12-Hour Shifts and Workload in a Canadian Refinery

Bourdouxhe M. A, Quéinnec Y. B, Guertin S. C

A Institut de recherche Robert-Sauvé en santé et sécurité du travail (IRSST), Montréal, B Université de Toulouse-2, France
C Ergo-Norme inc., Consultant, St-Ignace-de-Loyola, Québec

Objectives

No work schedule exists in isolation: both workload and conflicts between work schedules and biological and social rhythms are at the root of observed net effect on workers’ health and safety and operational reliability (Prunier-Poulmaire and Gadbois, 1998). The 12-hour shifts were studied in a Canadian refinery where operators have been working this work schedule for more than 20 years (Bourdouxhe et al., 1998, 1999). The overall assessment comprised seven themes; this communication presents the results on fatigue, workload, and safety.

Operators' work and schedules

The 160 operators spend an average of 60% of their time in the control room, and the remaining 40% is spent in outdoor inspections consisting of the verification of major equipment, detection of leaks and fire hazards, and validation of computer data. The operators are divided into 4 crews. They work 12-hour shifts, beginning at 06:30 and 18:30, for a nominal total of 37,1/3 hours per week. The schedule follows a 54-day cycle with rotation on every three day: DDD---DDD---NNN---NNN--- etc., and a free weekend out of three. In fact, it rapidly became apparent that operators’ real work schedule differed significantly from their nominal one. The analytical model was therefore modified to include these differences.

Materials and methods

Previous studies have reported correlations between impaired performance of computer-based work and the known dips in chronobiological rhythms between 02:00 and 04:00, and in early afternoon (Folkard and Monk, 1979; Andorre and Quéinnec, 1998). To determine whether similar circadian variations existed in outdoor control and monitoring activities, 12 operators were observed continuously over 6 day- and 6 night shifts. Three-hour means were plotted for each activity analysed. In addition, conventional ergonomic analysis produced an inventory of motor, sensory-motor, cognitive, and communication activities, with an emphasis on circadian variation. Eighty operators and their spouses responded to questionnaires adapted from the Standard Shiftwork Index (Barton et al., 1995). Real and nominal schedule of 78 operators were studied over a 54-day cycle. Work absences over 19 years, and 291 occupational accidents were also analysed, using Ascending hierarchical classification (Benzécri & Benzécri, 1984) to identify accident scenarios typical of various tasks.

Results

Sleep disorders and chronic fatigue were the main problems directly related to work schedules, and more specifically, to shift duration. But analyses also revealed that workload was much higher during day shifts and exceeded the capacities of the shift crews. This manifested itself as a marked dip in the graph of monitoring activity at the end of the morning. This dip reflects interference with work for maintenance and technical staff, who only work during the day; it is even larger than the classic nocturnal chronobiological dip expected and observed between 02:00
and 04:00. Analysis of the ratio of the number of accidents to the number of monitoring activities per 3-hour segment revealed that interference with secondary tasks had the effect of increasing the number and severity of accidents (Figure 1). Analysis of work absences confirmed the inadequacy of the nominal schedule and staffing level to both production imperatives and operators' needs. Furthermore, overtime work was so prevalent that the mean duration of the real work week was of the order of 42-50 hours, which contradicts the nominal duration of $37^{1/3}$ hours. In conclusion, understaffing during day-shifts has repercussions on the schedule itself, increases workload and fatigue, and reduces safety and reliability. These results confirm the importance of detailed evaluation of tasks and the number and composition of work teams prior to establishing work schedules.

![Figure 1: Numbers of outdoor activities for process control during the 24-hour cycle (means for 12 operators on 6 day- and 6 night shifts). Circadian distribution of 291 accidents suffered by 66 operators](image)

**References**


Small size entreprises (SSE’s) are known to suffer from both lack of resources and difficult access to information in relation to occupational health and safety (OHS) management. It is however impossible to reach and support them individually hence concerned researchers and OHS councilors and specialists have oriented their search for solutions to account for these constraints. An action-research project aiming for the elaboration of safety checklists for SSE’s in the garment and metal products industries has been carried out in Québec during the year 2000-2001.

The goal of safety checklists is to provide support to SSE’s for the identification of characteristic risks and solutions and the elaboration of an action plan. The tools must be attractive and easy to use, and must propose simple, concrete solutions. Two checklists were developed by two teams of experts (ergonomists, hygienists, prevention counsellors from OHS sectoral associations and inspectors) in collaboration with the researchers. The elaboration of the contents themselves proved a trying exercise: the checklists are the reflection of significant compromise between varied expertise and perspectives, they must also respond adequately to constraints associated to SSE’s themselves.

