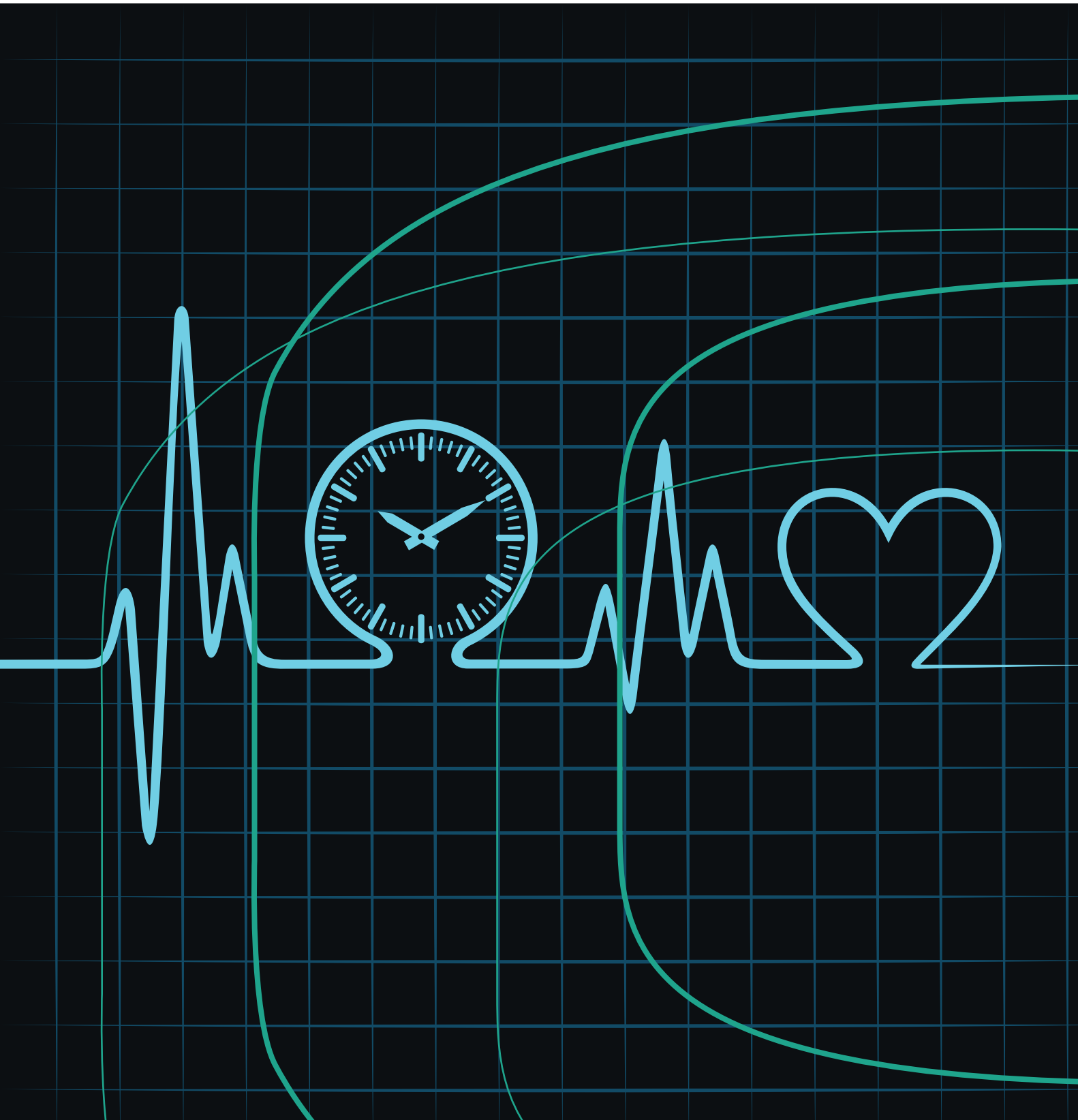
Working hours and health – 2014

Coordination of research on working hours and health in the Nordic countries – Future perspectives 2014

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Contents

Summary

The 2014 workshop on "Co-ordination of research on working hours and health in the Nordic countries" was held at the Finnish Institute of Occupational Health on the 23th–24th October 2014. The overall purpose of the workshop was to provide a platform for cooperation and development of high-quality research projects on working hours and health in the Nordic countries. In total there were 28 participants representing nine research environments on working hours in the Nordic countries. The project is supported by the Nordic Council of Ministers and the present report summarizes the presentations and discussions at the workshop.

