

Fitness for work in health care workers from the prospective of ethics, science and good practices

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SUMMARY

Fitness for work (FFW) is the final task of both risk assessment and health surveillance, aimed at protecting workers' health and working capacity. There are numerous specific concerns regarding health care workers. In particular: i) the frequent difficulty in determining at pre-employment/pre-placement examinations the specific task that the individual worker will perform; ii) the prevalence of female workers and the contemporary presence of numerous occupational risk factors that are a potential cause of harmful effects on women's reproductive health; iii) the progressive aging of the staff, especially nurses; iv) the risk to third parties, with particular reference to the issues of biological risk and substance abuse, also in relation to shift work, fatigue and occupational stress; v) the increasing number of immigrant workers among support staff. In such cases the occupational physician, respecting both ethical principles and regulations and with an appropriate balance between scientific evidence and the precautionary principle, should express a FFW judgment that allows both the adaptation of work to the worker and vice versa, as recommended by the World Health Organization (WHO) and the International Commission on Occupational Health (ICOH). Proper FFW judgment also permits the expected benefits to be achieved, not only for the workers but also for employers, companies and society.

RIASSUNTO

«Il giudizio d'idoneità nei lavoratori della sanità tra etica, scienza e buone prassi». Il giudizio d'idoneità lavorativa alla mansione specifica costituisce l'atto conclusivo della valutazione dei rischi e della sorveglianza sanitaria, finalizzato a proteggere la salute dei lavoratori nonché la loro capacità lavorativa. Numerose sono le specificità che riguardano i lavoratori della sanità. In particolare, la frequente impossibilità di identificare all'atto dell'assunzione a quale specifica attività il lavoratore sarà assegnato; la prevalenza di soggetti di sesso femminile e la contemporanea presenza di numerosi fattori di rischio occupazionali che rappresentano potenziali cause di danno alla salute riproduttiva femminile; il progressivo invecchiamento del personale, in specie infermieristico; il rischio verso terzi, con

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particolare riferimento alle tematiche del rischio biologico e dell'abuso di sostanze, anche in relazione a lavoro a turni, fatica e stress occupazionale; la crescente quota di soggetti immigrati tra il personale addetto all'assistenza. In questi casi il Medico del Lavoro, nel rispetto sia dei principi etici della normativa vigente e con un adeguato equilibrio tra evidenza scientifica e principio di precauzione, dovrà formulare un giudizio d'idoneità alla mansione specifica che consenta da un lato l'adattamento del lavoro al lavoratore e viceversa, come raccomandato da OMS e ICOH, e dall'altro di conseguire i benefici attesi, non solo per il lavoratore ma anche per datore di lavoro, impresa e società in generale.

INTRODUCTION

Since 1950, the International Labour Organization (ILO) and the WHO provided a common definition of Occupational Health, according to which “*occupational health should aim at...the maintenance and promotion of workers' health and working capacity...and...the adaptation of work to the workers and of each worker to his or her job*”. This concept falls into the wider definition of health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”, which was first formulated by the WHO in 1948 (30).

Workers' health surveillance, on occasion of both pre-employment/pre-placement and periodic health examinations, works in this direction, particularly through the evaluation of fitness for work (FFW), which was defined as “the final task of both risk assessment and health surveillance” (2) and “the result of a detailed knowledge of both working and health conditions, bearing in mind the changing nature of these two variables and, consequently, the fact that job fitness evaluation is a dynamic concept” (44). Moreover, it was reported that agreement on medical decisions regarding job fitness evaluation on the same case is an important aspect of the occupational physicians' competence (33).

Traditionally, in the process of FFW evaluation the occupational physician took into consideration health impairments specifically caused by occupational risk factors, examining the functional state of the various target organs. As a consequence of changing working conditions and preventive interventions, traditional risks and classical occupation-

al diseases are progressively decreasing (1). Therefore, in order to assess FFW, the main aims of health surveillance today are the identification of all conditions, congenital or acquired, that can cause individual hyper-susceptibility and the diagnosis of health conditions which may be aggravated, although not directly caused, by working activity and which may interfere with normal performance of job tasks.

In this regard, in the foreword of the book “Fitness for Work - The Medical Aspects” Palmer et al. stated that “...FFW can no longer be about exclusion of the unfit from jobs which could in fact be adapted to their disability. Occupational physician's main contribution to the process is now to advise on how such employees can be safely employed...” (15). Moreover, a recent systematic review on criteria and methods used for the assessment of FFW stressed that “in summary, occupational health aims to adapt work to the workers and each worker to his or her job” and “workplace modifications to improve or adjust working conditions must always be considered” (44).

FITNESS FOR WORK IN THE EVALUATION OF THE LITERATURE

In view of the practical and professional relevance of FFW, we verified the impact of this theme on scientific production.

