Review of occupational hazards faced by physicians

**Requestor:** Occupational and Environmental Medical Association of Canada (OEMAC)

**Request prepared by:** Geneviève Cadieux, PhD, MD, resident in Public Health & Preventive Med.
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**Issue**

The Occupational and Environmental Medical Association of Canada (OEMAC) requested a review of occupational hazards faced by physicians.

**Literature search**

A search of Ovid MEDLINE® 1946-present and Ovid MEDLINE® In-Process and Other Non-Indexed Citations was conducted. The search was limited to (systematic and non-systematic) review articles published since January 1st, 2005. Language was restricted to English only. The detailed search strategy is available in the Appendix.

A search of the grey literature was conducted using Google search engine, and combinations of terms reflecting the following 3 concepts: (“workplace” OR “occupational”) AND (“risk” OR “hazard”) AND (“physician” OR “doctor” OR “healthcare provider” OR “clinician”)

**Methods**

First, we sought a framework to classify occupational health hazards. We modified the WHO framework,¹ and classified health workers occupational hazards into these 5 categories:

- Biological (e.g., infections),
- Chemical (e.g., glutaraldehyde, anesthetic gases),
- Physical (e.g., radiation, falls),
- Ergonomic (e.g., heavy lifting), and
- Psychosocial (e.g., shiftwork, violence, stress).
Next, we created a list of potential hazards that physicians may be exposed to in their workplaces (Table 1, column 1) using grey literature published by the World Health Organization (WHO), the US Department of Labour’s Occupational Safety and Health Agency (OSHA), the US Centers for Disease Control and Prevention’s (CDC) National Institute for Occupational Safety and Health (NIOSH), the European Commission Directorate-General for Employment, Social Affairs and Inclusion, and the Government of Alberta.

Then, we looked for review articles that addressed each of the various occupational hazards faced by physicians. To do so, we screened the articles resulting from our systematic search of the published literature using the following inclusion and exclusion criteria:

- The study population must include physicians; studies that focused on dentists and veterinarians were excluded; studies that focused exclusively on pregnant physicians were also excluded.
- The workplace setting must be located in a high-income country similar to Canada (i.e., OECD countries); studies focusing on humanitarian workers and military physicians deployed to non-eligible or combat settings were excluded.
- The study must report on at least one occupational hazard; studies that focus on health outcomes only (e.g., burnout) were excluded.
- The study must report on some quantitative measure(s) of prevalence, burden, or risk of hazard exposure or outcome; qualitative studies were excluded.
- The study must be a review (systematic or not); individual original studies were excluded.
- Studies evaluating interventions for or reviewing the management of physician occupational hazards were excluded.

For included studies, we abstracted the occupational hazard, physician specialty (study population), study design, outcome, and effect measure. Relevant information from included studies was entered in Table 1, on the line corresponding to the appropriate hazard.

**Results**

**Literature search results**
A total of 616 articles were identified through the Ovid MEDLINE® search. Of those, 44 were included in our review (Figure 1).

**Findings from the literature**
Table 1 summarizes the list of potential occupational hazards faced by physicians, as well as the evidence about these occupational hazards from the published literature. Empty cells indicate gaps in knowledge, i.e. physician occupational hazards for which there has not been a review article published since 2005.
Figure 1. PRISMA flow diagram of study selection

- 616 MEDLINE® search results
- 616 Underwent title & abstract screen
- 551 Excluded based on title & abstract screen
- 66 Underwent full-text screening
- 22 Excluded based on full-text screen
- 44 Included in our review
Table 1. Occupational hazards faced by physicians