The main outcomes of the project are:

- Ongoing research on working hours within the Nordic countries was described in 18 abstracts, most of which were presented at the workshop.
- Key variables to be included in cohorts on working hours in the Nordic countries were discussed and the work is continued in a smaller group with representatives from Norway, Finland, Sweden, and Denmark aiming at publishing a paper in a scientific journal comparing the arrangement of working hours among nurses in the Nordic countries.
- Relevant registers on health outcomes in the Nordic countries were identified with the aim of identifying possibilities for future joint research project.

Future possibilities for collaboration and joint applications across countries were discussed. The project has already supported submission of three research grant applications with collaborators from the project.

The project has further supported cooperation and development of high-quality research projects on working hours and health in the Nordic countries:

- The network established in the context of the workshop "Co-ordination of research on working hours and health in the Nordic countries 2013" continues as the more formal consortium "Working hours In the Nordic Countries" (WINC). The scope of WINC is to provide high-quality research on working hours and related health outcomes in the Nordic countries.
- A web page has been set up for WINC (www.nrcwe.d/winc). The web page can be referred to for introduction of WINC and inclusion of new members.
- The 22nd International Symposium on Shiftwork and Working Time will be held in Denmark in 2015. The scientific board will include representatives from WINC.

Introduction

Modern society has been changing quite rapidly from 9–17 work to a "24-hour-society" and services are requested and provided around the clock in many jobs, e.g. police, health and elderly care, industries and transportation. Around 15–20% of the working force in the EU is estimated to work evening or night shifts (1;2).

The arrangement of working hours is an important factor for the employee's health and wellbeing. Especially night work has been associated with several health consequences such as poor sleep (3), decreased cognitive function (4;5), gastro-intestinal problems (6) as well as accidents and injuries (7). Further, there are some but limited epidemiological evidence that working hours is related to chronic disorders, e.g. diabetes (8;9), peptic ulcer disease (10), cardiovascular disease (11), and breast cancer as well as possibly other cancers (12).

Despite previous research, our knowledge about the epidemiological evidence for causality between working in shifts and health is rather limited (13;14), nevertheless such knowledge is much needed to take efficient preventive actions. Current recommendations concerning the most ergonomic ways to organize shift work have mainly been made on basis of general knowledge about fatigue and circadian rhythms (15;16). A few studies have included interventions, but these studies are often relatively small and include several recommendations, which can be conflicting.

With the long traditions of research on working hours in the Nordic countries and all of the extensive registers available in each country the possibilities for a strong platform for joint future research are good. By combining the knowledge and research strengths from all the Nordic countries we have the possibility to strengthen the impact of Nordic research on working hours significantly.

With the arrangement of workshops and the establishment of WINC (Working hours in the Nordic Countries) collaboration is facilitated and a place for discussion, future perspectives and collaborations is formed. The present report summarizes the work from the most recent workshop held at the Finnish Institute of Occupational Health, 23rd–24th October 2014.

1. Scope and program of the work-shop “Coordination of research on working hours and health in the Nordic countries” in 2014

The scopes of the workshop were to:

- Identify and document relevant registers on health outcomes across the Nordic countries.
- Propose a list of key variables to be included in cohorts on working hours in the Nordic countries.
- Discuss possibilities for future collaboration across countries/cohorts based on presentations of ongoing research.