To this purpose, we searched PubMed for (fitness[All Fields] AND (“work”[MeSH Terms] OR “work”[All Fields])) and for (“health personnel”[MeSH] AND (fitness[All Fields] AND (“work”[MeSH Terms] OR “work”[All Fields])),

with Limits Activated: Publication Date from 1991/01/01 to 2010/12/31. Thus, we found a total of 2,632 publications in the last 20 years, among which 73 (2.8%) were related to health care workers and published mostly (51%) in the last 5 years (figure 1). On the whole, there was a prevailing interest towards biomechanical, psychosocial and biological risks, while other aspects (e.g. chemical-allergological risk, substance abuse, work and aging, effectiveness/quality evaluation) appeared to be less studied (figure 2).

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The above-mentioned numbers are surprising, since they indicate a scant scientific consideration for a theme that is one of the pivots of an occupational physician's practical activity. Moreover, it may be stressed that 16 (22%) of the 73 titles found were published in Italian, with a prevalent interest towards biological risk (38%), followed by

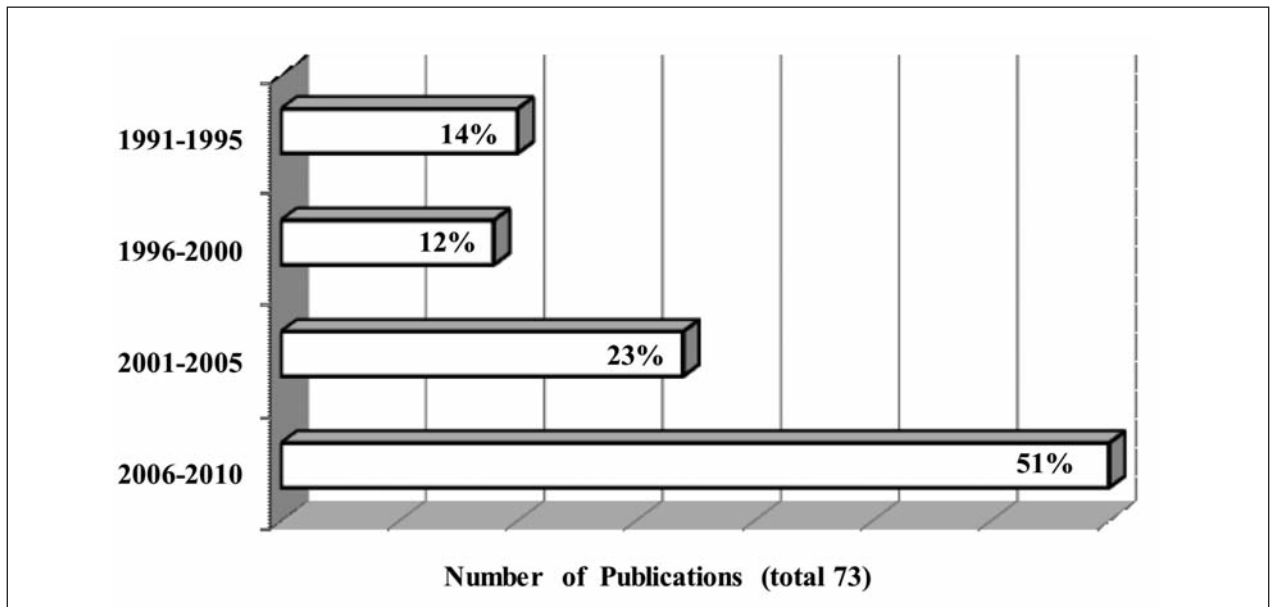


Figure 1 - Percentage distribution of publications on the topic in the period 1991-2010, by five-year periods

