

Current Comments

Multidimensional aspects related to shiftworkers' health and well-being

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Keywords

Occupational health. Shift work. Workers. Health promotion. Working conditions. Work hours.

Abstract

The impact of shift and night work on health shows a high inter- and intra-individual variability, both in terms of kind of troubles and temporal occurrence, related to various intervening factors dealing with individual characteristics, lifestyles, work demands, company organisation, family relations and social conditions. The way we define "health" and "well-being" can significantly influence appraisals, outcomes and interventions. As the goal is the optimisation of shiftworkers' health, it is necessary to go beyond the health protection and to act for health promotion. In this perspective, not only people related to medical sciences, but many other actors (ergonomists, psychologists, sociologists, educators, legislators), as well as shiftworkers themselves. Many models have been proposed aimed at describing the intervening variables mediating and/or moderating the effects; they try to define the interactions and the pathways connecting risk factors and outcomes through several human dimensions, which refer to physiology, psychology, pathology, sociology, ergonomics, economics, politics, and ethics. So, different criteria can be used to evaluate shiftworkers' health and well-being, starting from biological rhythms and ending in severe health disorders, passing through psychological strain, job dissatisfaction, family perturbation and social dis-adaptation, both in the short- and long-term. Consequently, it appears rather arbitrary to focus the problem of shiftworkers' health and tolerance only on specific aspects (e.g. individual characteristics), but a systemic approach appears more appropriate, able to match as many variables as possible, and aimed at defining which factors are the most relevant for those specific work and social conditions. This can support a more effective and profitable (for individuals, companies, and society) adoption of preventive and compensative measures, that must refer more to "countervalues" rather than to "counterweights".

Descritores

Saúde ocupacional. Trabalho em turnos. Trabalhadores. Promoção da saúde. Condições de trabalho. Jornada de trabalho.

Resumo

O impacto do trabalho noturno e em turnos sobre a saúde demonstra ter grande variabilidade entre os indivíduos e num mesmo indivíduo, em termos tanto dos tipos de problemas como da ocorrência temporal, relativas a vários fatores interferentes como características pessoais, estilo de vida, exigências do trabalho, organização da empresa, relações familiares e condição social. O modo como "saúde" e "bem-estar" são definidos pode interferir significativamente com a avaliação, resultados e intervenções. Como o objetivo é otimizar a saúde dos trabalhadores em turnos, é necessário ir além da proteção da saúde e agir para a promoção da saúde e ter a participação de não apenas profissionais da área das ciências médicas, mas também

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outros agentes (ergonomistas, psicólogos, sociólogos, educadores, legisladores), assim como dos próprios trabalhadores. Foram propostos vários modelos com o propósito de descrever as variáveis interferentes que intermedeiam e/ou moderam os efeitos. Esses modelos buscam definir as interações e conexões entre os fatores de risco e resultados por meio de várias dimensões humanas, que remetem à fisiologia, psicologia, sociologia, ergonomia, economia, política e ética. Assim, podem ser usados diferentes critérios para avaliar a saúde e o bem-estar dos trabalhadores em turnos, de ritmos biológicos a graves transtornos de saúde, passando por tensão psicológica, insatisfação no trabalho, transtorno familiar e má adaptação social a curto e longo prazo. Como resultado, parece um tanto arbitrário enfatizar o problema da saúde e tolerância dos trabalhadores em turnos apenas sob aspectos específicos (por exemplo, características pessoais) e parece ser mais apropriada uma abordagem sistemática, capaz de combinar o maior número possível de variáveis e direcionada a definir os fatores mais relevantes aos tipos particulares de trabalho e condições sociais. Isso pode servir de respaldo para a adoção de medidas preventivas e compensatórias mais eficazes e proveitosas (para indivíduos, empresas e sociedade) que precisam remeter mais a “contravalores” do que a “contrapesos”.

INTRODUCTION

The interaction between shift work, health and well-being is a complex and multifaceted matter, concerning personal characteristics, working and living conditions, and involving several different dimensions of human life, referring to physiology, psychology, pathology, sociology, ergonomics, economics, politics, and ethics.

Before getting deeply into such an intricate subject it is necessary to mark the meaning of “health” and “well-being”, in order to better understand how we can analyse and describe the relation between shiftwork and health, and, above all, what the different implications are in terms of actions we can take and roles we can play.

