8: 19-25.


APPENDIX 1 PAPERS THAT COULD NOT OBTAINED FOR THE REVIEW

The papers listed below could not be obtained through the British Library


Supporting ill doctors

Having your registration restricted as a result of ill health can be a traumatic experience. Read one doctor's experiences of the GMC’s procedures and the support and advice that is on offer.

I first came into contact with the GMC in 2001 following a conviction for being drunk in charge of a vehicle while in my second house officer post. I was surprised as the police had told me when arrested that the GMC would not find out.

I was shocked, frightened and too ashamed to tell anyone, especially my family, friends and work colleagues.

I was subsequently examined by two psychiatrists and placed under the supervision of a medical supervisor, who was supportive. I was deep in addiction to alcohol, with little insight into my condition, and being treated for depression.

I never drank at work, but got drunk to unconsciousness almost every night, turning up to work the following day still drunk and smelling of alcohol. My undertakings stated I should abstain from
alcohol. I did not manage to abstain for more than a day, but my liver function tests were normal and I lied to my medical supervisor and clinical tutor about my alcohol use.

I thought I could continue to get away with it and remained in denial of the damage to my mental health, my patients and my career. The following year on rotation I was found to be drunk at work.

My workplace supervisor, who had until then believed me to be abstinent, reported this to the GMC, and I was suspended from work. My mother had recently died and I used this as an excuse to continue drinking which became out of control.

The GMC wrote to me in terms which I found unhelpful and hard to understand at the time. I no longer have these letters, but they were worded in strong terms with bold letters and emphasis on how I was in breach of my undertakings.

I was seriously unwell, with alcohol the only way I knew to silence the suicidal thoughts. I didn’t know who to ask for help. I was lucky. My hospital provided funds for a treatment centre, although after six weeks on discharge I relapsed and was once again charged with drink-driving.

After two more months I went back into treatment and following this stayed sober. I remember being afraid of both the impending court case and the GMC hearing. However, in treatment I felt safe.

After six months of agreeing not to work (but not suspended), I appeared before the Panel for the first time. My medical defence union would not provide legal services as my membership had expired, so the GMC provided me with a contact for legal representation.

I borrowed the money for a solicitor. To my surprise I was given conditional registration. The hearing was very formal but I felt elated with the outcome. I went back to work, and stayed sober.

Over the next three years I appeared annually at GMC hearings, which became easier and felt less formal the longer I stayed sober. I felt comfortable enough not to have legal representation.

I began to see the GMC as less threatening and punitive as I began to accept I had a mental condition and that the GMC has a duty to protect patients. It became less uncomfortable for the Panel to discuss my mental health with me, and whilst it was hard for me to take afternoons off work to see my supervisor and treating psychiatrist I made the time to do so.

I have found the most difficult and shaming aspect of all this has been to inform future employers of my registration status, although nearly all my employers have reacted with support.

After three years, I started missing appointments and stopped attending AA meetings. I stopped taking my antidepressants, and soon became dependent on opiates. After a year of this I was admitted to a psychiatric ward.

Three weeks after discharge I appeared at a further hearing at the GMC, and this time my dad came with me. I recall feeling for the first time that they acknowledged I was a person with an illness, and they weren’t there to punish me.
I was suspended for six months, although I expected longer. At the next hearing I was given conditional registration. I have now returned to work and have remained clean and sober for 21 months.

Over the last two years, my experience with the GMC has been very different from 2001. I have been quite touched by supportive remarks in correspondence, and no longer fear hearings, resent drug testing or seeing my supervisor.

All healthcare professionals need somewhere to go and get help without fear, otherwise they get more unwell, putting patients more and more at risk. It must be enormously difficult to protect the public from a doctor who is incapable of working due to mental illness, but also supporting the doctor who, after all, is a person who needs help and support in a job of sometimes enormous pressure.

A new service is being piloted in London to redress the lack of specific services for doctors (and dentists) who have mental or physical health concerns or addiction problems of any severity.

When it comes to mental health or addiction problems, doctors sometimes suffer in silence which can have catastrophic consequences for both the doctor and their patient. Feelings of guilt, fear of jeopardising their career or simple embarrassment at having to adopt the 'sick role' have been given as reasons for doctors not approaching health services for help.

An additional factor is that doctors may feel embarrassment on treating a fellow practitioner, tending to approach a consultation like a clinical discussion, rather than allowing the sick doctor to be a patient.

The Practitioner Health Programme is a new, free, independent and confidential service supported by a multi-professional team of doctors, specialist nurses and counsellors. The programme began taking referrals in September 2008 and to date PHP has had a steady stream of practitioner-patients requiring help, support, treatment and onward referral.

The GMC has agreed a Memorandum of Understanding with the PHP which confirms the principle of the confidential service provided by the PHP and the protection, as far as possible, of confidential health information about individual doctors, subject to the GMC's statutory duty to protect patient safety.

Dr Clare Gerada, a general practitioner with mental health and addiction expertise, is the programme's Medical Director. She told GMCtoday: ‘Research has shown that doctors have higher rates of addiction and mental health problems than a matched population, with certain specialities (such as psychiatrists) being at even greater risk. Doctors are prone to self-diagnosis and treatment or to asking colleagues in corridor conversations “can I just ask your opinion on...”.’

Dr Gerada added: ‘We can offer assessment, treatment and ongoing management for a range of mental health, addiction and physical health problems affecting work. The programme should be seen as complementary to existing services and with your consent we endeavour to communicate with any other health professional you might be in contact with.’
In time, it is hoped that the service will be extended to other areas of the country. For now, the service is based in the south London transport hub of Vauxhall, so is accessible by bus, tube, train, boat, foot and bicycle.

For more information visit www.php.nhs.uk. For a confidential discussion about yourself or anyone you are concerned about please ring on 020 3049 4505.