

Physical and mental health of medical professionals: a systematic review

A saúde física e mental do profissional médico: uma revisão sistemática

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ABSTRACT The objective of this systematic literature review was to identify the main diseases that affect physicians worldwide, through an electronic survey in the Virtual Health Library (BVS) database based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Prisma) methodology. We analyzed 57 of the 374 scientific papers published on this subject between 2005 and 2015 in English, Portuguese, and Spanish. The findings showed that mental affections prevailed, highlighting the occupational exhaustion (burnout syndrome). Among the physical ailments, musculoskeletal affections prevailed.

KEYWORDS Occupational diseases. Burnout, professional. Occupational health.

RESUMO O objetivo desta revisão sistemática da literatura foi de identificar as principais doenças que acometem os médicos em todo o mundo, mediante uma pesquisa eletrônica na base de dados Biblioteca Virtual em Saúde (BVS) baseada na metodologia Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Prisma). Foram analisados 57 dos 374 artigos científicos encontrados sobre o tema em inglês, português e espanhol, publicados entre 2005 e 2015. Os resultados encontrados apontaram que os acometimentos mentais prevaleceram, destacando-se o esgotamento profissional (síndrome de burnout). Entre as doenças físicas, predominaram os acometimentos musculoesqueléticos.

PALAVRAS-CHAVE Doenças profissionais. Esgotamento profissional. Saúde do trabalhador.

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Introduction

Changes in the current medical job market, with new diagnoses and therapeutic technologies, the influence of the pharmaceutical industry, and the commodification of medical services have had consequences on the medical profession, such as the loss of autonomy, remuneration reduction, changes in the lifestyle, damages to physician's health and changes on ethical behavior. In connection to this, the media has been contributing to the distortion of the social image of health professionals, sensationally disclosing medical errors and overestimating technological resources with impact on the practice of the profession.

Furthermore, those professionals suffer from the influence of working conditions, such as the lack of infrastructure, lack of resources to meet the demand for care, long working hours, low remuneration, instability and insecurity (ASAIAG ET AL., 2010). Those bad conditions at the working place have motivated medical professionals to seek alternatives, thus causing a high turnover of physicians in some regions of the country (PIERANTONI ET AL., 2015). Moreover, medical specialization becomes inevitable, leading to a higher concentration at specialized centers with high complexity level and available resources for adequate medical practice (CARVALHO; SANTOS; CAMPOS, 2013).

It is also important to highlight the repercussions on the financial management of the private and public health systems due to absenteeism resulting from diseases, demotivation, work accidents and even unwillingness to work (JUNKES; PESSOA, 2010). Very little work is done with those professionals concerning the possibilities to handle those various professional situations. Because no preparation is provided in the academic environment, physicians are confronted with situations that surpass the professional limits and affect the personal level, thus causing illness.

This article presents the results of a systematic review aiming at identifying the main disorders affecting the physical and mental health of medical professionals.

Material and methods

This systematic literature review was carried out by means of a synthesis of evidence, critically interpreting the available relevant researches regarding medical professionals' health.

We have used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Prisma) method, consisting of a review of the Quality of Reporting of Meta-analyses (Quorum), which aims at improving the quality of systematic review and meta-analysis studies. Although this method has been designed for clinical randomized studies, it has been used by adapting it to the scope of all types of studies concerning the chosen theme.

At first, the study identified all types of studies in the format of scientific articles dated from 2005 to 2015, found in the electronic database Virtual Health Library (VHL), which includes the following databases: Lilacs, SciELO, Medline, PubMed, Cochrane. The articles analyzed were those written in English, Portuguese and Spanish. The descriptors used in the search carried out from August 26 to September 2, 2015, were: 'burnout, professional', 'occupational health' and 'occupational diseases', with 'physicians' as the main subject.

Referring to the descriptor 'burnout, professional', 194 articles were found and the analysis of titles and abstracts resulted in the selection of 113 articles. Nine of those 113 articles were not entirely and/or gratuitously available, and nine also occurred in the two other descriptors – 'occupational health' and 'occupational diseases'. Thus, 95 articles were examined, resulting in the selection of 27 articles to

be analyzed in this systematic review.