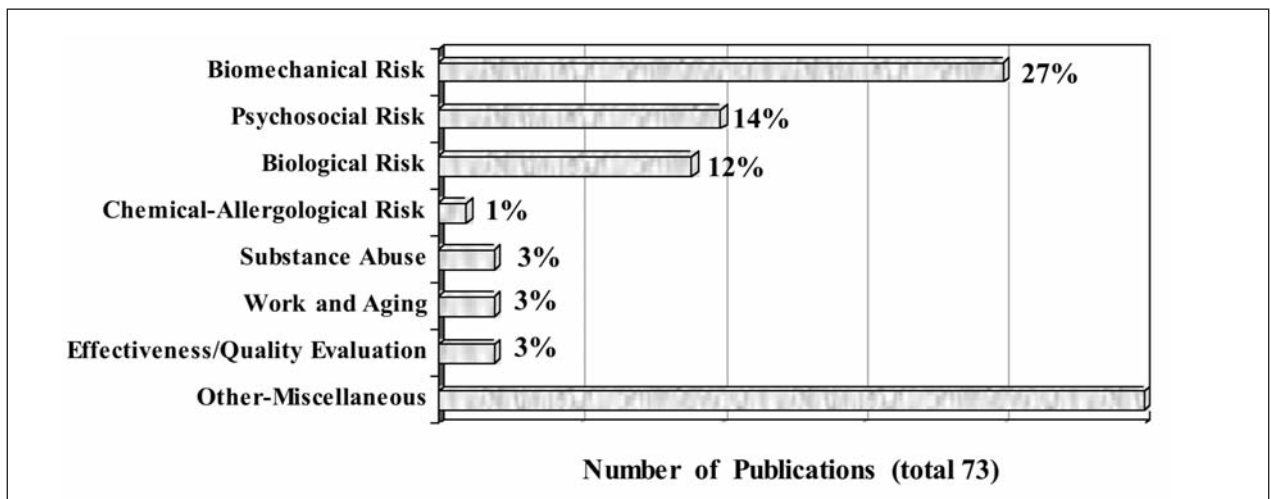


Figure 2 - Percentage distribution of publications on the topic in the period 1991-2010, by specific subject

biomechanical and psychosocial risks (13% each), chemical-allergological risk and substance abuse (6% each).

On the other hand, the relatively low number of publications may reflect the low interest shown by occupational health researchers for this topic. Occupational safety and health priorities, identified by means of the Delphi technique (23), show that “medical surveillance and work ability criteria” and “health care workers” are not present among those set by USA, Japan and European Union (25, 26), while they are quoted by an Italian panel including 300 experts from universities, local national health service units and social partners, identified by the National Institute for Occupational Safety and Prevention (ISPESL) (43).

It should be noted that literature on the validity of FFW decisions is limited. Moreover, the effectiveness of pre-employment medical assessment was questioned (11) and poor agreement among professionals on FFW judgement was observed (12, 19). Despite these shortcomings and doubts, there is a growing awareness that occupational health practices should be supported by the best available evidence in order to maximize the outcome. As for other medical specialities, the evidence-based paradigm was proposed in recent years to promote the identification, appraisal and application of the best practices, to support medical doctors in the decision making process (17). Therefore, the decision-making process of any occupational health practice requires an analysis according to both science (i.e. an updated knowledge based on scientific evidence) (48) and ethical conscience (i.e. engagement, seriousness, impartiality), according to the code of the medical profession adapted also for occupational health professionals (29). Based on this approach, an Occupational Safety and Health Review Group has been established within the Cochrane Collaboration, with the aim of collecting the available research on the effectiveness of different interventions, such as prevention, treatment, management or rehabilitation (8). So far, the activity of this group resulted in the publication of about 80 systematic reviews, although only a limited number of them deals with the FFW assessment (35).

FITNESS FOR WORK IN HEALTH CARE WORKERS

With regard to the specific discussion about FFW evaluation in health care workers exposed to chemical-allergological, biological and biomechanical risks and with substance abuse problems, the reader should consult the following articles published in this issue (10, 41, 42, 49).

The health sector has its own peculiarities, which are reflected in the type of health surveillance that should be adopted and, consequently, in FFW judgement. Among these many features, it is necessary to draw attention to:

- the variety of health risks (chemical, physical, biological, ergonomic and psychosocial) to which workers may be exposed, simultaneously or in rapid succession;
- the presence in the workplace not only of patients but also of relatives and visitors;
- the possibility that the patient becomes a source of risk to the worker and vice versa.

Some points of special interest are addressed below.

Is a specific FFW evaluation really possible?

Generally, given the organization of the working activities of health care workers, at pre-employment/pre-placement examinations it is often impossible to determine the specific task that the individual worker will perform. This implies the difficulty in expressing a specific FFW judgement and, therefore, the occupational physician will have to make a generic FFW assessment, which could influence the worker's assignment to one task rather than another. On the other hand, the frequent lack of caregivers can result in transfers from one department to another, which can affect various risk situations. Therefore, the FFW problem is not restricted only to the pre-employment/pre-placement phase but also to later times.

Female gender

It is estimated that the prevalence of female nurses in Africa, America, South-East Asia, Eastern Mediterranean, Western Pacific and Europe

(55), Italy included (31), is about 80-90%. Moreover, a sharp increase in the number of female physicians was registered in the last few years, with a current prevalence of about 30-40% in Africa, Americas, Eastern Mediterranean and Europe (55), Italy included (32).

The framework outlined above can lead to particular risk situations resulting from gender-based hypersusceptibility. In this sense, many chemical (e.g. ethylene oxide, anaesthetic gases, antineoplastic drugs), physical (e.g. ionizing radiation) and biological (e.g. Rubella, Cytomegalo, Human Immunodeficiency, Hepatitis B and C viruses; *Toxoplasma gondii* and *Listeria monocytogenes*) agents, ergonomic (e.g. heavy workload and awkward postures, shift and night work, long working hours) and psychosocial (i.e. work stress) risk factors were identified as a potential cause of harmful effects on women's reproductive health (16, 46).