<table>
<thead>
<tr>
<th>Hazards</th>
<th>Specialties</th>
<th>Outcomes</th>
<th>Studies</th>
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<tbody>
<tr>
<td><strong>BIOLOGICAL</strong></td>
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<tr>
<td>Blood-borne pathogens (e.g., HBV, HCV, HIV) (also see sharps injuries &amp; needle sticks section, under physical hazards)</td>
<td>All physicians</td>
<td>HCV prevalence</td>
<td>Westermann 2015:⁶ systematic review and meta-analysis of prevalence of HCV infection among healthcare workers compared to the general population</td>
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<td>Increased OR for HCV infection in HCWs relative to control populations, with a value of 1.6 (95% CI 1.03 to 2.42). Stratification by study region gave an OR of 2.1 in low prevalence countries; while stratification by occupational groups gave an increased prevalence for medical (OR 2.2) and for laboratory staff (OR 2.2). The OR for professionals at high risk of blood contact was 2.7.</td>
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<td>Risk of infection per needlestick injury for HIV, HBV, HCV</td>
<td>Lee 2005:⁷ review of the epidemiologic, economic, and quality of life Issues of needlestick injuries in the United States</td>
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<td>Droplet-spread pathogens (e.g., influenza, meningococcus, respiratory viruses, Legionella)</td>
<td>All physicians</td>
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<tr>
<td>Airborne pathogens (TB, varicella, measles)</td>
<td>All physicians; especially those who see patients before diagnosis is made (ED, primary care)</td>
<td>TB infection (LTBI) prevalence and active TB incidence</td>
<td>Menzies 2007:⁸ systematic review of the prevalence and incidence of TB infection and disease among HCWs in countries categorised by mean income. We included studies published in English since 1990 from high-income countries (HICs).</td>
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<td>Direct contact-spread pathogens (e.g., MRSA, scabies)</td>
<td>All physicians</td>
<td>MRSA carriage prevalence</td>
<td>Dulon 2014:⁹ systematic review of the prevalence of MRSA carriage amongst HCWs in non-outbreak situations</td>
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<tr>
<td>Indirect contact-spread pathogens</td>
<td>All physicians</td>
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<td>(e.g., norovirus, rhinovirus, RSV)</td>
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<td>Sporadic Creutzfeldt-Jakob disease (unclear mode of transmission)</td>
<td>All physicians</td>
<td>Sporadic Creutzfeldt-Jakob disease incidence</td>
<td>Alcade-Cabero 2012:10 Systematic review, as well as case series and case-control study of sCJD cases from countries participating in the European Creutzfeldt Jakob Disease Surveillance network (EuroCJD).</td>
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<tr>
<td>Emerging pathogens (with unknown mode of transmission, e.g. SARS, Mers-CoV)</td>
<td>Emergency medicine, internal medicine and subspecialties, primary care</td>
<td>Incidence and case-fatality ratio for MERS-CoV, Ebola, SARS, avian influenza.</td>
<td>Suwanrat 2015:11 review of risk factors, evidence of infection in HCPs, and prevention strategies with Middle East respiratory syndrome coronavirus, Ebola virus disease (Ebola), severe acute respiratory syndrome (SARS), and avian influenza.</td>
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<tr>
<td>Multidrug-resistant organisms (MDROs)</td>
<td>All physicians; especially hospital-based ones</td>
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<td>Lack of universal precautions</td>
<td>All physicians</td>
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<td>Inappropriate PPE</td>
<td>All physicians</td>
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<td>Lack of post-exposure follow-up/prophylaxis</td>
<td>All physicians</td>
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<td>Nano-technological products</td>
<td>Unclear</td>
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<td>CHEMICAL</td>
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<tr>
<td>Cold sterilizing agents (e.g., glutaraldehyde, peracetic acid, ethylene oxide)</td>
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<td>Low-level disinfectants (e.g., chlorine compounds, alcohols, quaternary)</td>
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<td>ammonium salts, iodophors, phenolic compounds, hydrogen peroxide</td>
<td>All physicians</td>
<td>Latex allergy (dermatitis, asthma or wheezing, rhinoconjunctivitis)</td>
<td>Bousquet 2006:12 systematic review and meta-analysis of latex allergy, comparing healthcare workers to the general population</td>
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<tr>
<td>Hand sanitizer</td>
<td>All physicians</td>
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<tr>
<td>Latex (e.g., gloves)</td>
<td>All physicians</td>
<td>Latex allergy</td>
<td>Wiszniewska 2014:13 (non-systematic) review to summarize the recent advances in occupational allergy as well as potential hazardous agents in healthcare workers (HCWs)</td>
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<td>Healthcare workers</td>
<td>Allergy, asthma</td>
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<td>Mercury (e.g., thermometers, manometers)</td>
<td>Primary care (nurses&gt;physicians)</td>
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<tr>
<td>‘Waste’ anesthetic gases (e.g., nitrous oxide, enflurane, isoflurane, sevoflurane, desflurane, halothane)</td>
<td>Surgical specialties, anesthesia</td>