DIFFERENT PERSPECTIVES OF APPROACH TO SHIFTWORKERS' HEALTH

In its simplest and most popular version the word “health” means “absence of disease”. In 1946, the World Health Organization defined “health” as the “state of complete physical, emotional, and social well-being, not merely the absence of disease or infirmity”.³⁰ The first definition is mainly posed in negative terms and oriented to “objective” assessment, dealing almost exclusively with the medical domain; on the contrary, the second one is positively and more subjective-oriented, and it deals mainly with the psycho-social domain, thus including “well-being”.

It is important to recognize such different perspectives, as they are both currently used in assessing shiftworkers' health and, either intentionally or un-

consciously, they can influence and address appraisals, outcomes and interventions differently.

It is quite clear that shiftwork-related problems fit well with the WHO's definition, as shiftwork interferes with all those dimensions, perturbing psychophysical homeostasis (e.g. circadian rhythms, sleep, performance), hampering family and social relations, as well as being a documented risk factor for many health disorders, concerning in particular the gastrointestinal, neuropsychological, cardiovascular and reproductive functions.¹³

Consequently, our goal has to be the optimisation of shiftworkers' health, and not only the prevention of diseases they might suffer. In other words, it is necessary to go beyond the field of health protection and to act mainly in the domain of health promotion.

The first perspective is in fact more oriented to the individual, while the second one to groups and communities. Thus, they imply the contribution of different actors: mostly occupational health physicians or people related to medical aspects in the first case, in which the shiftworker is considered as a passive patient subjected to periodical screenings; mainly social actors (ergonomists, psychologists, sociologists, educators, legislators) in the second one, where the shiftworker is asked to participate actively in the solution of the problems.

Moreover, on the side of health protection, we have to refine their medical surveillance, which implies the adoption of sometimes complex diagnostic tools for the evaluation of their fitness to work and/or disability, with consequent therapeutic, rehabilitative

and compensative actions, and related costs. On the other hand, for health promotion, we have to turn our actions to support and improve their work ability by means of ergonomics and work organisation, in order to achieve the best possible results both for the work community (including the company's demands) and the whole society.

These perspectives can have different implications in terms of appraisal of the health consequences. On the one hand, the aspects related to the individual dimension refer mainly to Clinical Medicine; on the other hand, the community dimension refers mainly to Public Health, that is what C.E.A. Winslow in 1920 defined as "the science and art of preventing disease, prolonging life and promoting health and efficiency through organized community effort".²⁹

Consequently, in the first (individual) case, our approaches and connected strategies are mainly aimed at defining whether or not a trouble or a disease is related to shift work, and whether or not it can be considered as an occupational disease; that has implications in terms of compensation, forensic medicine and employability: in other words, we have to define what the "risk/benefit" ratio for the worker is, and if it is acceptable or not.

In the second (community) case, we are mainly driven by an epidemiological approach, aimed at defining the extent and the severity of the risk factors, and related effects, in order to address the most appropriate preventive measures, and to achieve the best possible "cost/effectiveness" ratio for the workers and their work and social communities.

Therefore, depending on the different domains we are going to address, we can refer to different parameters to evaluate shiftworkers' health and well-being and to drive our consequent interventions. In general, most studies (in particular those based on medical and psycho-physiological topics) are oriented to health protection; others (more sociologically and ergonomically based) are oriented to health promotion. Consequently, the criteria we can use for the analysis and description of health effects and their mechanisms deal with several dimensions, starting from biological rhythms and physiological adjustments and ending in severe health disorders, passing through psychological strain, job dissatisfaction, family perturbation and social mal-adaptation, both in the short- and long-term.

SEVERAL MODELS AND METHODS OF HEALTH ASSESSMENT AND PREVENTION

Starting from the classical model proposed by

Rutenfranz,²² many authors built up other more complex models aimed at describing the many intervening variables mediating and/or moderating the effects, in an attempt to understand their interlinks and interactions, as well as to define rational pathways connecting the different dimensions, which characterise the stress due to shift and night work and its consequent impact on health and well-being.^{1,2,5,8,12,16,19,23}

In the frame of the stress-strain model, they emphasise both occupational and non-occupational stressors, as well as cognitive and behavioural coping efforts and strategies: some models focus more on personal aspects, others deal more with organisational and social conditions.

Their number testifies to the complexity of the problem and the difficulty in combining factors pertaining to different domains, also because many relations between and among factors are still speculative and not fully supported by the evidence of data collected up-to-now.