Aging

The aging problem, until recently not so relevant in the health sector that was mainly characterized

by a rather low average age of workers, in recent years has begun to be significant, linked on the one hand to increased life expectancy and on the other hand to a different organization of the pension and social security system, which precludes abandoning employment at a "young" age (9, 52).

In particular, in the United States of America the number of nurses older than 50 years increased from 100,000 in 1980 to 400,000 in 2007 (24); in Europe, the proportion of nurses aged over 50 varies from 12 to 20% (37); in Italy, in 2009, the average age registered among nurses was 42.2 years (31).

There are some interesting projections, which assess the trend of aging in nursing populations applying deterministic mathematical models (22). In particular, as shown in figure 3, a steady increase in the proportion of nurses aged over 45, up to 48.8% of the nursing workforce, is expected from 2008 to 2021.

In such a sensitive sector as that of health care, it is assumed that aging could be a problem of considerable importance, where the job demands remain unchanged over time while the maximal

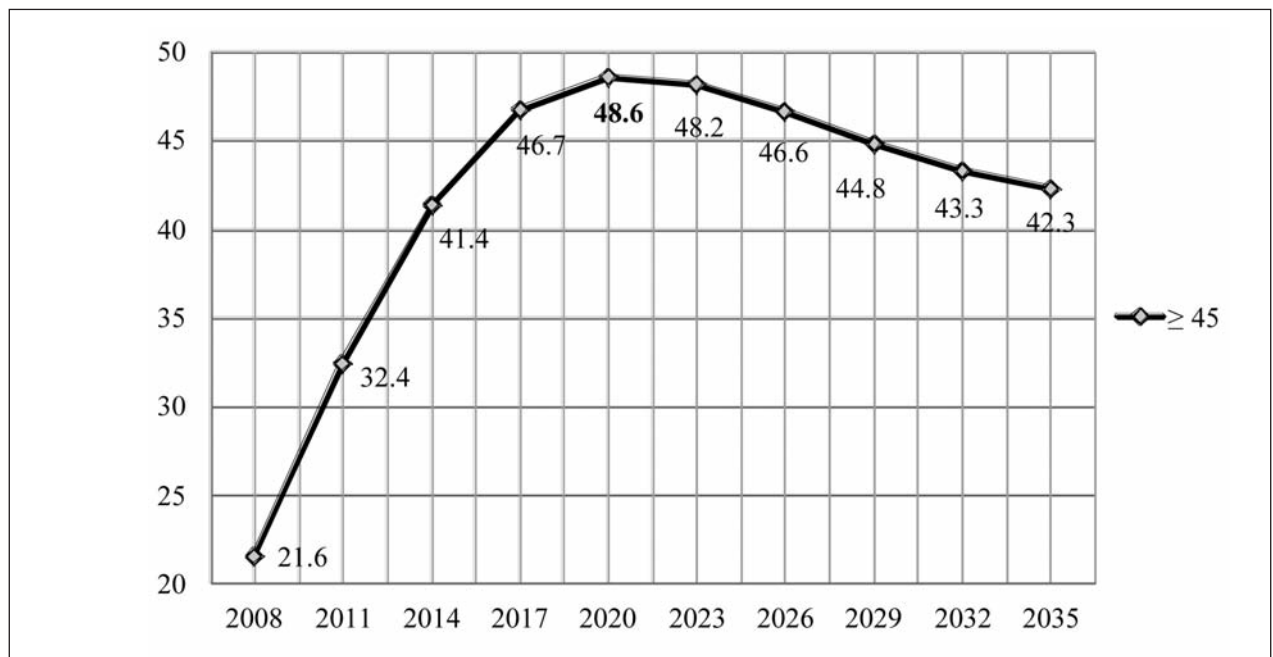


Figure 3 - Aging of nursing workforce: expected trend in the next 25 years in an Italian hospital. [From: Guardini I, Dero-ma L, Salmaso D, Palese A: Stima del trend di invecchiamento della popolazione infermieristica di due ospedali del Friuli Venezia Giulia: applicazione di un modello matematico deterministico. *G Ital Med Lav Erg* 2011; 33: 55-62]

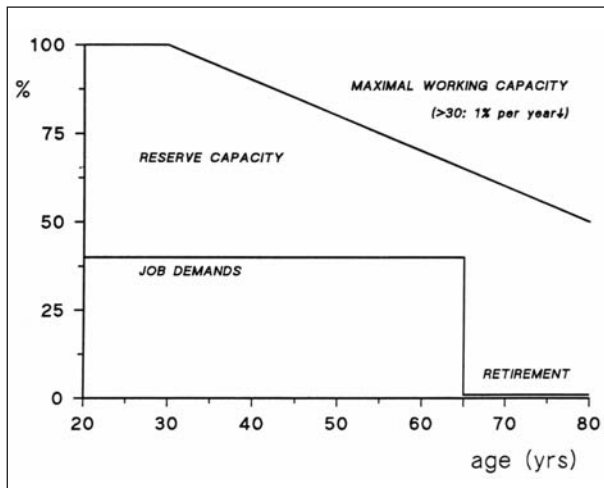


Figure 4 - A theoretical model of the relationship between age-related decline in working capacity and job demands [From: ICOH Scientific Committee "Aging and Work": Aging and work - Goedhard WJA (ed). The Netherlands: ICOH, 1992]

working capacity declines gradually, probably as early as the age of 30 (figure 4), as was well illustrated by the ICOH Scientific Committee "Aging and Work" (28).