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<td>Surgical smoke from laser or electrocautery (may contain benzene,)</td>
<td>Surgical specialties, anesthesia, dermatology,</td>
<td>Respiratory system: Nasopharyngeal lesions, sneezing, throat irritation,</td>
<td>Okoshi 2015:15 review of Health risks associated with exposure to surgical smoke for surgeons and operation room personnel</td>
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<td>Hydrogen cyanide, and formaldehyde)</td>
<td>Ophthalmology</td>
<td>Acute and chronic inflammatory changes in respiratory tract (emphysema, asthma, chronic bronchitis)</td>
<td>Walczak 2011: review of the risks associated with surgical smoke</td>
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<tr>
<td>Antineoplastic and hazardous drugs, including teratogenic drugs (NIOSH 2004 list is 6 pages long)</td>
<td>Health care workers exposed to these drugs</td>
<td>Reproductive health risks</td>
<td>Connor 2014: structured literature review and meta-analysis of 18 peer-reviewed, English language publications of occupational exposure and reproductive outcomes</td>
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<tr>
<td>Methyl methacrylate (cement-like substance used to secure prostheses to bone during orthopedic surgery)</td>
<td>Orthopedic surgery</td>
<td>Cancer, acute toxic events, congenital malformations, stillbirths, and spontaneous abortions</td>
<td>Dranitsaris 2005:17 systematic review and meta-analysis to test the hypothesis that oncology health care workers are at an increased risk of cancer, reproductive complications and acute toxic events</td>
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<td>Fire hazards</td>
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<td>Explosion hazards</td>
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<td>Personal care products, scents and fragrances (e.g., perfumes, deodorants)</td>
<td>All physicians</td>
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<td>Second-hand tobacco smoke (e.g., patient homes)</td>
<td>Physicians who do house calls</td>
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<td>PHYSICAL</td>
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<tr>
<td>Radiation (e.g., x-ray, fluoroscopy, CT, angiography, nuclear medicine scans)</td>
<td>Orthopedic surgery</td>
<td>Annual mean cumulative and per procedure radiation dose received at anatomical locations like eyes, thyroid glands and hands</td>
<td>Kesavachandran 2012:18 systematic review of the annual mean cumulative and per procedure radiation dose received at anatomical locations like eyes, thyroid glands and hands in orthopaedic staff</td>
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<tr>
<td>Cardiac catheterization operators (cardiologists and other)</td>
<td>Occupational radiation doses to operators performing cardiac catheterization</td>
<td>Occupational radiation doses to operators performing cardiac catheterization</td>
<td>Kim 2008:19 systematic comprehensive summary of the reported radiation doses received by operators due to diagnostic or interventional fluoroscopically-</td>
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<td>physicians) procedures</td>
<td>guided procedures, to identify</td>
<td>measured over protective shields, were 0.9 ±1.0 for the eye, 1.0 ±1.5 for</td>
<td>measured over protective shields, were 0.9 ±1.0 for the eye, 1.0 ±1.5 for the trunk, and 1.3 ±2.0 for the hand.</td>
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<td>Brain tumours</td>
<td>to evaluate whether there have</td>
<td>the trunk, and 1.3 ±2.0 for the hand.</td>
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<td>Fluoroscopy users</td>
<td>Radiation exposure</td>
<td>The estimated effective dose per case ranged from 1.7-56 Ksv for PCNL, 0.1-101 Ksv for vertebroplasty, 2.5-88 Ksv for orthopedic</td>
<td>The estimated effective dose per case ranged from 1.7-56 Ksv for PCNL, 0.1-101 Ksv for vertebroplasty, 2.5-88 Ksv for orthopedic extremity nailing, 2.0-46 Ksv for biliary tract procedures, 2.5-74 Ksv for TIPS, 1.8-53 Ksv for head/neck endovascular therapeutic procedures, and 0.2-49Ksv for ERCP. Overall, mean operator radiation dose per case measured over personal protective devices at different anatomic sites on the head and body ranged from 19-800 (median = 113) Ksv at eye level, 6-1,180 (median = 75) Ksv at the neck, and 2-1,600 (median = 302) Ksv at the trunk. Operators’ hands often received greater doses than the eyes, neck, or trunk.</td>
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<td>Exposed physicians</td>
<td>Cataracts, brain tumours</td>
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<td>Radiology staff</td>
<td>Radiation exposure</td>
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<td>Data for effective dose (E), and doses to the eyes, thyroid, hands and legs have been analysed. These data have been supplemented with local measurements to determine the most exposed part of the hand for monitoring purposes. There are ranges of 60–100 in doses to individual tissues reported in the literature for similar procedures at different centres. Ranges in the doses per unit dose-area product (DAP) are between 10 and 25.</td>
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Laser Surgical
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<th>Hazards</th>
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<th>Studies</th>
<th>Effects</th>
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<tr>
<td><em>(also see surgical smoke, under ‘chemical’ hazards)</em></td>
<td>specialties, dermatology, ophthalmology</td>