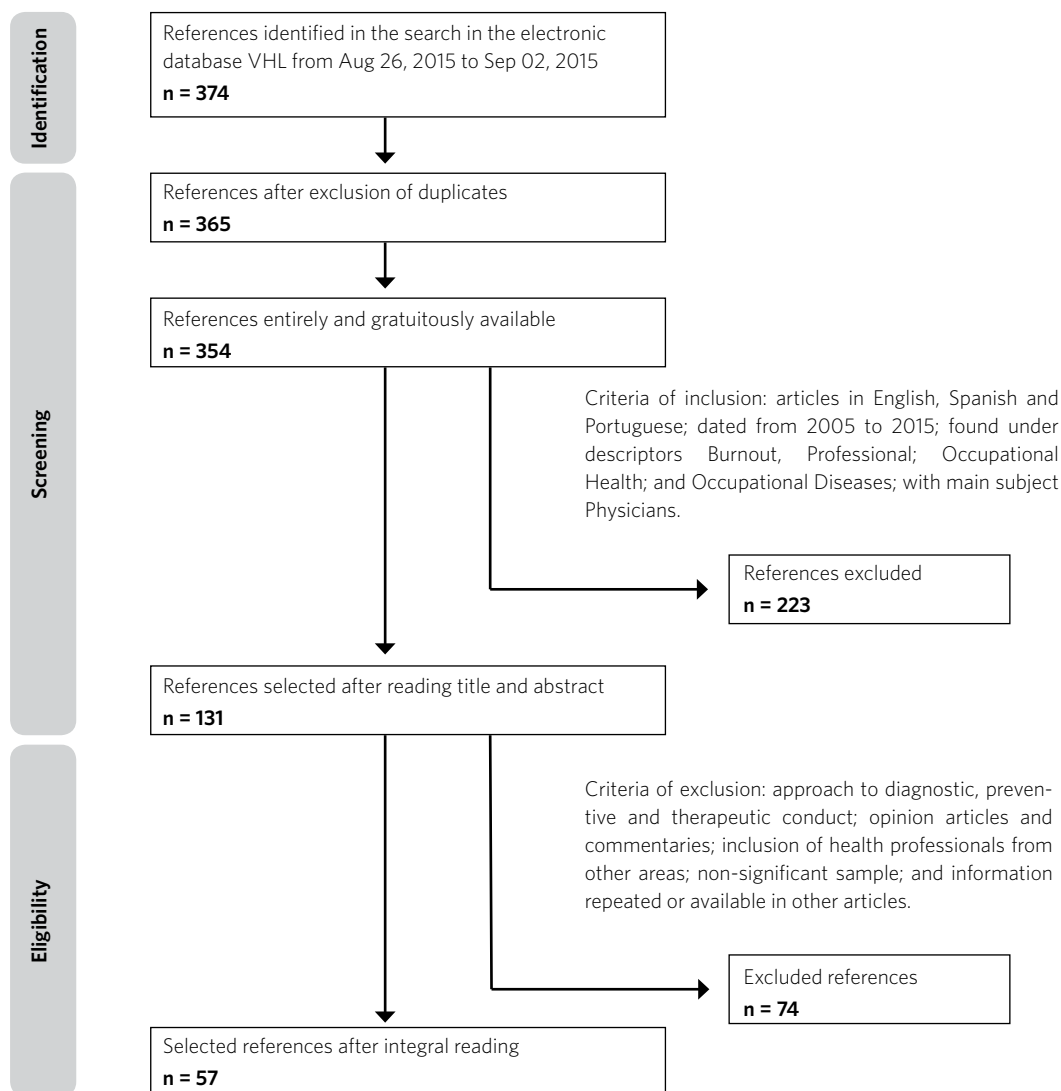
Regarding the descriptor ‘occupational health’, 92 articles were found and 12 were selected after the analysis of title and abstract. Once those 12 articles were fully read, two of them were excluded.

As to the descriptor ‘occupational diseases’, 88 articles were identified at the VHL database, of which 26 articles were selected due to their titles and abstracts. Gratuitous access to two of those articles was denied, thus 24 articles were fully read,

of which three were excluded, resulting in the selection of 21 articles.

The criteria of exclusion were: the approach to diagnostic, prevention, and therapeutic conduct; opinion articles and commentaries; inclusion of health professionals from other areas; non-significant sample; information repeated or available in other articles; and the impossibility to have gratuitous access. Therefore, this study comprises 57 articles, as shown in *figure 1*.

Figure 1. Schematic representation of the methodology according to Prisma



Results and discussion

The 57 articles included in this systematic literature review were analyzed in the aspects year, journal, country and language of publication, study method, and categorized in two thematic groups according to the respective results and discussions: mental and physical health, as respectively represented in *tables 1* and *2*, which contain a short definition of each study.

The articles are published in various journals, among which the following ones were repeated: 'Academic Medicine', 'BMC Public Health', 'Radiologia Médica', 'Occupational Medicine' e 'International Archives of Occupational and Environmental Health'.

Mental health

According to the data presented on *table 1*,

the category 'mental health' was addressed in 45 of 57 articles analyzed, representing 78.94% of the results.

The largest amount of publications on physicians' mental health occurred in 2011 (20%), followed by 2013 with a relative participation of 17.77%, and 2014 with 15.55%. Regarding the country of publication, the United States and the United Kingdom prevailed, with 31.11% and 24.44% of the articles, respectively. In third place, Brazil appears with a contribution of 11.11% of the articles. The language of publication of 80% of the articles was English, Portuguese was responsible for 11.11%, and Spanish for 8.88%. Regarding the study method, cross-sectional studies prevailed (80%) and review studies (bibliographic and systematic) represented 6.66%.

Table 1. Characteristics of the studies included in the thematic category mental health

Study (authors)	Year	Journal	Country	Language	Method	Short definition
Aldrees <i>et al.</i>	2013	Annals of Saudi Medicine	India	English	Cross-sectional study	Prevalence of burnout syndrome in physicians of various specializations at a hospital in Saudi Arabia.
Arigoni <i>et al.</i>	2009	Supportive Care in Cancer	Germany	English	Cross-sectional study	Prevalence of burnout and psychiatric diseases among Swiss oncologists, pediatricians and generalist physicians.
Assunção <i>et al.</i>	2013	Occupational Medicine	United Kingdom	English	Cross-sectional study	Detects that in Brazil common mental disorders affect more female than male physicians.
Balch <i>et al.</i>	2011	Annals of Surgical Oncology	United States	English	Cross-sectional study	Comparative of the incidence of burnout, depression, suicidal ideation, professional satisfaction and quality of life between oncologist surgeons and 14 other surgical specializations.
Bellieni <i>et al.</i>	2012	Journal of Maternal-Fetal and Neonatal Medicine	United Kingdom	English	Cross-sectional study	Level of professional burnout of neonatologists and its association with suicidal ideation, time in the profession, children, and religion.
Beltrán; Moreno	2007	Revista Medica del Uruguay	Uruguay	Spanish	Cross-sectional study	Most frequent diseases: musculoskeletal, respiratory, gastrointestinal, and psychological.

Table 1. (cont.)