The program at the workshop 2014 at the Finnish Institute of Occupational Health was:

Thursday 23th October 2014	
9.00–11.00	Coffee/tea and bread (registration)
11.00–11.30	Welcome and brief presentation of participants *– Anne Helene Garde*
11.30–17.00	Presentation of overall research ideas to be studied in laboratory and/or field studies
11.30–11.45	*Hyperalgesia after experimental and work-related sleep restriction* *– Dagfinn Matre*
11.45–12.00	*Sleep, sleepiness, and sleepiness countermeasures in safety-critical industries: field studies on truck drivers and airline pilots* *– Mikael Sallinen*
12.00–12.15	*Number of consecutive nights and sleep* *– Åse Marie Hansen*
12.15–12.30	*Nonpharmacological treatment of insomnia among shift workers* *– Heli Järnefelt*

12.30–13.00	Summing up and questions
13.00–13.45	Lunch
13.45–14.00	*Studies of health outcome and sick leave based on survey data from Statistics Norway* *– Jenny Anne Sigstad Lie*
14.00–14.15	*Working hours and accidents* *– Simone Visbjerg Møller*
14.15–14.30	*A summary of ongoing working time related sleep research from Stress Research Institute* *– Göran Kecklund*
14.30–14.45	*Quick returns and night work as predictors of sleep, recovery, wellbeing and work-related outcomes* *– Philip Tucker*
14.45–15.00	*A presentation of the SLOSH cohort study emphasizing work time related measures* *– Constanze Leineweber*
15.00–15.15	*Which groups are characterized by high or low work time control? A study in progress* *– Sophie Albrecht*
15.15–15.30	Summing up and questions
15.30–15.45	Coffee break
15.45–16.45	Ideas for future applications *– Mikko Härmä, Anne Helene Garde*
16.45–17.00	Summing up *– Anne Helene Garde*
19.00–	Dinner – Restaurant Lasipalatsi (Mannerheimintie 22–24)

Friday 24th October 2014

8.30–9.00	Coffee/tea
9.00–16.00	Status and presentation of ongoing research – register data
9.00–9.20	*Light exposure and tolerance to shift work (Thursday topic continued)* *– Arne Lowden*
9.20–9.40	*Developing measures to objectively assessed working time patterns relevant to health* *– Mikko Härmä*
9.40–10.00	*Status of ongoing working time research based on pay roll register at the University of Bergen (Register study of Working hour, Health and Sickness absence)* *– Øystein Vedaa*
10.00–10.20	*Comparison of definitions of night work by use of pay roll data* *– Anne Helene Garde*

10.20–10.40	*A comparison of information on working time from self-reports and pay-roll data – an example from Denmark* *– Johnni Hansen*
10.40–11.00	Coffee break
11.00–11.20	*The use of pay roll data for a register study on shift work and sickness absence* *– Pernille Uhrskov Hjarsbech*
11.20–11.40	*Using pay-roll data to study night shift work and risk of breast cancer* *– Helene Tilma Vistisen*
11.40–12.00	Summing up and questions
11.20–12.20	Co-ordination of which variables to extract from pay roll data across the Nordic countries – introduction to group work and discussion *– Anne Helene Garde*
12.20–13.00	Lunch
13.00–14.15	Co-ordination of which variables to extract from pay roll data across the Nordic countries – group work and discussion *– Anne Helene Garde*
14.15.14.45	Discussion of possibilities for collaboration across countries/cohorts – future of WINC – next meeting? *– Anne Helene Garde*
14.45–15.00	Coffee break
15.00–15.15	Structure of the report – abstract, publication list *Ann Dyreborg Larsen*
15.15–15.30	22nd International Symposium on Shiftwork and Working Time, Copenhagen *– Anne Helene Garde*
15.30–16.00	Summing up and end of workshop – sandwiches to go *– Anne Helene Garde*

2. Participants

The participants at the WINC workshop, 2014 at the Finnish Institute of Occupational Health were:

Finland

- Researcher Annina Ropponen, Finnish Institute of Occupational Health [Annina.Ropponen@ttl.fi].
- Specialized Psychologist Heli Järnefelt, Finnish Institute of Occupational Health [Heli.Jarnefelt@ttl.fi].
- Researcher Kati Karhula, Finnish Institute of Occupational Health [Kati.Karhula@ttl.fi].
- Researcher Maria Sihvola, Finnish Institute of Occupational Health [Maria.Sihvola@ttl.fi].
- Researcher Mia Pylkkönen, Finnish Institute of Occupational Health [Mia.Pylkkonen@ttl.fi].
- Team leader, researcher Mikael Sallinen, Finnish Institute of Occupational Health [Mikael.Sallinen@ttl.fi].
- Professor Mikko Härmä, Finnish Institute of Occupational Health [Mikko.Harma@ttl.fi].
- Researcher Päivi Vanttola, Finnish Institute of Occupational Health [Paivi.Vanttola@ttl.fi].
- Associate professor Sampsa Puttonen, Finnish Institute of Occupational Health [Sampsa.Puttonen@ttl.fi].

Norway

- Postdoc Anette Harris, Department of Health Promotion and Development, University of Bergen [Anette.Harris@iuh.uib.no].
- Researcher Dagfinn Matre, National Institute of Occupational Health, Oslo [Dagfinn.Matre@stami.no].
- Researcher Jenny Anne S. Lie, National Institute of Occupational Health, Oslo [jenny.a.s.lie@stami.no].
- Postdoc Siri Waage, University of Bergen [Siri.Waage@igs.uib.no].
- PhD student Øystein Vedaa, University of Bergen [Oystein.Vedaa@psysp.uib.no].

Sweden

- Associate professor Arne Lowden, Stress Research Institute, Stockholm [arne.lowden@su.se].
- Associate professor, data manager Constanze Leineweber, Stress Research Institute, Stockholm [constanze.leineweber@su.se].
- Associate professor Göran Kecklund, Stress Research Institute, Stockholm [goran.kecklund@su.se].
- Researcher Philip Tucker, Stress Research Institute, Stockholm [philip.tucker@su.se].
- PhD student Sophie Albrecht, Stress Research Institute, Stockholm [sophie.albrecht@su.se].

Denmark

- Postdoc Ann Dyreborg Larsen, The National Research Centre for the Working Environment [adl@nrcwe.dk].
- Professor Anne Helene Garde (project leader), The National Research Centre for the Working Environment [ahg@nrcwe.dk].
- PhD student Helene Tilma Vistisen, Department of Occupational Medicine, Danish Ramazzini Centre, Aarhus University Hospital [helvis@rm.dk].
- Professor Henrik Kolstad, Department of Occupational Medicine, Danish Ramazzini Centre, Aarhus University Hospital [henkol@rm.dk].
- Postdoc Ina Olmer Specht, Department of Occupational and Environmental Medicine, Bispebjerg University Hospital [Ina.Olmer.Specht@regionh.dk].

- Senior researcher Johnni Hansen, Danish Cancer Society Research Center, Copenhagen [johnni@cancer.dk].
- Researcher Pernille Uhrskov Hjarsbech, The National Research Centre for the Working Environment [pmi@nrcwe.dk].
- Research assistant Simone Visbjerg Møller, The National Research Centre for the Working Environment [svm@nrcwe.dk].
- Professor Åse Marie Hansen, Department of Public Health, University of Copenhagen and the National Research Centre for the Working Environment [asemarie.hansen@sund.ku.dk].

Invited participants who were unable to attend:

Norway
- Professor Bjørn Bjorvatn, Department of Global Public Health and Primary Care, University of Bergen [Bjorn.Bjorvatn@igs.uib.no].
- Researcher Morten Birkeland Nielsen, National Institute of Occupational Health, Oslo [Morten.Nielsen@stami.no].
- Professor Ståle Pallesen, Department of Psychosocial Science, University of Bergen [staale.pallesen@psysp.uib.no].

Sweden
- Associate professor John Axelsson, Department of Clinical Neuroscience, Karolinska Institute, Stockholm.
- PhD student Michael Ingre, Stress Research Institute, Stockholm.

Iceland
- Medical director Kristinn Tómasson, Administration for Occupational Health and Safety [Kristinn@ver.is].