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<td>Electrical (e.g., faulty or damaged electrical equipment/machinery or wiring, damaged receptacles and connectors, unsafe work practices)</td>
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<td>Slips, trips, and falls</td>
<td>All physicians</td>
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<td>Needle-sticks and sharps injuries</td>
<td>Healthcare workers (likely more nurses than physicians)</td>
<td>HCV, HBV, HIV infection</td>
<td>Goniewicz 2012:24 review of needlestick and sharps injuries</td>
<td>The World Health Organization (WHO) estimates that more than two million health care workers experience the stressful event of a percutaneous injury with a contaminated sharp object each year (25-90% of them, however, remain unreported). These exposures result in about 16,000 infections with HCV, 66,000 with HBV and about 1,000 (200-5000) with HIV, which lead to about 1,100 deaths or significant disability.</td>
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<td>Tarantola 2006:25 review of pathogens transmitted in published cases of infection following accidental exposure to blood or body fluids in health care workers</td>
<td>Published case reports were found for a total of 60 pathogens or species: 26 viruses, 18 bacteria/rickettsia, 13 parasites, and 3 yeasts. The human immunodeficiency virus (HIV) or those of hepatitis B (HBV) or C (HCV) account for most of this risk in France and worldwide.</td>
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<td>Elder 2006:26 literature review on sharps injuries and occupational bloodborne virus transmission in health care in the UK</td>
<td>UK studies showed as much as a 10-fold difference between injuries reported through standard reporting systems (0.78–5.15 per 100 person-years) and rates estimated from retrospective questionnaires of clinical populations (30–284 per 100 person-years). National surveillance data from England, Wales and Northern Ireland gives a rate of 1.43 known hepatitis C virus or human immunodeficiency virus (HIV) transmissions to health care workers per annum. When extrapolated, this suggests an approximate rate of 0.009 such viral transmissions per 1000 hospital beds per annum.</td>
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<td>Cryogenic agents in cryosurgical procedures</td>
<td>Dermatology, gynecology clinics, primary care</td>
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<td>Lee 2005: review of the epidemiologic, economic, and quality of life Issues of needlestick injuries in the United States</td>
<td>The CDC reported that 384,325 percutaneous injuries occur in the hospital setting each year (IHCWSC, 2000). The annual incidence of needlestick injuries based on these self-reported injuries ranged from 23 to 103 needlestick injuries per 1,000 health care workers. The annual incidence was found to range from 13 to 46 needlestick injuries per 100 hospital beds. All studies indicated that the majority (42% to 74%) of reported needlestick injuries was suffered by nurses.</td>
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<td>Noise</td>
<td>Surgeons</td>
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<td>Katz 2014: review of noise in the operating room</td>
<td>In a study conducted by Wallace et al., 12 66% of anesthesiologists had abnormal audiograms and those younger than 55 yr had a hearing acuity significantly worse than the general population. In one study, 84% of anesthesiologists reported that the noise levels in their operating rooms negatively affected their work.</td>
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<td>ERGONOMIC</td>
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<td>General ergonomic (no specific hazard defined)</td>
<td>Health care workers</td>
<td>Neck, shoulder, and upper back musculoskeletal disorders</td>
<td>Long 2012: systematic review of risk factors and functional consequences of work-related upper quadrant musculoskeletal disorders in midwives, nurses and physicians</td>
<td>Job demands, demanding work schedules and physical exposures have the strongest associations with work-related upper quadrant musculoskeletal disorders. Functional consequences included widespread use of prescription and over-the-counter medications and major negative impact on activities of daily living.</td>
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<td>Median annual prevalence rates were 45% (neck), 40% (shoulder), and 35% (upper back). Methodological concerns included small sample size, inconsistency of outcome measures, likelihood of non-response bias, and low response rates.</td>
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<td>Hospital physicians</td>
<td>musculoskeletal complaints</td>
<td>Oude-Hengel 2011: systematic review of the prevalence and incidence of musculoskeletal complaints among hospital physicians</td>
<td>The frequently reported prevalence for hand and wrist pain was 8–33 and 0%, 17% for shoulder pain, and 9–28% for neck pain. Moreover, the annual prevalence of low back pain was between 33 and 68%.</td>
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<td>Repetitive movements</td>
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<td>Static and awkward postures (e.g. in Surgery &amp; surgical)</td>
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<td>PSYCHOSOCIAL</td>
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<td>Stress/stressors/stressful environment (e.g., overwork, understaffing,</td>
<td>ICU</td>
<td>Compassion fatigue, secondary traumatic</td>
<td>Van Mol 2015;1 systematic review of the prevalence of compassion fatigue and burnout among healthcare professionals in intensive care units</td>