Brown; Goske; Johnson	2009	Journal of the American College of Radiology	Holland	English	Bibliographic review	Interference of conditions such as depression, burnout and stress on the disruptive behavior of physicians, jeopardizing the professional practice.
Chen <i>et al.</i>	2013	International Journal of Medical Sciences	Australia	English	Cross-sectional study	Incidence of burnout and its correlation with the dissatisfaction and bad professional practice and alcohol abuse in Taiwan physicians.
Dewa <i>et al.</i>	2014	BMC Health Services Research	United Kingdom	English	Systematic review	Incidence of burnout syndrome in five studies and its impact on physicians' productivity.
Dyrbye <i>et al.</i>	2013	Mayo Clinic Proceedings	United Kingdom	English	Cross-sectional study	Incidence of burnout syndrome throughout the career in the various medical specializations in the United States.
Dyrbye <i>et al.</i>	2014	Academic Medicine	United States	English	Cross-sectional study	Comparison between the prevalence of occupational exhaustion, depression, suicidal ideation, and fatigue in the different stages of the medical career with the general population in the US.
Escribà-Agüir; Artazcoz; Pérez-Hoyos	2008	Gaceta Sanitaria	Spain	Spanish	Cross-sectional study	Interference of psychosocial risk factors and sources of satisfaction at work on the burnout syndrome in physicians of several specializations and stages of the career in Spain.
Fogaça; Carvalho; Nogueira-Martins	2010	Revista da Escola de Enfermagem da USP	Brazil	Portuguese	Descriptive study	Detection of low quality of life of intensivist pediatricians and neonatologist physicians.
Galán-Rodas <i>et al.</i>	2011	Revista Peruana de Medicina Experimental y Salud Pública	Peru	Spanish	Baseline study	Relates depression to lack of logistic and human resources for medical practice.
Gander <i>et al.</i>	2010	Academic Medicine	United States	English	Cross-sectional study	Physicians in New Zealand described social isolation due to long working hours.
Garcia <i>et al.</i>	2014	Pediatric Critical Care Medicine	United States	English	Cohort study	Relates the great responsibility over patients' life to the higher incidence of burnout among Brazilian pediatric intensivists.
Gurman; Klein; Weksler	2012	Journal of Clinical Monitoring and Computing	Holland	English	Bibliographic review	High incidence of burnout among anesthesiologists due to the great responsibility regarding a patient's safety during surgery.
Harms <i>et al.</i>	2005	Annals of Surgery	United States	English	Cross-sectional study	Highlights the rate of alcohol dependence among interviewed surgeons.
Lee <i>et al.</i>	2013	Human Resources for Health	United Kingdom	English	Meta-Analysis	Main factors associated to occupational burnout in several regions and specializations.
Leiter; Frank; Matheson	2009	Canadian Family Physician	Canada	English	Cross-sectional study	Influence of high workload and incongruence between personal values and health system on the burnout syndrome in Canadian physicians.

Table 1. (cont.)

Lim; Pinto	2009	Journal of Medical Imaging and Radiation Oncology	United Kingdom	English	Cross-sectional study	Rates of occupational burnout and stress among radiologist physicians practicing in public and private hospitals in New Zealand.
Liu <i>et al.</i>	2012	BMC Public Health	United Kingdom	English	Cross-sectional study	Characterizes the exposure to strong physical and emotional demands as generator of internal and external stressors.
Lovseth <i>et al.</i>	2013	Stress and Health	United States	English	Cross-sectional study	Medical confidentiality as a barrier to seeking emotional support among hospital physicians in Sweden, Norway, Iceland, and Italy, influencing in occupational burnout.
Magnavita; Fileni	2013	Radiologia Medica	Italy	English	Cross-sectional study	Prevalence of depression and anxiety symptoms among radiologist physicians participating in the National Congress of the Italian Society of Medical Radiology.
Magnavita <i>et al.</i>	2008	Radiologia Médica	Italy	English	Pilot study	Occupational stress and its psychosocial effects on Italian radiologists and radiotherapists.
McAbee <i>et al.</i>	2015	Journal of Neurosurgery	United States	English	Cross-sectional study	Rate of burnout syndrome in North American neurosurgeons and its impact on bad medical practices and satisfaction with the career.
Misiotek <i>et al.</i>	2014	Anaesthesiology Intensive Therapy	Poland	English	Cross-sectional study	Risk for occupational burnout among physicians practicing in intensive care and pain clinic care departments.
Mendonça; Coelho; Júca	2012	Psicologia em Pesquisa	Brazil	Portuguese	Cross-sectional study	Correlation between stress at work with occupational burnout and fatigue among medical teachers at a Brazilian faculty.
Nishimura <i>et al.</i>	2014	Circulation: Cardiovascular Quality and Outcomes	United States	English	Cross-sectional study	Incidence and risk factors for burnout syndrome among Japanese neurologists and neurosurgeons.
Oliveira Júnior <i>et al.</i>	2013	Anesthesia and analgesia	United States	English	Cross-sectional study	Rate of depression and occupational burnout among medical residents in anesthesiology, correlated with suicidal ideation, drug abuse and medical errors rates.
Opoku; Apen-teng	2014	International Health	United Kingdom	English	Cross-sectional study	Factors associated with burnout syndrome and professional satisfaction among physicians in Ghana.
Picard <i>et al.</i>	2015	Psychology, Health and Medicine	United Kingdom	English	Cross-sectional study	Relation between empathy and occupational burnout among residents.
Pistelli <i>et al.</i>	2011	Archivos Argentinos de Pediatría	Argentina	Spanish	Cross-sectional study	Incidence of the professional waste syndrome among residents in pediatrics and pediatricians at a children's hospital in Argentina.
Popa <i>et al.</i>	2010	Journal of Medicine and Life	Romania	English	Cross-sectional study	Causal factors, coping mechanisms and repercussions of occupational burnout and depression among emergency physicians.

Table 1. (cont.)