There are numerous potential problems associated with aging of health personnel. In particular: an increased susceptibility to ergonomic and organizational risk factors (just think in this regard of not adequately assisted manual handling of patients and shiftwork); moreover, the aging of the general population will entail an increasing need to assist chronically ill subjects, carriers of multiple diseases, with the associated difficulties that this phenomenon may present; the tumultuous change in technologies can become a source of difficulty for staff of a certain age and, in view of the fact that such technologies can be easily used instead by younger colleagues, this could lead to difficulties in relationships between different age classes, aggravated by the fact that, at least in European Union countries, the training followed today by future health care workers is academically oriented and, therefore, their cultural level is higher.

Danger to a third parties and quality of healthcare provision

The theme of the third party risk assessment in occupational health is frequently underestimated and, in our experience, sometimes seen as unrelated to the occupational physician's expertise.

However, institutions of international prestige have long stressed the importance of this theme. Particularly, the ILO in 1998 stressed that "When workers' health surveillance reveals that the health conditions of the worker and the nature of the tasks performed are likely to endanger the safety of the others, the decision with regard to fitness may be difficult to take. The worker must be clearly informed of the situation, so that he or she can take remedial action. In the case of a particular hazardous situation, the management must be informed and take the necessary measures to safeguard other persons" (30). Similar statements are made in article 11 - "Danger to a third party" - of the ICOH code of ethics (29). Moreover, the same concepts were resumed at the 28th ICOH International Congress on Occupational Health in the Session "FFW: challenging situations", where it was stated that "occupational physician to the best of his knowledge and conscience,...must take each case on its merits...and decide to deliver a verdict of fitness...tending...to favour the need to safeguard collective health, or that of third parties, should there be a conflict of interests" (47). Finally, a recent review defined FFW as "the evaluation of a worker's capacity to work without risk to their own or others' health and safety" (44).

In the health sector there are many conditions that can be regarded as possible risk to third parties situations. In this sense, among the previously mentioned 73 publications on the assessment of FFW in health care workers, only 6 articles published in 2001-2010 dealt with the issue of risk to third parties, as to biological risk and substance abuse. The potential damage that the worker who is a carrier of an infection or of an infectious disease can cause the patient is intuitive, both for airborne and for blood-borne pathogens (3). What, however, is taken less into consideration is the harm from abuse of alcohol or drugs, although

such habits may affect high proportions (10-15%) of physicians and nurses (4, 13, 34, 36), resulting in work ability impairment of health care personnel and a consequent increased risk of error.

Shift-work, long working hours and occupational stress

Also shift-work and long working hours (i.e. work periods of >8 hours), have negative effects on human performance and decision-making as they cause fatigue, sleep loss, circadian desynchronization and occupational stress, and present a substantial and well-documented detrimental effect on safety, resulting in an increased risk of errors in professional conduct and interfering with the quality of healthcare provision, so that public safety is at stake (6, 50, 51). In this context, it should be noted that a contemporary abuse of alcohol and/or drugs can both be facilitated by those issues and help to emphasize them.

Moreover, an International Agency for Research on Cancer (IARC) Working Group concluded that “shift-work that involves circadian disruption is probably carcinogenic to humans (Group 2A)” (27).

Immigrant workforce

In the near future it is likely that the support staff will be largely replaced by immigrant workers, as such activity involving unskilled manual work is often rejected by the new recruits, partly because of their initial educational course, usually at university level. This will result in and, in part, already leads to problems of employment of subjects who, by the very fact of being foreign, have working and hygienic habits different than those necessary for a health care worker.

The fact that this phenomenon is already important is supported by a prevalence of 10% of foreign nurses and 13% of foreign physicians currently registered in Italy (31, 32).

For these subjects FFW assessment will have to be closely combined with appropriate training programmes, without underestimating the fact that for recent immigrants the possibility must be consid-

ered that they are carriers of infectious/parasitic diseases endemic in their countries of origin.

CONCLUSIVE REMARKS

Today, the main aim of health surveillance and FFW evaluation is to guarantee to each individual “an opportunity to participate actively in work without risk of procuring harm to his or her health and working capacity” and an effective protection “against discrimination at work...” (54).