<td>Two studies reported the prevalence of compassion fatigue as 7.3% and 40%; five studies described the prevalence of secondary traumatic stress ranging from 0% to 38.5%. The reported prevalence of burnout in the ICU varied from 0% to 70.1%.</td>
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<td>tight schedules, paperwork, intricate or malfunctioning equipment,</td>
<td>Emergency physicians</td>
<td>Burnout</td>
<td>Arora 2013;22 review summarizing the available literature on burnout among emergency medicine physicians</td>
<td>Emergency medicine has burnout levels in excess of 60% compared with physicians in general (38%). Both work-related (hours of work, years of practice, professional development activities, non-clinical duties etc.) and non-work-related factors (age, sex, lifestyle factors etc.) are associated with burnout.</td>
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<td>complex hierarchies of authority and skills, dependent and demanding</td>
<td>Palliative care</td>
<td>Burnout</td>
<td>Martins-Pereira 2011;33 systematic review of burnout in palliative care staff</td>
<td>Burnout levels in palliative care, or in health care settings related to this field, do not seem to be higher than in other contexts.</td>
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<td>patients, and patient deaths)</td>
<td>Oncology staff</td>
<td>Burnout</td>
<td>Sherman 2006;34 literature review of empirical peer-reviewed studies focusing on prevalence and correlates of burnout among oncology physicians and nurses.</td>
<td>Findings from a number of studies using validated measures and large samples suggest that prevalence rates for burnout and psychosocial distress are high among oncology staff, though not necessarily higher than in non-cancer-practice settings. A growing database has examined occupational (e.g., workload) and demographic (e.g., gender) factors that may contribute to risk, but there is less information about personal (e.g., coping) or organizational (e.g., staffing, physician-nurse relations) determinants or multilevel interactions among these factors.</td>
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<tr>
<td>Surgeons</td>
<td>Burnout</td>
<td>Oskroch 2016;35 systematic review of the nonphysical effects of a surgical career</td>
<td>Fifty-four studies (77%) assessed burnout with a reported prevalence of 12.6–58% (mean, 34.6%; SD, 11.0%). Workload was found to be the most significant contributor to burnout. Rates of psychiatric morbidity ranged between 16 and 37% (mean, 25.3%; SD, 6.6%) and rates of suicidal ideation, especially among more senior surgeons and those involved in malpractice, was higher than the general population. Depression was reported in 30.8–37.5% (mean, 33.9%; SD, 3.1%). All were strongly associated with workload and burnout, indicative of a likely synergistic effect. Other risk factors included junior status and younger age, poor professional relationships, work–home conflicts and poor work–life balance. Protective factors included marriage or spousal support, career satisfaction, autonomy, and academic practice.</td>
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<td>Anesthesiologists</td>
<td>Burnout</td>
<td>Rama-Maceiras 2015;36 review of recent studies regarding stress and</td>
<td>Almost 50% of anaesthesiologists scored positive for some of the burnout domains in different surveys, with one-third reporting high</td>
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<td>Burnout, suicide</td>
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<td>Gurman 2012:27 review of professional stress in anesthesiology</td>
<td>A Finnish study found that the on-call workload was the most important cause of anesthesiologists’ stress and fatigue. Studies regarding suicide and death rates among anesthesiologists are rather controversial (and methodologically flawed). Studies found that rates of suicide among anesthesiologists were similar to those among other doctors, but higher than the general population. Studies found that age-specific all-cause mortality rates were lower among anesthesiologists than the general population.</td>
</tr>
<tr>
<td>Dialysis staff</td>
<td>Burnout</td>
<td></td>
<td>Bohmert 2011:38 systematic review of psychological stress and strain in dialysis staff</td>
<td>The findings were heterogeneous and difficult to compare. The results indicate that employees in the dialysis sector are subject to moderate levels of stress and burnout. Job satisfaction seems to be good. The few studies that allowed for comparison with other professions did not reveal excess stress and strain in dialysis personnel.</td>
</tr>
<tr>
<td>Hospital-based physicians</td>
<td>PTSD</td>
<td></td>
<td>Robertson 2010:39 systematic review of exposure to traumatogenic events and PTSD among institutionally-based healthcare workers</td>
<td>Presentation of PTSD among institutionally-based workers appears comparable to data reported for emergency services staff.</td>
</tr>
<tr>
<td>All physicians</td>
<td>Substance abuse, mental health issues</td>
<td></td>
<td>Brown 2009:40 review of how common psychological conditions such as depression, stress, and burnout may drive disruptive behavior in the workplace and result in impaired patterns of professional conduct similar to what is seen with substance abuse</td>
<td>Approximately 13% to 20% of physicians suffer from depression in the US. In one survey of 700 physicians, 31% reported excessive anxiety, 60% experienced exhaustion and stress, and 48% suffered sleep disturbance. In a recent prospective cohort study of pediatric residents, Fahrenkopf et al found that depressed residents were &gt;6 times more likely than non-depressed residents to make medication errors. Even for physicians who are initially healthy, committing a medical error may secondarily lead to depression, starting a “vicious cycle”.</td>