The elaboration of both the structure and the contents of the checklists involved repeated questioning and discussion of a wide array of dimensions, such as the inclusion of arguments most susceptible to generate interest in the checklists and facilitate their use, agreement on principles pertaining to the hierarchy of risks and solutions, the construction of mutually acceptable compromise in propositions for solutions, presentation of information related to applicable regulation as well as, last but not least, choice of vocabulary. The presentation will focus on sections of the checklists which illustrate the kind of difficulties encountered by the collaborators, particularly those elements which stressed different professional views and required the most difficult compromise.
Le développement de grilles d’auto-diagnostic en santé et sécurité du travail pour les petites entreprises: Une approche pragmatique et concertée

D. Champoux, J.-P. Brun
IRSST, Université Laval

Le manque d’information et de ressources pour la prise en charge adéquate de la prévention dans les petites entreprises (PE) ainsi que l’impossibilité pour les intervenants de les soutenir individuellement sont au nombre des facteurs qui ont orienté des chercheurs et des intervenants en santé et sécurité du travail (SST) dans la recherche de solutions. Une recherche-action réalisée au Québec au cours de l’année 2000-2001 a comme objectif principal l’élaboration de deux guides d’auto-diagnostic et d’identification de solutions pour les principaux types de risques présents dans les PE des secteurs manufacturiers de l’habillement et de la fabrication de produits en métal.

Deux grilles d’auto-diagnostic ont été élaborées par deux équipes d’intervenants-experts en SST (des ergonomes, hygiénistes et conseillers en gestion de la prévention d’associations sectorielles paritaires et des inspecteurs), en collaboration avec les chercheurs. Outre la mise en commun d’expertises et de perspectives variées, l’exercice requérait l’adaptation à des contraintes importantes associées aux caractéristiques des entreprises ciblées et à l’objectif de développer un outil succinct, facile à utiliser et proposant des solutions pour soutenir la prise en charge de la SST.

La présentation d’éléments les plus susceptibles de susciter l’intérêt et de favoriser l’utilisation des grilles, la formulation de principes relatifs à la priorisation des risques et des solutions retenus, la construction de compromis mutuellement acceptables quant au niveau de détail lors de l’identification de solutions concrètes, la prise de position en ce qui a trait à l’information relative à la réglementation, le choix du vocabulaire approprié, sont autant de dimensions importantes qui ont confronté les deux équipes d’experts et les chercheurs au cours de l’élaboration des grilles d’auto-diagnostic. L’essentiel de la communication portera sur des sections de grilles permettant d’illustrer le genre de difficultés posées aux collaborateurs lors de l’élaboration des contenus, de manière à faire ressortir les contradictions, les compromis de même que les questions associés à ce genre d’outils.
BACKGROUND: Unemployment has been repeatedly associated with suicide; however, whether the association is causal remains unclear. Little is known on the relationship of part time work and suicide. The objective of this study is to compare the relationships between unemployment, part time work, non-labour force participation and full time work with suicide behaviour after controlling for potential confounding factors.

METHODS: This study is based on a unique research database which combines longitudinal information for on individual encounters with the Manitoba health care system over a seven year period (1983-1990), with detailed information on social, economic and occupational characteristics provided by a 5% sample of Manitoba respondents to the Census 2B form in 1986. Employment status was defined as either full time employed (n = 10,397) part time employed (less than 48 weeks per year and/or 30 hours per week) (n= 8,119) unemployed ( n= 1,739) or out of the labour force ( n= 7,019). Individuals who attempted suicide after the census (n = 144) were identified using established definitions based on hospital claims to only identify serious attempts.

RESULTS: Step wise multiple logistic regression which controlled for the effects of age, gender, education, area of residence, marital status, ethnicity, living with a full time employed individual, living in the same dwelling for five years, household income, and previous mental health care and suicide attempts in the period prior to census (April 1,1983 to June 5, 1986), revealed that unemployment (Odds Ratio (OR) 3.68, 95% confidence intervals (95%CI) 1.76-7.71, part time work (OR 1.99, 95%CI 1.07-3.71) and being out of the labour force (OR 2.11, 95%CI 1.12-3.97) were all associated with attempted suicide. Compared to the reference category of 52 weeks of work in the year prior to the census, a progressive increase in the reported adjusted odds ratios for attempted suicide was observed for working 26-51 weeks (OR 1.40 (95% CI 0.67 – 2.90)), 1-25 weeks (OR 2.22 (95% CI 1.05 – 4.70)), and zero weeks (OR 2.90 (95% CI 1.04 – 8.09)). In stratified analyses part time work, unemployment, and being out of the labour force remained important predictors of suicide behaviour in the group who did not live with a full time employed individual or had under the median income. The occupational status variables were more important predictors of attempted suicide in women than in men.

