just entering this area of occupational health, and an inter-
change among the research delivery communities on what else
may or may not help and why.

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MULTIPLE JOB STRESSORS OF NIGHT AND ROTATING
SHIFT WORKERS THAT AFFECT HEALTH AND
WELLBEING: BASIS FOR COMPREHENSIVE
INTERVENTIONS FOR THEIR SOLUTIONS

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Multiple workplace xenobiotic, physical, and psychosocial fac-
tors can affect employee wellbeing and health, particularly
when working nights. The human circadian time structure
(CTS) is an unappreciated, yet potentially important considera-
tion to establishing threshold limiting values, employee biolog-
ical monitoring (BM) procedures, and recommended biological
exposure indices (BEIs). Encounters by night workers, before
CTS adjustment, to potentially harmful workplace contami-
nants and stressful physical conditions, occur during a differ-
cent circadian stage than day workers. Numerous animal and
human investigations document prominent circadian patterning
in the biological tolerance to a broad array of chemical, bio-
logical, and physical stressors often found in occupational set-
tings. Time-qualified for biological rhythms reference values,
several currently utilised in clinical laboratory medicine, are
likely to be of relevance to employee surveillance. Workplace
psychosocial factors are additionally of great importance to
employee wellbeing, with several demand-control-social sup-
port and effort-reward imbalance models serving to assess det-
rimental outcomes. Despite recognition the psychosocial
workplace milieu can affect the physical and psychological
health of day workers, there is a scarcity of knowledge of its
impact on night and shift employees. Some studies indicate
low job control, high physical demands, low supervisor social
support, and high overcommitment can be more problematic
for night than day shift workers. At-work violence is an addi-
tional psychosocial stress, with police officers, security person-
nel, bank employees, professional drivers, and other service
employees in regular contact with the public, in particular, at
elevated risk. The severity of workplace violence problems
and their consequences is probably underestimated, especially
when co-existing among stressors with known impact on
workers’ health. Practical considerations and recommendations
for action to mitigate the effect of these multiple job stressors
of particularly high relevance to night and shift workers are
presented.

SLEEPINESS AND VIGOUR IN AIRLINE GROUND CREW
SHIFT WORKERS MOVING FROM 8- TO 12-HOUR
ROTATING SHIFT SCHEDULES: A PILOT FIELD STUDY

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Objective To investigate the effects of transition from 8- to
12 hour shifts on sleepiness and vigour of employees during
morning and night shifts.

Methods Thirty-nine airline ground crew shift workers (mean
age 38.9±8.2 y; mean seniority 13.9±7.1 y, 19 male) volun-
teeered in a pilot study. During each round, employees were
assessed during one morning and two night shifts, by com-
pleting a sleepiness questionnaire (the Karolinska Sleepiness Scale,
KSS) hourly, and a vigour questionnaire (3 times in the
8 hour, 4 times in the 12 hour rounds) per shift. Repeated
measures ANOVA was performed to compare changes in
sleepiness and vigour levels in 8 hour and 12 hour shift plans,
during day and night shifts.

Results For morning shifts main effects were found for sleepi-
ness [F(3,58)=13.1, p<0.001] and for shift plan [F(1,18)=7.4,
p<0.014]. Sleepiness levels rose throughout both morning
shifts, and were lower during the 12 hour than during the
8 hour shifts. Furthermore, main effects were found for vigour
[F(1,25)=11.37, p<0.001] and for shift plan [F(1,18)=14.87,
p<0.001]. Vigour levels decreased in both morning shifts, and
were higher during 12 hour shifts than in the 8 hour shifts.
No interactions were found.

For night shifts main effects were found for sleepiness
[F(1,18)=9.9, p<0.001], and for sleepiness*shift plan
[F(3,41)=3.2, p<0.023]. During the 8 hour round, sleepiness
consistently increased with a slight decrease towards the end
of the shift, while in the 12 hour round sleepiness increased
until 04:00 am, after which there was a decrease and again
increase towards the end of the shift.

Furthermore, main effects were found for vigour
[F(1,25)=11.37, p<0.001], and for shift plan [F(1,18)=14.87,
p<0.001], during the 12 hour shift round participants’ vigour
levels were higher than in the 8 hour shift round. Vigour lev-
els decreased during the night in both rounds, no interaction
was observed.

Conclusion An overall improvement was observed in somno-
ence and vigour indices of employees after the transition to
12 hour shift, which appears to be preferable over the 8 hour
shift.