Roth <i>et al.</i>	2011	Pediatric Blood and Cancer	United States	English	Cross-sectional study	Prevalence of occupational burnout among oncology pediatricians in 13 countries.
Rubin	2014	JAMA - Journal of the American Medical Association	United States	English	Theoretical reflection	Reflection on suicide rates among medical population.
Serralheiro <i>et al.</i>	2011	Arquivos Brasileiros de Ciências da Saúde	Brazil	Portuguese	Cross-sectional study	Prevalence of burnout syndrome among Brazilian anesthesiologists and its relation with physical activity.
Shanafelt <i>et al.</i>	2011	JAMA Surgery	United States	English	Cross-sectional study	Rate of suicidal ideation among North American surgeons and its link with depression, occupational burnout, medical errors, and antidepressant use.
Nascimento Sobrinho <i>et al.</i>	2006	Revista da Associação Médica Brasileira	Brazil	Portuguese	Cross-sectional study	Identifies mental tiredness as the most prevalent symptom among Brazilian physicians interviewed.
Stafford; Judd	2010	Gynecologic Oncology	United States	English	Cross-sectional study	Prevalence of psychiatric diseases and occupational burnout among oncologist gynecologists in Australia and its influence on professional satisfaction.
Taft; Keefer; Keswani	2011	Journal of Clinical Gastroenterology	United States	English	Cross-sectional study	Coping strategies among North American gastroenterologists in stressing situations and its relation to burnout.
Tomioka <i>et al.</i>	2011	Occupational Medicine	United Kingdom	English	Cross-sectional study	Demonstrates a positive relation between working hours and the prevalence of depression.
Torres <i>et al.</i>	2011	Revista Brasileira de Epidemiologia	Brazil	Portuguese	Cross-sectional study	Self-evaluation of quality of life, professional satisfaction, and physical and mental health by physicians in Brazil.
Wada <i>et al.</i>	2010	BMC Public Health	United Kingdom	English	Cross-sectional study	Relates depressive condition to the number of off duty days among Japanese physicians.
Wang <i>et al.</i>	2010	International Archives of Occupational and Environmental Health	Germany	English	Cross-sectional study	Associates the suffering inherent to the medical profession with the higher rate of depressive symptoms among Chinese physicians than among the general Chinese population.

Source: The authors.

The mental condition most mentioned in the analyzed articles was the occupational burnout, defined as a pathological syndrome resulting from extended period of occupational stress. The three main

characteristics of this condition are: emotional exhaustion, depersonalization, and sentiment of professional inefficacy. It is postulated that the dimensions of the burnout syndrome arise sequentially over

time. In this sense, emotional exhaustion develops first, depersonalization then arises in an attempt to deal with exhaustion, and ultimately the capacity to resist work demands decreases, resulting in a reduction of personal satisfaction sentiments (BROWN; GOSKE; JOHNSON, 2009).

In Brazil, the burnout syndrome is considered as a work-related disease and it is present in the list of mental disorders and work-related behavior, according to Portaria/MS nr 1.339/1999 (Ministry of Health Ordinance nr 1.339/1999). According to the Ministry of Health (BRASIL, 2001), the worker loses the significance of work in his/her life and usually loses interest in occupational activities and all efforts seem useless.

When analyzing the incidence of burnout syndrome along the medical career, Dyrbye *et al.* (2013) found that physicians in their mid-career presented higher points in the emotional exhaustion dimension, whereas those in their early career presented higher points in the depersonalization dimension. A later study by Dyrbye *et al.* (2014) with medical students and interns found that they presented even higher points regarding depersonalization, emotional exhaustion and fatigue. In the aspect quality of life, physicians in their early career showed higher points than students and interns, but 51.4% presented occupational burnout, 40% reported at least one depression symptom, and 50.3% presented high fatigue.

Satisfaction with choosing the medical career increased over the years – as observed in both studies referred above – and it is worthy of notice that physicians with more than 10 years in the profession needed to adapt to changes taking place in the professional practice, which is a challenging aspect. This increase in satisfaction over the years may be attributed to the ability to deal with the issue or to the selection of physicians who are more capable, due to the dropout of those who are more dissatisfied,

considering that the burnout syndrome has been present among retired physicians or those who are not practicing, most likely having this issue been a contributing factor for such decisions.

In the study by Dyrbye *et al.* (2013) the analysis of the variation in the satisfaction with the career between the specializations showed that it was smaller among physicians in the early career in the primary care and surgeons, and among physicians in the mid-career in intern medicine and pediatrics. Considering the area of practice, individuals in the academic practice had a lower burnout index and higher satisfaction with the career.

The initial period of the medical career (internship and residency) is the most hostile, exposing the professional to high stress levels (BROWN; GOSKE; JOHNSON, 2009; CHEN *ET AL.*, 2013; ESCRIBÀ-AGÜIR; ARTAZCOZ; PÉREZ-HOYOS, 2008; ROTH *ET AL.*, 2011). In these studies, estimates are higher than those found by Dyrbye *et al.* (2013), ranging from one third to half of medical interns suffering from depression, and over three quarters of residents presenting occupational burnout. (2013). The house-office syndrome in medical residents has been described and is characterized by episodic cognitive impairment, sleep disorders, chronic rage, generalized cynicism and family conflicts.

Among the risk factors for physicians' psychological illness most addressed, the studies emphasize high workload demand, both physical and emotional, family conflicts due to the profession, financial difficulties, and discontentment with the health system (BROWN; GOSKE; JOHNSON, 2009; CHEN *ET AL.*, 2013; LEITER; FRANK; MATHESON, 2009; OPOKU; APENTENG, 2014; STAFFORD; JUDD, 2009). There are other chronically stressing conditions affecting medical professionals, such as anxiety, exhaustion, sleep disorders, rage and substance abuse, demonstrating the importance of self-care practices and good personal and family life management. According to Aldrees *et al.* (2013), sleep deprivation affected 86% of

physicians.

In a study undertaken by Picard *et al.* (2015) with 24 residents, they revealed that empathy is a practice with direct impact on the emotional condition, because the empathic listening to several patients becomes tiring due to the high workload and may be responsible for fatigue onset. However, medical confidentiality was a barrier to seeking emotional support to alleviate stress, according to a study by Lovseth *et al.* (2013) with 2,095 hospital physicians in Sweden, Norway, Iceland, and Italy. Hence, depersonalization occurs and causes further damage to the functioning of empathy.

According to Wang *et al.* (2010), among the Chinese physicians interviewed, 63.5% presented depression symptoms, a frequency two times higher than in the general Asian population. The great exposure to suffering and death, the strong physical and emotional demands, and the mission of saving lives are, according to Liu *et al.* (2012), internal and external stressors responsible for the onset of depression symptoms.