CONCLUSIONS: All three groups of individuals who were not working full time had an elevated likelihood of attempted suicide after adjustment for potential confounding factors suggesting that working full time is protective against suicide behavior. Our finding that part time work is also associated with suicide behavior, even after adjustment for potential confounding factors and stratification, is consistent with adverse health effects of underemployment. Suicide behaviour which is due to lack of full time work may be more preventable than other causes of suicide and may be decreased by social policies that limit "under"and unemployment.
Building Engagement With Work

Michael P. Leiter
Centre for Organizational Research & Development, Acadia University, Nova Scotia

Relationships with work range from a burnout characterized by exhaustion, cynicism, and ineffectiveness to engagement with work characterized by energy, involvement, and efficacy. A significant challenge for promoting workplace health is identifying qualities of organizational environments that move people away from burnout and towards engagement with work. European policy makes have noted the importance of this issue as long-term workplace disability claims based on burnout, stress, and depression have overtaken those based upon muscular-skeletal problems.

Responses to a survey of 2800 health care workers in Canada examined relationships with work in reference to six areas of worklife: workload, control, reward, community, fairness, and values. The analysis tested a model that considers the predictive power of areas of worklife in reference to the dimensions of energy, involvement, and efficacy. It also encompasses relationships among these six areas of worklife as a step towards developing a comprehensive model of worksettings in reference to occupational health. The analysis substantiated the model. The analysis compared responses from various occupational groups working within the hospital in reference to resources and demands associated with their roles.

The presentation contrasts the findings of the Canadian study with a parallel survey of health care organizations in Europe, indicating shared and distinct qualities of the two settings.

The presentation considers as well the use of strategic planning in organizations as a means of developing interventions to address pervasive problems in occupational health. The complementary processes of strategic planning and strategic thinking in regard to developing workplace environments encompass essential qualities of participation, creative problem solving, and intelligent opportunism. The presentation describes the role of an organizational checkup—a survey assessing critical areas of worklife—in developing and assessing an action plan.

Productive, fulfilling relationships with work are fundamental to supporting a positive quality of life and maintaining health in the workplace as a major life arena. This research contributes to defining a model of engagement with work with a potential to support more productive and pleasant places to work.
CAW/McMaster Blood Pressure Project

Wayne Lewchuk (McMaster), David Robertson (CAW),
Donald Cole (UofT & IWH), Mickey Kerr (IWH), Ted Haines (McMaster),
Dorothy Wigmore (McMaster), Joe Zsoldos (CAW)

This project explores the relationship between work organization and health in the automobile industry. It builds on earlier work by Lewchuk & Roberston on the impact of lean production on autoworkers and the Karasek "job strain" model.

We have developed a new survey instrument that works with the original decision latitude/psychological demands constructs of Karasek. The instrument is sensitive to the unique characteristics of work in repetitive line paced manufacturing plants.

We are collecting "point" blood pressure readings on the shop floor from approximately 10% of the work force. These readings are meant to reflect blood pressure while working. We ask about 15% of those who provide a "point" blood pressure reading to also wear an ambulatory monitor for 24 hours.

Our presentation will be based on results from three vehicle assembly plants and a set of office workers. It will be broken down into three sections. In the first section we will discuss the relationship between the measures of workload and decision latitude that we have developed and the original Karasek constructs. We will look at new ways of measuring "job strain". Section two will look at the "point" and ambulatory blood pressure readings, their relationship to each other and the prevalence of hypertension in automobile plants. Section three will discuss the relationship between our new measures of job strain and our blood pressure readings.
The Impact of Restructuring on the Health and Well-Being of Home Care Workers

Isik Urla Zeytinoglu, Margaret Denton and Sharon Webb
McMaster University

In the last five years, the home care system in Ontario has been restructured to a system of “managed competition” where agencies bid for contracts through a Request for Proposal (RFP) process. At the same time, hospitals are discharging patients quicker and sicker. The purpose of this paper is to examine the impact of restructuring on the health and well-being of home care employees. Results of interviews with 59 agency representatives such as directors, senior managers, union representatives, and board members of eleven home care agencies in a medium sized city in Ontario are analyzed for themes using NUD*IST software for qualitative data. Home care agencies include both ‘for-profit’ and ‘not-for-profit’ agencies which employ clerical staff, case managers, nurses, therapists and home support workers. Results show that health care restructuring has resulted in heavier workloads, more complex work, an increase in unpaid work, less time for the caring aspects of work, job insecurity, increased stress, low morale, physical injuries and health and safety risks for employees. Results also show that interviewees consider home care restructuring to be more detrimental to employees of non-profit home care agencies than employees of for-profit agencies. When asked what the agencies are doing to promote workplace health, respondents reported providing staff with health and safety committees, training sessions, employee assistance programs, supportive environments, and employee recognition events. Results of this study suggest that these health promotion activities are not enough. Drastic structural changes are needed to the home care system in Ontario in order to improve the work-related health of home care employees.

Acknowledgment
This project is funded by the Ontario Workplace Safety and Insurance Board (WSIB)
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