In fact, the problem is multidimensional and multifaceted in terms of:

- a) external risk factors: i.e. work load and environment, family and social conditions;
- b) individual aspects: i.e. age, gender, personality, attitudes, coping strategies;
- c) outcomes and targets: i.e. circadian adjustment, sleep troubles, performance efficiency, mental health, physical health, family life, social integration, work satisfaction, work ability;
- d) interactions among factors and effects: i.e. dose/response (circadian rhythms, hormonal strain, sleep), dose/effect (health troubles, family life), up/down regulation (association, enhancement, compensation), mediators/modulators, confounders; short/long-term action;
- e) importance, priority and feasibility for the individual, companies, communities, and the whole of society;
- f) actions: i.e. legislation, work organisation, working time arrangements, social support, group/individual education;
- g) domains describing human life, such as: physiology (i.e. circadian rhythms, sleep, performance, health); psychology (i.e. behaviours, coping, commitment); sociology (i.e. family life, social integration, social disparities); ergonomics (i.e. working hours, work load, participation); economics (i.e. work management, production/services strategies); politics (i.e. legislation, work contracts); ethics (philosophy, religion, culture).

It is quite clear that these interfere and interact with each other and when one changes the others are in-

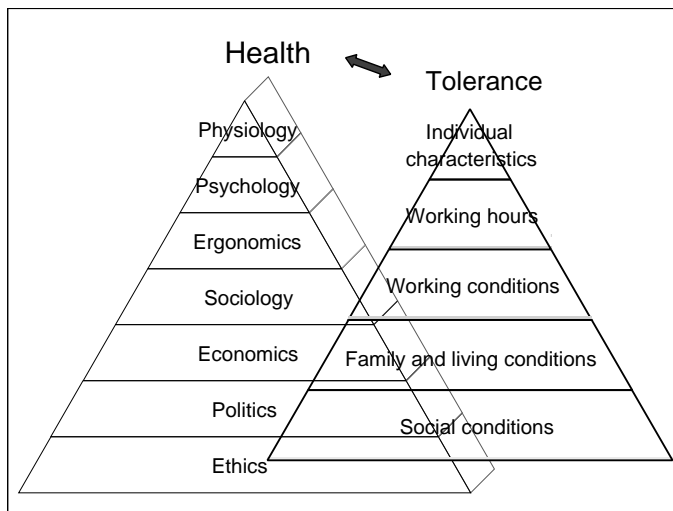


Figure - Dimensions describing shiftworkers' health and well-being, and factors influencing tolerance to shift and night work. Their position in the pyramid structures does not reflect a hierarchical order, but their more or less large sphere of interference with the individual worker.

fluenced. Of course, the more holistic the approach is, the more possibilities exist for fully understanding the problem and, consequently, for adopting the best actions and countermeasures. On the other hand, the more specific the appraisal is, the more detailed and deep the analysis can be, but the higher the risk is of "losing the picture" and consequently not being able to define the most congruent actions.

We certainly need both approaches: the micro one to clarify the mechanisms, the macro one to understand the scenarios. They have to be combined to obtain the best possible results. For example, the higher prevalence of cardiovascular diseases in shiftworkers (see Boggild & Knutsson⁴ for a review) deals with the physical domain, but their physio/pathological mechanisms deal with many other domains, i.e. physiology (sex), psychology (personality), sociology (lifestyles), work management (work load). Moreover, the actions we can carry out also deal with other dimensions (i.e. work and social organisation, health politics), which in turn affect psycho-physical aspects.

THE MULTIFACETED ASPECTS OF TOLERANCE TO SHIFTWORK

Shiftworkers' health and well-being are the consequence of more or less balanced interactions among all the factors dealing with such domains: that is reflected in what we call "tolerance" to shift and night work (Figure).

The factors intervening in influencing tolerance,^{21,24} with a more or less severe impact on health and well-being, deal with many aspects pertaining to several

dimensions related to: a) individual characteristics, i.e. age, gender, biological temporal structure, physical fitness, personality traits (e.g. neuroticism), personal behaviours (i.e. morningness, sleep strategies, commitment); b) family and living situations (i.e. marital status, number and age of children and co-habiting persons, housing comfort, partner's job); c) social conditions (income level, participation in community activities, public services and social protection, labour market restrictions and discrimination; commuting; d) work organisation (i.e. job demands, working hours, shift schedules, health surveillance) (see Costa,⁶ for a review).

These factors can have different effects (e.g. physical health, mental health, social relations) according to the circumstances and ways of interaction (e.g. addition, enhancement, compensation), and the consequent result depends not only on the specific load of each factor, but mainly on how much and how long they interact and interfere with each other in relation to the peculiar conditions of each individual or group of shiftworkers. They may also have significant implications on productivity, company strategies and social organisation, which in turn influence individual health and well-being.