Presently, the occupational physician is facing a variety of difficulties in the assessment of FFW, including the occurrence of ethical dilemmas, influence of different stakeholders, bureaucratic requirements and legal responsibilities within a complicated set of rules, and finally lack of proper tools and resources (45).

These difficulties are particularly relevant in the health settings where specific organizational aspects are quite different from those of other working sectors.

The ethical behaviour of the occupational physician is a result of individual choices based on ethical conscience inspired by the universally recognized principles of beneficence/non-maleficence, autonomy and justice. On the other hand, despite the unanimous consensus about their universal importance, these principles do not generally have the force of law, although in Italy the legislator explicitly introduced with Legislative Decree 81/2008 the obligation for the occupational physician to perform his/her activities according to the principles of the Code of Ethics of the ICOH (21, 29). However, it should be noted that it is not always possible to deal with ethical dilemmas based only on compliance with the law and that occupational health professionals should apply an analytical approach that, within the law, takes into account the ethical costs and benefits of all the involved parties (18, 53).

It is also worth mentioning article 16 - “Competence, integrity and impartiality” - of the ICOH Code of Ethics, where it is reported that “occupational health professionals must always act...in the interest of the health and safety of the workers ... must base their judgements on scientific knowl-

edge and technical competence... must refrain from any judgement, advice or activity which may endanger the trust in their integrity and impartiality” (29). This issue of impartiality that the occupational physician must be able to establish in the relationships between the various stakeholders (employee, employer, person responsible for prevention and protection service) is of fundamental importance, not only for a clear and as correct as possible FFW evaluation, but also to reinforce a credibility that the occupational physician may risk losing, associated with the loss of expertise in the event of any abdication of integrity and impartiality.

In addition to guidelines and directives aiming at helping professionals in taking appropriate decisions, more evidence-based and effective tools are required to be available in the near future. In addition to several studies on the topic, including different Italian contributions dealing with health surveillance in health care settings (7, 20, 38, 39), the working programme of the Cochrane Occupational Safety and Health Review Group (8) should be considered as a reference for the practice. In fact, the Group aims at reviewing literature data on health surveillance (including interventions based on FFW studies with a concurrent control group as well as interrupted time series) to assess its effectiveness in improving outcomes such as occupational and work-related disorders, occupational disability or sick leave and occupational injuries.

However, since FFW assessment is concerned with individual cases that present a considerable variability from one to another, it will probably not be simple to obtain easily shared and applicable guidelines. Therefore, in our opinion, the application of the precautionary principle (i.e. “the absence of evidence about harmful impact is not evidence of their absence”, otherwise “lack of scientific certainty must not be used as a reason to ignore or postpone preventive or remedial action when there are other good reasons to do so, as happened many times in the past”) should orientate the occupational physician’s practice (14), bearing in mind that work restrictions may not always be evidence-based and it might be difficult to balance rights and duties of patients, employers and occupational physicians (40). On the other hand, each occupa-

tional physician should evaluate the cost/effectiveness ratio of their FFW judgement over time, through the follow-up of workers with prescriptions and/or restrictions, in order to see if they actually achieved the desired goal and produced the expected benefits, not only for the worker himself but also for the employer, the company climate and society at large (5).

An old law in Italy (Royal Decree 530/1927) prescribed “medical examination to see if workers have the special requirements of resistance to the action of the noxious agents to which they must be exposed...”. To a reader who is not involved in everyday problems, what was promulgated 84 years ago might seem antique. Unfortunately, daily reality shows how, in a more or less disguised form, the attempts of pressure on the occupational physician occur very frequently to select subjects based on their “resistance”.

Finally, it seems worth pointing out that, even today, occupational physicians are frequently asked both by employers and workers to solve a variety of problems outside the range of their expertise. Obviously, the occupational health professionals, compared with this issue, will refer to the ethics that should guide their profession (29), taking into account the contents of the following two quotations that should be a warning to the occupational physician:

- “(deus) Pronaque cum spectant animalia caetera terram/os homini sublime dedit caelumque videre/iussit et erectos ad sidera tollere vultus” (Though all other animals are prone and fix their gaze upon the earth, he (God) gave to man an uplifted face and bade him stand erect and turn his eyes to heaven), from *Metamorphoseon libri*, by Publius Ovidius Naso 3-8 AD;
- “Zwei Dinge erfüllen das Gemüt mit immer neuer und zunehmender Bewunderung und Ehrfurcht, je öfter und anhaltender sich das Nachdenken damit beschäftigt: Der bestirnte Himmel über mir und das moralische Gesetz in mir” (Two things fill the mind with ever new and increasing admiration and awe, the oftener and more steadily we reflect on them: the starry heavens above me and the moral law within me), from *Kritik der praktischen Vernunft*, by Immanuel Kant 1788.