</tr>
<tr>
<td>Violence (insults, threats and physical or psychological aggression; involving All physicians; especially emergency medicine,)</td>
<td>Injuries, emotional/psychological effects</td>
<td></td>
<td>Phillips 2016:41 review on workplace violence in various healthcare settings, including the prevalence across professions and</td>
<td>Nationwide, 78% of emergency department physicians reported being targets of workplace violence in the previous 12 months. Specifically, 75% reported verbal threats, 21% physical assaults, 5% confrontations outside the workplace, and 2% stalking. 89% of</td>
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<tr>
<td>Hazards</td>
<td>Specialties</td>
<td>Outcomes</td>
<td>Studies</td>
<td>Effects</td>
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<tr>
<td>---------------------------------------------</td>
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<td>-------------------------------------------------------------------------</td>
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<tr>
<td>patients/families or coworkers)</td>
<td>psychiatry,</td>
<td>potential risk factors</td>
<td>Benveniste 2005: we reviewed the relevant data on incidents involving violence collected using the Australian Incident Monitoring System (AIMS).</td>
<td>assaults against physicians were perpetrated by patients, 9% by patients’ family members, and 2% by patients’ friends. Rates of workplace violence against physicians in psychiatric settings may be even higher than those in emergency department settings.</td>
</tr>
<tr>
<td></td>
<td>geriatrics</td>
<td></td>
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<tr>
<td>Incidents, injuries</td>
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<td>Among 42,338 incidents reported from 1 July 2000 to 30 June 2002, 3621 (9% of all incidents) involved patients and physical violence or violent verbal exchange; staff injury was reported in 5% of cases. The proportion was higher in emergency departments (16%, with frequent involvement of mental health problems or alcohol or drug intoxication) and mental health units (28%).</td>
</tr>
<tr>
<td>Shiftwork, sleep deprivation</td>
<td>All physicians; especially interns and residents</td>
<td>Sleep disturbances, chronic fatigue,</td>
<td>Schaefer 2012: review of sleep and circadian misalignment for the hospitalist</td>
<td>When working at night or in the early morning, nearly 75% of shift workers encounter some amount of at-work fatigue and sleepiness. After the shift is over, objective assessments among rotating shift workers and interns demonstrated that day sleep is 1 to 4 hours shorter than night sleep. Chronic or recurring night shifts can therefore lead to chronic sleep loss. Medical errors among resident physicians during extended shift durations are well documented.</td>
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<tr>
<td></td>
<td></td>
<td>Physic</td>
<td>Olson 2009: overview of the impact of physician schedules on sleep/wake homeostasis and recent literature on the personal and professional effects of sleep loss on physicians</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ian performance, patient safety, motor-vehicle collisions, etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of access to psychotropic drugs (e.g., narcotics)</td>
<td>All physicians; especially anesthesiologists</td>
<td>Substance abuse, especially opioids</td>
<td>Garcia-Guasch 2012: review of substance abuse among anesthetists</td>
<td>Twenty-five percent of physicians followed for substance abuse/dependence are anaesthesiologists. Anaesthesiologists have a significantly higher rate of substance abuse by a factor of 2.7 when compared with other physicians. Anaesthesiologists were significantly more likely than their peers to report abuse of opioids. Opioids were implicated in 66% of cases overall. The next most frequent were anaesthesia induction agents (20%) and benzodiazepines (15%).</td>
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<td>Substance abuse and chemical dependency among anesthesiologists</td>
<td>Ismail 2010: review of substance abuse and chemical dependency among anesthesiologists</td>
<td>A survey done in the US between 1991 and 2001 showed 80% of American anaesthesiology residency programmes to have experience with impaired residents and 19% reported at least one pre-treatment fatality. In 2002, Booth et al found drug abuse among anaesthesia personnel to be 1.0% among faculty members and 1.6% among residents. Addiction to opioids is the most common, with</td>
</tr>
</tbody>
</table>
Hazard | Specialties | Outcomes | Studies | Effects
--- | --- | --- | --- | ---
Physician self-investigation, self-referral and self-treatment | All physicians | Not reported | Montgomery 2011:47 review of self-medication in physicians and medical students as an occupational hazard | Self-treatment and self-medicating was found to be a significant issue for both physicians and medical students. In 76% of studies, reported self-treatment was >50% (range: 12–99%). Overall, only one of two respondents was registered with a general practitioner or primary care physician (mean 5 56%, range 5 21–96). Deeper analysis of studies revealed that physicians believed it was appropriate to self-treat both acute and chronic conditions and that informal care paths were common within the medical profession.