It is worth mentioning that, in relation to the different combinations, we can notice a high inter- and intra-individual variability,^{17,25} both in terms of short-term adaptation and long-term tolerance (which should not be mixed up!), as concerns the level of imbalance of well-being and the type and severity of health troubles and disorders.

Thereby, it seems neither reasonable nor acceptable to limit the evaluation of shiftworkers' health and tolerance to specific aspects, as it can lead not only to a distorted appraisal of their condition, but it also makes difficult (if not impossible) to define the most proper interventions and countermeasures,^{11,14} taking into account the many interrelations occurring.

Furthermore, the closer the correspondence is, in terms of dimensions and domains, between the risk factors and the preventive and compensative measures adopted, the higher the benefits are, deriving from the actions undertaken. That implies we should act more by means of "countervalues", that is interventions aimed at reducing or eliminating the risk factors and inconveniences, rather than by means of "counterweights", that is interventions aimed only at compensating for the inconveniences.^{26,28}

We can outline such a perspective dealing with some relevant problems which characterise present shiftworkers' conditions: that is the progressive ageing of the working population, the increasing prevalence of women in the workforce, and the globalisation of the labour market.

Ageing can cause a reduced tolerance to shift and night work in relation to an increased vulnerability due to physical aspects (i.e. reduced psycho-physical health, decreased restorative properties of sleep, higher proneness to internal desynchronization), but it can also favour a better tolerance according to psycho-social factors: i.e. higher commitment, more appropriate coping strategies, more satisfactory job positions⁹. Consequently, actions for older shiftworkers should not only refer to physiological and medical evaluations concerning physical health (which could even lead to dangerous effects in terms of age discrimination and unemployment), but mainly to interventions in work organisation (i.e. reduced physical work load, more flexible working hours), as well as social support (i.e. permanent education, better housing and public services).

Also as women are concerned, although no significant differences between sexes in terms of chronological adjustments to temporal changes are detectable, there are some specific biological aspects that can mediate peculiar effects in terms of reproductive health: i.e. menstrual disorders, increased risk for spontaneous abortion, pre-term birth and lowered baby's birth-weight.¹⁸ However, it has been pointed out that women's tolerance is more related to family and social determinants: women shift workers in fact (in particular those with small children) have more difficulties in combining their irregular working schedules with their additional domestic duties, and thus suffer more from sleep problems and chronic fatigue.^{3,7} Therefore, consequent actions have not only to guarantee a higher protection for women shiftworkers by proper legislation (i.e. exemption from night work when pregnant), but also to support them by means of suitable social services (i.e. kindergartens, school and shop timetables) and working time arrangements (i.e. flexible working hours).

Third, labour-market globalisation carries not only a positive interracial mixing and a wider distribution of

goods and services all over the world, but also causes an increasing flow of poor people from developing to developed countries, that is very often associated with racial and social discriminations; whereas, in the opposite direction, we can see a transfer of dangerous substances and technologies, as well as of long and irregular working hours. Many surveys in developing countries have shown that less favourable living and social conditions, often connected with both poor working conditions and long working hours, may aggravate the impact of shift and night work on health.^{15,20} On the other hand, immigrant people are those who have to face more unfavourable working conditions, including bad shift systems, in the industrialised countries. Consequently the actions that have to be undertaken in this perspective deal not only with the psycho-physical domain, but mainly with the social one, in terms of political and economic strategies as well as ethical choices.

CONCLUSIONS

It seems quite clear that the problem of shiftworkers' health and well being, and their consequent tolerance to shiftwork, is multifaceted both in its origins and in its temporal and subjective/objective manifestations; consequently, it needs a systemic and systematic approach, able to take into account the many domains involved, which can differently affect the outcomes according to their several interactions. That, in turn, addresses the interventions at their best through their more balanced integration between individual aspects and community policies.

Although more difficult, this is the only way that has a chance of avoiding some uncritical evaluations of (mal)adaptation, (in)tolerance and (un)fitness to shift and night work based on particular or limited aspects (i.e. some individual characteristics and/or behaviours) not sufficiently supported by scientific data and longitudinal studies.²⁷ That can lead to a risky and even dangerous (i.e. for employment) attitude for selection of shift workers, without taking into consideration the whole context both in terms of (shift)work organisation and social conditions, which in many cases are the most relevant intervening factors, and towards which more profitable (both for subjects and companies, as well for society) interventions should be addressed.¹⁰

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