NO POTENTIAL CONFLICT OF INTEREST RELEVANT TO THIS ARTICLE WAS REPORTED

REFERENCES

- Alessio L, Abbritti G, Germanò D: Evaluation of fitness for work: the most challenging situations. *Med Lav* 2006; *97*: 488-490
- Alessio L, Farina G: Il giudizio di idoneità lavorativa specifica: atto conclusivo della sorveglianza sanitaria. *Med Lav* 2001; *92*: 227-238
- Alessio L, Porru S, Aparo UL, et al: *Linee Guida per la sorveglianza sanitaria dei lavoratori della sanità esposti a rischio biologico*. Pavia: SIMLII, 2005
- Baldisseri MR: Impaired healthcare professional. *Crit Care Med* 2007; *35*: S106-S116
- Burdorf A: Do costs matter in occupational health? *Occup Environ Med* 2011; *68*: 707-708
- Carayon P, Alvarado CJ: Workload and Patient Safety Among Critical Care Nurses. *Crit Care Nurs Clin N Am* 2007; *19*: 121-129
- Carrer P, Micheloni G, Campagna M, et al: Focus sulla sorveglianza sanitaria dei lavoratori della sanità esposti ad agenti biologici trasmessi per via ematogena: risultati e prospettive di un gruppo di lavoro multicentrico. *G Ital Med Lav Erg* 2010; *32*: 249-255
- Cochrane Occupational Safety and Health Review Group: <http://osh.cochrane.org> (page last updated: Tue 23rd Aug 2011)
- Costa G: Lavoro e invecchiamento. *Med Lav* 2010; *101* (Suppl 2): 57-62
- Crippa M, Bartolucci GB, Toffoletto F, Marcer G: Occupational diseases due to allergic and toxic chemicals in health care workers: fitness for work. *Med Lav* 2012; *103*: 187-197
- De Kort WL, Fransman LG, Van Dijk FJH: Pre-employment medical examinations in a large occupational health service. *Scand J Work Environ Health* 1991; *17*: 392-393
- De Kort WL, Uiterweer HWP, Van Dijk FJH: Agreement on medical fitness for a job. *Scand J Work Environ Health* 1992; *18*: 246-251
- Domino KB, Hornbein TF, Polissar NL, et al: Risk Factors for Relapse in Health Care Professionals With Substance Use Disorders. *JAMA* 2005; *293*: 1453-1460
- European Environment Agency: *Late lessons from early warnings: the precautionary principle 1896-2000*. Luxembourg: Office for Official Publications of the European Communities, 2001
- Faculty of Occupational Medicine: *Fitness for Work: The Medical Aspects - 4th Edition - Keith Palmer*, Robin Cox and Ian Brown (eds). New York: Oxford University Press, 2007
- Figà-Talamanca I: Occupational risk factors and reproductive health of women. *Occup Med* 2006; *56*: 521-531
- Franco G: The future of occupational health practice: reconciling customer expectation and evidence based practice. *Occup Med* 2001; *51*: 482-484
- Franco G: Analisi etica del processo decisionale nella pratica professionale del medico del lavoro. *Med Lav* 2005; *96*: 375-382
- Franco G: Agreement of medical decisions in occupational health as a quality requirement. *Int Arch Occup Environ Health* 2006; *79*: 607-611
- Franco G, Grandi P: Evaluation of medical decisions' effectiveness: a 4-year evidence-based study in a health care setting. *Int Arch Occup Environ Health* 2008; *81*: 921-928
- Franco G, Mora E: Attività del medico competente e obblighi etici secondo il nuovo testo unico sulla sicurezza sul lavoro (Decreto Legislativo 81/2008). *Epidemiol Prev* 2009; *33*: 116-121
- Guardini I, Deroma L, Salmaso D, Palese A: Stima del trend di invecchiamento della popolazione infermieristica di due ospedali del Friuli Venezia Giulia: applicazione di un modello matematico deterministico. *G Ital Med Lav Erg* 2011; *33*: 55-62
- Harrington JM: Research priorities in occupational medicine: a survey of United Kingdom medical opinion by the Delphi technique. *Occup Environ Med* 1994; *51*: 289-294
- Hill KS: Nursing and the Aging Workforce: Myths and Reality, What Do We Really Know? *Nurs Clin N Am* 2011; *46*: 1-9
- Iavicoli S, Rondinone B, Marinaccio A, Fingerhut M: Research priorities in occupational safety and health: a review. *Ind Health* 2006; *44*: 169-178
- Iavicoli S, Rondinone BM, Marinaccio A, Fingerhut M: Research priorities in occupational safety and health: a review. In: *Priorities in OSH*. Rome: ISPESL, 2008
- International Agency for Research on Cancer - IARC monographs on the evaluation of carcinogenic risks to humans, Volume 98: *Painting, Firefighting, and Shift-work*. Lyon: IARC, 2010
- International Commission on Occupational Health (ICOH) - Scientific Committee "Aging and Work": *Aging and work - Goedhard WJA* (ed). The Netherlands: ICOH, 1992
- International Commission on Occupational Health: *International Code of Ethics for Occupational Health Professionals*. Updated version 2002, available at http://www.icohweb.org/core_docs.asp