Nascimento Sobrinho *et al.* (2006) identified that the prevailing complaint among 7,897 physicians was mental tiredness, afflicting 54.1% of the respondents. The prevalence of less psychic disorder among those professionals was 26%, afflicting more women; this female predominance for depression disorders has been proposed by other authors (ASSUNÇÃO *ET AL.*, 2013; BROWN; GOSKE; JOHNSON, 2009; MAGNAVITA; FILENI, 2013).

In their study, Wada *et al.* (2010) have found a direct relation between the depressive condition and the fact that the physicians had no day off or were either on duty or on call for several days. The relation between the number of working hours and the prevalence of depression appeared as positive also in the study of Tomioka *et al.* (2011).

The lack of logistic and human resources for medical practice and the lack of recognition in the region of practice were

the justifications given by Galán-Rodas *et al.* (2011) in their study, which found that 26% of the female physicians in the rural service in Peru and 14.5% of the male physicians suffered from depression.

Social manifestations of mental disorders were highlighted by Gander *et al.* (2010) in the study in which most participants described social isolation due to long working hours, too much tiredness to take part in other social activities, as well as to relate to other individuals. Roth *et al.* (2011) also described that physicians do not allow themselves time for leisure practices as a consequence of the workload.

According to Magnavita and Fileni (2014), the percentage of physicians affected by depressive symptoms is high in both hemispheres of the planet and that the younger physicians are under greater risks. This was confirmed in the study by Dyrbye *et al.* (2014), in which depression and suicidal ideation symptoms were more prevailing during the university period than in the residency period or in the beginning of the career. Oliveira Júnior *et al.* (2013) evaluated 1,508 residents in anesthesiology in the United States and found a depression rate of 22%. A similar rate, from 13% to 20%, was found by Brown, Goske and Johnson (2009) in their bibliographic review.

Mental disorders may develop into alarming suicide numbers. In the study by Oliveira Júnior *et al.* (2013), the suicidal ideation rate among physicians was twice as high as the rate found in the general population. Whereas Shanafelt *et al.* (2011) found that this percentage can be up to three times higher among North American surgeons over 44 years of age compared to the general population. In this study, one in every 16 (6.4%) among 7,825 physicians who were evaluated reported suicidal ideation in the last 12 months. According to Rubin (2014), every year, from 300 to 400 physicians commit suicide in the US, wherein the suicide rate among female physicians is 130%

higher than in the general female population. Brown, Goske and Johnson (2009) have also observed that among physicians this risk is higher among women.

Shanafelt *et al.* (2011) observed that self-depreciation by surgeons of their health adversely affects their students, because the suicidal ideation rate among medical students and residents was higher than among professional surgeons. It was also reported that among 5.8% of the physicians who used antidepressant in the last 12 months, 8.9% used self-prescription, and 7.4% received the prescription from a colleague without clinical analysis. Suicidal ideation was directly and strongly related to depressive symptoms, burnout syndrome and medical errors, and in an inverse way to the quality of life. The relation between suicidal ideation and burnout is reversible, considering that the suicidal risk decreases with the recovery from the syndrome. Oliveira Júnior *et al.* (2013) also established a positive relation between occupational burnout, depression, and self-report of medical errors, also associated to the non-adherence to best medical practices, resulting in quality decrease of patient care.

Other consequences of stress and occupational burnout include absenteeism, job turnover, deterioration of doctor-patient relationship and with other health professionals, more requests for additional exams, early retirement and use of disability insurance (BROWN; GOSKE; JOHNSON, 2009).

The systematic review of Dewa *et al.* (2014) included five researches with differences in the incidence of burnout syndrome, with values of 6%, 13% and 31%. The emotional exhaustion rates varied from 13.3% to 4.5% and the depersonalization rates varied between 4.5% and 35.3%. The studies related the syndrome with losses in productivity, sick leave, lower intention to carry on practicing medicine in the long run, intention to change jobs, and self-perception of insufficient work abilities.

Escribà-Agüir, Artazcoz and Pérez-Hoyos (2008) analyzed the burnout syndrome in a sample with 1,021 physicians of several specializations in Spain. The highest rates of emotional tiredness were observed in the specializations oncology (22.4%) and traumatology (20.5%), among residents, women and physicians with over 20 years of professional activity. The personal satisfaction rate was lower in radiologists (54.8%) and women, while depersonalization was higher among traumatologists, physicians with less than 10 years of practice, and men. The conclusion was that psychosocial risk factors intrinsic to medical practice (contact with suffering and death, privation of family life and work overload) have influence on two dimensions of the burnout syndrome, which are the emotional tiredness and depersonalization; and that extrinsic factors (low intellectual stimulus at work, little professional reward, low level of satisfaction in the relationship with patients and relatives, and no dedication to teaching activities) predominantly affect the third dimension of the syndrome, which is the personal satisfaction. There was an emphasis on the fact that the quality of the doctor-patient relationship influences all the dimensions and that there is increasingly less time dedicated to this relationship, which may increase even more the incidence of this syndrome.

Chen *et al.* (2013) have estimated the incidence of burnout on 809 physicians in Taiwan in the three dimensions of this syndrome and the highest rates were found in: 13.1% of the physicians in emotional exhaustion; 9.3% of them in depersonalization; and 49.9% in the dimension professional satisfaction. Furthermore, 62.3% were unsatisfied about the doctor-patient relationship, and 29.5% about his/her medical specialization.

Taft, Keefer and Keswani (2011) questioned 410 gastroenterologists about their attitudes in face of stressing situations. They found

that dealing with the situation in a planned and positive way by seeking social support is related to lower psychological stress, depersonalization, incidence of endoscopic complications, and higher sentiment of professional self-efficacy. On this aspect, Lee *et al.* (2013) observed that physicians with more years of practice demonstrated better management of risk factors. The study by Mendonça, Coelho and Jucá (2012) also emphasized that the physicians' control over their activities and the social support reduce the damages caused by excessive work demand.