SLEEPY ON THE NIGHT SHIFT? BIO-PsyCHO-SOCIAL
FACTORS OF SUBJECTIVE SLEEPINESS IN FEMALE
NURSES DURING THE NIGHT SHIFT

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Abstracts

**1602d BREAST CANCER AND SHIFT WORKING IN A LIGHT POLLUTED WORLD**

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**Introduction** Breast cancer (BC) is increasing worldwide together with light pollution (LP) emerging from various outdoor and indoor sources. Results of different studies including our research centre report on the relations between BC-incident and exposure to Artificial Light at Night (ALAN). The trend for energy saving-ALAN increases the problem, as light intensity is increasing and mainly that of short wavelength (SWL), within the blue part of the spectrum (450–500 nm). Our master biological clock, located in the hypothalamus, entrained by light/dark cycles is in charge of our temporal organisation from cell functions. It is not only light-intensity, which changes with the 24 hour cycles, but also the dominant parts of the light spectrum, which reach’s earth. Those dominant parts, signalling for daytime are the SWL, including parts of the light spectrum, which reach our organism from cell functions. It is not only light-intensity, entrained by light/dark cycles.

**Methods** Female nurses (n=119) working irregular rotating shifts were recruited from two hospitals in Northern Israel, using convenience sampling by clusters. Exclusion criteria were working at least 75% of full time, with at least one night shift per week. Exclusion criteria were pregnancy, a diagnosed sleep disorder, and/or chronic medical conditions. Subjective sleepiness was measured hourly during two night shifts using the Karolinska Sleepiness Scale (KSS). Sleep was monitored by actigraphy 24 hours before and until the end of the night shifts. Participants completed a socio-demographic questionnaire, the Munich ChronoType Questionnaire for Shiftwork (MCTQshift), the Pittsburgh Sleep Quality Index (PSQI) and the Pre-Sleep Arousal Scale (PSAS).

**Results** Mixed models stepwise analyses found main effects for hour, age, cognitive pre-sleep arousal and number of children on nighttime sleepiness (all p<0.01). Effects of chronotype on sleepiness were inconsistent. Interactions were found for age*number of children (p<0.01), pre-sleep cognitive arousal*chronotype (p<0.05), and age*chronotype (p=0.06). Older nurses were less sleepy than younger nurses, but this impact was attenuated by early chronotype and having more children. High cognitive pre-sleep arousal, but not sleep, predicted increased sleepiness, especially in nurses with late chronotype.

**Discussion** The impact of bio-psycho-social factors on night shift sleepiness is complex and depends on mutual interactions between these factors. Nurses who are young, late chronotypes and with high cognitive pre-sleep arousal require special attention and support, and must develop personal strategies for maintaining vigilance on the night shift.

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**1602e CAN ON-SHIFT NAP BENEFIT NIGHT WORKERS’ HEALTH? STUDIES ON BLOOD PRESSURE AND OBESITY IN NURSING TEAMS**

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**Introduction** On-shift napping can benefit night workers as regards sleep deprivation, adjustment of circadian rhythms, and alertness. But possible benefits of nap on health outcomes are scarcely investigated. Considering that night work is pointed as a risk factor for hypertension and obesity, we investigated the possible attenuation of blood pressure and body mass index increase by on-shift napping among nursing teams.

**Methods** A cross-sectional study was conducted in a public hospital in Rio de Janeiro, Brazil with nursing professionals who were informally allowed to nap for up to three consecutive hours during working nights. Current and accumulated doses of night work (NW) were studied through the number of working nights/2 week-span and years of NW, respectively. Four outcomes were measured using standard equipment and techniques: systolic blood pressure (SBP), diastolic blood pressure (DBP), hypertension (SBP ≥140 mmHg or DBP ≥90 mmHg or prescription of antihypertensive medication), and body mass index (BMI). The associations between exposure variables and outcomes were based on logistic regressions (hypertension) and generalised linear models (SBP, DBP and BMI).

**Results** Among non-nappers (but not among nappers), current and accumulated doses of NW (number of working nights) was significantly associated with increased SBP (β-value=1.39; 95% CI: 0.31 to 2.49) and DBP (β-value=0.80; 95% CI: 0.10 to 1.50), as well as increased odds for hypertension (OR=3.35; 95% CI: 1.74 to 6.57). This association was not observed for accumulated doses of NW. As regards BMI, both current and accumulated doses of NW were significantly associated with increased BMI levels (β-value=0.364 [95% CI: 0.002 to 0.749] and β-value=0.092 [95% CI: 0.011 to 0.173]), respectively only among non-nappers.