30. International Labour Organization: Technical and ethical guidelines for workers' health surveillance. Geneva: International Labour Office, 1998 (Occupational Safety and Health Series No. 72)
31. Italian National Federation of Nurses' Colleges: Report 2009. Rome: IPASVI, 2010
32. Italian National Federation of Physicians' Colleges: Report 3 and 28. Rome: FNOMCeO, 2011
33. Knottnerus JA, Van Weel C, Muris JWM: Evaluation of diagnostic procedures. *BMJ* 2002; *324*: 477-480
34. Magnavita N: Management of impaired physicians in Europe. *Med Lav* 2006; *97*: 762-773
35. Mahmud N, Schonstein E, Schaafsma F, et al: Pre-employment examinations for preventing occupational injury and disease in workers. *Cochrane Database of Systematic Reviews* 2010, Issue 12. Art. No.: CD008881. DOI: 10.1002/14651858.CD008881
36. Mavraforou A, Giannoukas A, Michalodimitrakis E: Alcohol and drug abuse among doctors. *Med Lav* 2006; *25*: 611-625
37. Nurses' early exit study: NEXT Scientific Report, July 2005 – Hasselhorn H-M, Müller BH, Tackenberg P, University of Wuppertal NEXT-Study Coordination (eds). Available at: www.next-study.net
38. Placidi D, Bacis M, Belotti L, et al: La tubercolosi. Focus sulla valutazione del rischio e la sorveglianza sanitaria dei lavoratori della sanità: risultati e prospettive di un gruppo di lavoro multicentrico. *G Ital Med Lav Erg* 2010; *32*: 273-281
39. Porru S: Il rischio biologico per i lavoratori della sanità: aggiornamenti e buone prassi alla luce di uno studio multicentrico: Introduzione. *G Ital Med Lav Erg* 2010; *32*: 232-234
40. Porru S, Crippa M, Lucchini R, et al: Fitness for work in difficult cases: an occupational medicine experience in a University Hospital. *Med Lav* 2006; *97*: 521-528
41. Porru S, Micheloni GP, Carrer P: Fitness for work in healthcare workers: biological risk. *Med Lav* 2012; *103*: 175-186
42. Riboldi L, Bordini L, Ferrario MM: Fitness for work in health care workers: state of the art and possible operational recommendations for its formulation and management in relationship to alcohol and drug addiction *Med Lav* 2012; *103*: 203-211
44. Rondinone BM, Bocconi F, Iavicoli S: Trends and priorities in occupational health research and knowledge transfer in Italy. *Scand J Work Environ Health* 2010; *36*: 339-348
45. Serra C, Rodriguez MC, Delclos GL, et al: Criteria and methods used for the assessment of fitness for work: a systematic review. *Occup Environ Med* 2007; *64*: 304-312
45. Soleo L, Romano C, Abbritti G, et al: *Linee Guida per la sorveglianza sanitaria*. Pavia: SIMLII, 2004
46. Taskinen H, Lindbohm M-L, Chia S-E: Female Reproductive Disorders. In: *Textbook of Occupational Medicine Practice - 3rd Edition - David Koh and Ken Takahashi (eds)*. Singapore: World Scientific, 2011
47. Tomei F, Saia B, Fiore P: Protection of third parties in current legislation and preventive practice. *Med Lav* 2006; *97*: 509-520
48. Verbeek J, Husman K, Van Dijk F, et al: Building an evidence base for occupational health intervention. *Scand J Work Environ Health* 2004; *30*: 164-170
49. Violante FS, Mattioli S, Camagni A, et al: Assessment of fitness for work in healthcare workers: biochemical risk factors. *Med Lav* 2012; *103*: 198-202
50. Wagstaff AS, Sigstad Lie J-A: Shift and night work and long working hours- a systematic review of safety implications. *Scand J Work Environ Health* 2011; *37*: 173-185
51. Wang L-L, Chen C-K, Hsu S-C, et al: Active Job, Healthy Job? Occupational Stress and Depression among Hospital Physicians in Taiwan. *Ind Health* 2011; *49*: 173-184
52. Wegman DH: Aging and globalization. *Med Lav* 2006; *97*: 137-142
53. Westerholm P, Nilstun T, Ovreteit J: *Practical ethics in occupational health*. Oxford: Radcliffe Medical Press, 2004
54. World Health Organization: *Global Strategy on Occupational Health for All – The way to Health at Work*. Geneva: WHO, 1995
55. World Health Organization: *The World Health Report 2006: working together for health*. Geneva: WHO, 2006