Arigoni *et al.* (2009) carried out a comparative study with 371 Swiss oncologists, pediatricians, and generalist physicians and observed that 32% of the respondents presented signs of psychiatric diseases and burnout syndrome, especially among the generalist physicians. The characteristics of work that predisposed to greater psychological affections were a workload higher than 50 hours per week, less than six hours per month dedication to continuing education, and working at public institutions.

Opoku and Apenteng (2014), in a study with 200 African physicians, found that they were satisfied regarding the relationship with the health team and moderately satisfied about their career, especially those practicing in rural areas and those working over 40 hours per week. The incidence of burnout in general was low, but slightly higher among women and residents.

Pistelli *et al.* (2011) assessed the professional waste syndrome in 39 residents in pediatrics and 69 pediatricians at a children's hospital in Argentina. The values observed in the emotional tiredness and depersonalization aspects were high and above those found in other studies with pediatricians in Buenos Aires and Spain. High depersonalization is combined with the fact that physicians do not get involved with the child patient as a way of defense against the care stress,

a fact that has been confirmed by Garcia *et al.* (2014) and Fogaça, Carvalho and Nogueira-Martins (2010). However, the rate of personal fulfillment was intermediate, indicating that at the same time professionals are exposed to working conditions that contribute to occupational burnout, they are satisfied about their vocation. In addition, depersonalization rates decrease over the years of practice while personal fulfillment rates increase as a consequence of professional self-esteem consolidation.

Roth *et al.* (2011) analyzed the prevalence of occupational burnout in 410 oncology pediatricians in 13 countries. They found that 38% present a high level of burnout and 72% a moderate level. Over one third of the respondents reported symptoms of the syndrome, of which 94% were confirmed with intermediate level and 73% with high level. The highest rates of the syndrome were observed in women, and they were also found by Leiter, Frank and Matheson (2009).

Bellieni *et al.* (2012), in a research with 110 neonatologists, found that the majority were in a critical level of burnout, correlated to having less than five years of professional practice, having children – which intensifies empathy with the suffering of other children –, personal belief that it is not worth living with physical limitations – influencing in the lower resuscitation rate of newborn infants –, the presence of suicidal ideation, and being an atheist or an agnostic.

Serralheiro *et al.* (2011) evaluated 59 anesthesiology physicians associated to a Brazilian faculty of medicine and found that all physicians in the sample presented some level of burnout, though preponderantly low, with only 3.4% demonstrating a high level. The practice of physical activities was pointed as a factor that promotes quality of life, reducing the level of the depersonalization aspect of the syndrome. By contrast, Misiólek *et al.* (2014), in a research with 373 anesthesiologists in Poland, highlighted that 69.4% of the respondents

presented moderate and high risk of burnout syndrome, considering that they worked in intensive care and pain care clinic departments – which are recognized as being of risk for the development of the syndrome. A study by Oliveira Júnior *et al.* (2013), found that the incidence of burnout in residents in anesthesiology in the United States was 41%, an intermediate rate between the values found in the two previously mentioned studies, and higher among women. The main associated factors were the pressures in the work environment that cause occupational stress, such as a weekly workload higher than 70 hours and being on duty more than one in every five days. For Gurman, Klein and Weksler (2012) this high incidence among anesthesiologists is due, in addition, to being responsible for the safety of a patient during a surgery.

In the study by Torres *et al.* (2011) with 1,224 physicians graduated from a Brazilian faculty of medicine, 66.1% reported high professional fulfillment: 68% had a positive evaluation on their quality of life, 79% evaluated in the same way their physical health, and 85% their mental health. These factors were positively associated to one another and to the frequent participation in congresses and scientific events, dedication to leisure time, high income, not smoking and practicing physical activities. However, 56.3% referred to medium, high or very high level of stress to deal with death, 54.7% to deal with critically ill patients, 27.7% in the communication with the patient and relatives, and 31.1% to deal with civil lawsuit.

Popa *et al.* (2010), in a sample with 263 emergency physicians, found greater vulnerability to occupational stress and increasing burnout and depression rates over the years of practice in the area, associated to the decrease in the quality of life, professional fulfillment, and quality of medical care. Among the coping strategies, those highlighted were active coping, withdrawal behavior, and substance abuse.

Among 2,564 neurologist and neurosurgeon physicians working in centers for the treatment of encephalic vascular accidents in Japan, Nishimura *et al.* (2014) detected that 41.1% presented occupational burnout and 21.8% among them were severe cases. The risk factors found were excessive working hours per week, sleep deprivation, little experience, overload of responsibility in those emergency situations, insufficient health team, and low quality of mental health. In the national research carried out by McAbee *et al.* (2015) with 783 North American neurosurgeons the rate of burnout syndrome was even higher (56.7%) and it was a factor intrinsically related to bad medical practice. However, the rate of career fulfillment was 81.2%, demonstrating that the burnout may occur episodically during the career and despite this fulfillment may remain. The major negative factors associated to the rates obtained were personal-professional unbalance, worries about future remuneration, not carrying out academic activities, and longer time in the profession.

Stafford and Judd (2009) interviewed 29 among 37 oncology gynecologists practicing in Australia and detected that over half of them were satisfied with the career but over one third presented emotional exhaustion, and both results were higher than in other specializations. The study showed that physicians presenting burnout were more inclined to abandon the profession, decrease the amount of working hours, retire, and develop psychiatric disorders. The last factor was found in 17.2% of the respondents, and it was associated to personal sacrifice in favor of the profession and also to self-diagnosis and self-medication; yet this rate was lower than the one found in other medical specializations, due to higher professional satisfaction. Contrary to suppositions, the exposure to patients' constant suffering and the communication of bad news, common to the practice in the oncology area, have not

been associated to burnout. This was also verified by Balch *et al.* (2011) in a comparative study between 407 oncologist surgeons and 14 other surgical specializations. Moreover, it showed that the former presented lower incidence of depression and higher satisfaction with the career. However, the oncologist surgeons informed greater conflicts between work and personal life and greater desire to dedicate more time to the family. Family conflicts due to work were reported by 75% of the physicians in the study by Aldrees *et al.* (2013).