Organizational climate/culture/environment | All physicians | Mental health outcomes including burnout, depression, and anxiety | Bronkhorst 2015:48 systematic review of studies on organizational climate in health care organizations and employee mental health outcomes | Perceptions of a good organizational climate were significantly associated with positive employee mental health outcomes such as lower levels of burnout, depression, and anxiety. More specifically, our findings indicate that group relationships between coworkers are very important in explaining the mental health of health care workers. There is also evidence that aspects of leadership and supervision affect mental health outcomes. Relationships between communication, or participation, and mental health outcomes were less clear.

Inpatient-based versus outpatient-based physicians | Burnout | Roberts 2013:49 systematic review and meta-analysis of burnout in inpatient-based versus outpatient-based physicians | Outpatient physicians reported more emotional exhaustion than inpatient physicians. No statistically significant differences in depersonalization or personal accomplishment were found. The existing literature does not support the widely held belief that burnout is more frequent in hospitalists than outpatient physicians.

All physicians | Burnout, physician performance | Montgomery 2011:50 review of the existing literature on organisational culture, burnout and quality of care in the healthcare sector | A study among 26 French ICU’s (Minvielle et al., 2008) highlighted the direct links between organisational culture, burnout and performance; with the absence of burnout being linked to quality of ICU organisation, and cultural values of the ICU’s being linked to organisational performance. In the USA, Kaissi (2003) found that medical group practices with more clinical support systems had lower error rates if they also had collegial cultures and/or cultures that valued quality of care.
Summary

Physicians are potentially exposed to a variety of hazards in their workplaces. These hazards can be classified into 5 broad categories: biological, chemical, physical, ergonomic and psychosocial. A review of the literature published in MEDLINE revealed that psychosocial hazards such as stress, sleep deprivation and shiftwork, workplace violence, and organizational culture have been the subject of much published research over the last 10 years. Other occupational hazards for which multiple reviews were recently published include: blood-borne pathogens and needlestick/sharps injuries, latex, antineoplastic drugs, surgical smoke, and radiation.

Hazards for which we did not identify recent review articles, potentially reflecting gaps in knowledge, included: droplet and indirect contact-spread pathogens such as influenza and norovirus, cold sterilizing agents (e.g., used on endoscopy equipment), low-level disinfectants, slips, trips, and falls, as well as repetitive movements and static awkward postures (e.g., in surgery).

References


Appendix A. Literature search strategy

**Databases:**
Ovid MEDLINE® 1946-present and Ovid MEDLINE® In-Process and Other Non-Indexed Citations

**Search run on:**
2016-06-06

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