According to the same authors, larger use of alcoholic drink was observed, with 72.4% making weekly use and 30% with abusive use (over two doses per day). Chen *et al.* (2013) confirmed this practice of seeking relief from the heavy workload, especially among male physicians in Taiwan. Oliveira Júnior *et al.* (2013) also observed that the risk of burnout among residents in anesthesiology was higher among those who reported alcohol consumption and tobacco use. Galán-Rodas *et al.* (2011) verified that 22% of women presented problematic use against 26% of men. Yet Harms *et al.* (2005) found 7.3% of alcohol dependence.

Aldrees *et al.* (2013) concluded that the prevalence of burnout among 348 physicians of various specializations at a tertiary hospital in Saudi Arabia was high (70%), affecting the younger residents or those in the beginning of the career, women, and singles. The rate of emotional exhaustion was 54%, depersonalization 35%, and personal satisfaction 33%. The higher percentages were observed among gynecologist obstetricians, family doctors, anesthesiologists, intensivists, and pediatricians, whereas the lower percentages were among cardiologists.

Radiologists and radiotherapists are more susceptible to an unpleasant, negative, and non-adaptive reaction to stress (MAGNAVITA *ET AL.*, 2008). In a research with 136 radiologists

in New Zealand, Lim and Pinto (2009) observed that in comparison with physicians practicing in the private service, physicians in the public service presented higher rate of stress and burnout associated to professional dissatisfaction. Conflicts with time demands constituted the main source of stress at work, affecting 59% of radiologists in the public service, besides the complaint by 38% concerning low remuneration and higher proportion of hospital patients with complex and severe diseases. When the level of stress reaches an important clinical threshold it is known as stress-related disorder. This term encompasses various clinical conditions, such as neurasthenia, adjustment disorder, anxiety, and depression. Psychiatric diseases affected 21% of the physicians in the public service and 15% in the private service. Whereas Magnavita and Fileni (2013) found even higher rates, 43.7% with possible cases of anxiety and 43.9% with cases of depression.

Physical health

As demonstrated in *table 2*, physicians' physical health was analyzed in 12 articles, representing 21.05% of the 57 articles analyzed. All the studies on physical health, as on mental health, were published in English, and the countries with more publications were the United States (41.66%) and the United Kingdom (25%). The year with the highest number of publications on physical health themes, as on mental health, was 2011, with 41.66%. The majority (83.3%) comprised cross-sectional studies. Within this type of methodology, the main issues addressed in the studies on physical health were musculoskeletal disorders (AUERBACH *ET AL.*, 2011; MEHRDAD; DENNERLEIN; MORDHESIZADEH, 2012; RUITENBURG; FRINGS-DRESEN; SLUITER, 2013; MOHSENI-BANDPEI *ET AL.*, 2011; LIANG *ET AL.*, 2013) and ophthalmologic health (MRENA *ET AL.*, 2011; KRUPINSKI; BERBAUM, 2009).

Table 2. Characteristics of the studies included in the thematic category physical health

Study (authors)	Year	Journal	Country	Language	Method	Short definition
Auerbach <i>et al.</i>	2011	Spine	United States	English	Cross-sectional study	Prevalence of musculoskeletal disorders in spine surgeons due to bad ergonomics.
Brennan <i>et al.</i>	2011	British Journal of Oral and Maxillofacial Surgery	United States	English	Hypothetical study	Elevation of serum testosterone in head and neck surgeons directly proportional to the complexity of the procedure.
Beloyartseva <i>et al.</i>	2012	Archives of Osteoporosis	United Kingdom	English	Cross-sectional study	Proves that 79% of the Indians subjects in the study presented Vitamin D deficiency due to long working hours in environments with no access to sunlight.
Krupinski; Berbaum	2009	Academic Radiology	United States	English	Cross-sectional study	Work with digital displays causing oculomotor nerve fatigue.
Liang <i>et al.</i>	2013	PLoS One	United States	English	Cross-sectional study	Frequent musculoskeletal disorders in surgeons due to the emergence of less invasive surgical techniques but ergonomically unfavorable.
Magnavita; Fileni	2014	Radiologia Médica	Italy	English	Cross-sectional study	Increase on HDL and triglyceride levels and abdominal obesity in radiologists due to occupational stress.
Mehrdad; Dennerlein; Morsheidzadeh	2012	Archives of Iranian Medicine	Iran	English	Cross-sectional study	Relation between working conditions and ergonomic risks with the main musculoskeletal disorders in clinicians.
Mohseni-Bandpei <i>et al.</i>	2011	Journal of Manipulative and Physiological Therapeutics	United States	English	Cross-sectional study	Influence of low satisfaction with work on the increase of risk from low back pain.
Mrena <i>et al.</i>	2011	Scandinavian Journal of Work, Environment & Health	Scandinavia	English	Cross-sectional study	Prevalence of opacity in the crystalline and cataract among Finnish physicians.
Peters <i>et al.</i>	2011	BMC Infectious Diseases	United Kingdom	English	Systematic review	Higher level of infection by <i>H. pylori</i> in gastroenterologists.
Rauchenzauner <i>et al.</i>	2009	European Heart Journal	United Kingdom	English	Cross-sectional study	Influence of working hours and conditions on cardiovascular health of Austrian physicians.
Ruitenburg; Frings-Dresen; Sluiter	2013	International Archives of Occupational and Environmental Health	Germany	English	Cross-sectional study	Relates fine movements and relatively static posture of surgeons to physical work-related complaints.

Source: The authors.

Rauchenzauner *et al.* (2009) found that frequent stressing situations, sleep deficit, and deregulation of the circadian rhythm are causes of the incidence of cardiovascular diseases in this group of professionals. Before the manifestation of symptoms of cardiovascular diseases, after night shifts physicians presented an increase in the cardiac frequency, as well as the elevation of blood pressure, dysrhythmia, altered catecholamine secretion, and an increase of serum cholesterol, uric acid, and potassium. The 24h electrocardiogram registered higher levels of ventricular premature beats on physicians during the shift. The 24h monitoring of the blood pressure indicated an elevation of the diastolic pressure, its elevation during that night, and an elevation during the short periods of sleep during the shift.

According to Magnavita and Fileni (2014), the literature is clear about the relationship between work stress and the risk of cardiovascular diseases. Radiologists, on whom the article focuses, suffer from intense environmental pressure that generates an extended period of occupational stress and a decrease of job satisfaction. Among the respondents, 41.9% reported abnormal HDL levels and 11.3% had high triglyceride levels. Abdominal obesity affected 24% of the respondents and among those who presented three or more pathologic abnormalities, 7.1% received a metabolic syndrome diagnosis.

A study carried out in Finland by Mrena *et al.* (2011) researched the prevalence of opacity in the crystalline and cataract on physicians exposed to ionizing radiation. The large majority of the physicians under study were radiologists and only 11% made regular use of safety glasses in the work routine. Some degree of opacity in the crystalline was found in 42% of the physicians who were examined. Besides the opacity in the crystalline, radiologists are more inclined to present oculomotor nerve fatigue, which may reduce the accuracy of the diagnosis,

according to Krupinski and Berbaum (2009). The authors observed that the work overload caused eye strain, clinically known as asthenopia. Working during long periods of time with digital displays may also cause myopia.

Musculoskeletal disorders are more likely to affect surgeons than clinical physicians, but yet it is the most frequent complaint among primary care physicians in Guadalajara, Mexico, affecting 20% of the professionals (BELTRÁN; MORENO, 2007).

According to Auerbach *et al.* (2011), spine surgeons work during long hours on surgeries of complex ergonomics. Cervical pain presented a prevalence of 59% among the respondents, a much higher rate than the prevalence in the general population, which is approximately 20%. Herniated lumbar disc and dorsal pain with radiculopathy were reported by 31% of the surgeons, of which 41% needed to be absent from work and 23% went through surgical treatment. Another kind of pain and discomfort described by the authors were leg edema and varicose veins (20%). In comparison with clinical physicians at the hospital studied by Ruitenburg, Frings-Dresen and Sluiter (2013), surgeons made fine repetitive movements 26 times longer and stood up 130% longer. Moreover, 73% of the surgeons felt troubled about working in uncomfortable and exhaustive postures.

Besides the relation between working conditions and ergonomics giving rise to physical symptoms on surgeons, Mohseni-Bandpei *et al.* (2011) found a relation between the low satisfaction with work and the increasing risk of lower back pain. Corroborating the fact, Aldrees *et al.* (2013) observed that 65% of the physicians on their sample in Saudi Arabia suffered from back pain and the prevalence of burnout among them was also higher.

According to Mehrdad, Dennerlein and Morshedizadeh (2012), the main complaint from physicians in their research was knee

pain, followed by lower back pain and cervical pain. The most common ergonomic risks reported were spending long periods standing, sitting, and neck in flexion.

Liang *et al.* (2013) found that the increase on the incidence of numbness, pain and stiffness in the neck, shoulders, back, and legs of urologist surgeons was related to the emergence of surgical techniques that are less invasive but ergonomically less favorable.

Among other affections on physicians' health, the literature shows a higher level of infection by *H. pylori* in gastroenterologists (PETERS ET AL., 2011) and an elevation of serum testosterone in head and neck surgeons directly proportional to the complexity level of the procedure (BRENNAN ET AL., 2011).

Yet Harms *et al.* (2005) discuss the fact that despite being in close contact with the health care of others, surgeon physicians fall short of taking care of their own health. In their study, not all surgeons over 50 years of age complied with the basic preventive standards. Only 73% had a cardiac baseline evaluation, 81% of the men had received a prostate evaluation, and 73% reported having made a colonoscopy. An organic deficiency reported is that of Vitamin D in Indian health professionals (BELOYARTSEVA ET AL., 2012).

Conclusion

According to the results of this systematic review, it was possible to present a profile of Brazilian and international research on mental and physical health of medical professionals identifying their main pathological disorders.

Articles in English prevailed, followed by those written in Portuguese and Spanish, respectively. The countries that presented more publications were the United States, United Kingdom, and Brazil, in this order. The highest frequency of publications occurred in 2011, 2013, and 2014.

Cross-sectional researches were the most frequent in the analyzed period.

The number of articles on physicians' mental health was considerably higher than those on physical health. Regarding mental diseases, the most studied one was the occupational burnout syndrome, followed by substance abuse and mood disorders (anxiety and depression). The physical disorders most commonly reported in the articles were musculoskeletal and ophthalmologic diseases.

The decrease in the physicians' quality of life was observed as a result of working long hours in environments that are, for the most part, lacking the ideal conditions for medical practice, sleep deprivation, and high emotional demands. On the other hand, protective factors were observed, such as dedication to academic teaching and research activities, technical improvement, and dedication to leisure and physical activities. It was also possible to observe that the early stages of the medical career, especially internship and residency, are the most exhaustive and demanding for the physicians' mental and physical health.

The decrease in the physicians' quality of life and consequently in the professional practice may have a severe impact in society, especially due to the possible medical errors, which are mostly irreparable. This panorama highlights the importance of prophylactic interventionist measures against the physicians' falling ill from work-related diseases.

Collaborators

The authors Ana Laura Lima Zitta and Mariana Evangelista Gracino jointly contributed to the definition of the research theme, the elaboration of the methodology for the scientific project, the selection of articles by means of inclusion and exclusion criteria, and reading the abstracts. Besides this,

individually they read the full texts of the selected articles and subsequently discussed them. Afterwards, they wrote the scientific article, comprising introduction, methodology, results, discussion, and conclusion.

The authors Ely Mitie Massuda and Otávio Celeste Mangili guided the thematic

delimitation concerning the scientific relevance, helped with the definition of inclusion and exclusion criteria of articles, and with the selection of the database. Moreover, they guided the methodology of the synthesis of the results and made the final revision of the article. ■

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