Denmark
- Professor Jens Peter Bonde, Department of Occupational and Environmental Medicine, Bispebjerg University Hospital [jens.peter.ellekilde.bonde@regionh.dk].
- Postdoc Kirsten Nabe-Nielsen, Department of Public Health, University of Copenhagen [nabe@sund.ku.dk].
- PhD student Marie Aarrebo Jensen, Department of Public Health, University of Copenhagen [maaj@sund.ku.dk].
- Professor Reiner Rugulies, The National Research Centre for the Working Environment [rer@nrcwe.dk].

3. Future collaborations

Everybody agreed on the importance of WINC and the need to maintain this collaboration. WINC is needed for informal talks, early discussions, new applications etc. and is useful for both senior researchers and indeed also for young researchers.

It was agreed to make a webpage for WINC (www.nrcwe.dk/winc). This formalizes the WINC network and will be used for information on WINC, how to join a mailing list, upcoming meetings etc.

So far three applications have been submitted in collaborations between members of the project. The applications were submitted to: Horizon2020 (PI: AH Garde), NordForsk – Nordic program on Health and Welfare (PI: M Härmä) and The Research Council of Norway (PI: J-A Lie).

We had fruitful discussions about ideas for future collaborations and funding opportunities.

3.1 Future meetings and funding

There is no more funding for the current project. Therefore future WINC meetings rely on new funding. Several suggestions were discussed:

- Funding may be applied specifically for WINC meetings, e.g. the Swedish “Riksbankens Jubileumsfond”.
- Members are encouraged to include funding for WINC meetings in future applications on working hours.
- Participation in meetings is covered by the individual participants.

By placing meetings in connection to conferences (most of) the members would attend e.g. the International Symposium on Shiftwork and Working Time and thereby the need for funding is reduced.

The Danish National Research Centre for the Working Environment is hosting the 22nd International Symposium on Shiftwork and Working Time in Copenhagen in 2015. The scientific board will include representatives from WINC and the conference is an opportunity for the WINC members to meet.

4. Identification of key variables on working hours

It was an aim of the workshop to propose a list of key variables to be included in cohorts on working hours in the Nordic countries. The discussion was addressed in the whole group and continued in a smaller group. In both cases the discussion focused on pay-roll data which includes times for coming to and leaving work on a daily basis. Cohorts of pay-roll based working hour data have recently been established in Norway, Finland and Denmark and all the Nordic countries have experience with working with this type of data. This type of data is a promising new tool in working hour research.

The overall discussion included topics related to:

- definitions of shifts and shift work characteristics
- definitions of shift worker or intensity, e.g. how many night shifts per month?
- definitions of exposure period
- length of lag time.

It was agreed that the definitions depend on the exposure and outcome under study. So rather than agreeing on overall definitions the work is continued in a smaller group, which is working towards publication of a scientific paper on comparison of working hours among nurses in public hospitals in the Nordic countries.

5. Identification of relevant registers on health outcomes across the Nordic countries

The Nordic countries have a long history of collecting information on births, deaths, immigration and emigration, disease incidence and social conditions. Here we present registers relevant for research on working time in the Nordic countries. In the table the registers on hospitalization, sickness absence, prescription drugs, cancer and accidents are presented. In the following text, this is elaborated and supplemented with a few other registers.

Table 1. Table of registers of health outcomes in Finland, Norway, Sweden and Denmark

Country/ Outcome	Finland	Norway	Sweden	Denmark
Hospitali-zation	The National Hospital Discharge Register	The Norwegian Patient Register	The National Patient Register	The National Patient Register
Sickness absence	Social Insurance Institution	Register data on sickness absence and disability (FD-trygd)	National Health Insurance Agency	Danish Register-based Evaluation of Marginalization (DREAM)
Prescription drugs	Drug Reimburse-ment Register of the Social Insurance Institution	The Norwegian Prescription Data-base	The Swedish Prescribed Drug Register	The National Prescription Registry
Cancer	Finnish Cancer Registry	Cancer Registry of Norway	The Swedish Cancer Registry	The Danish Cancer Registry
Accidents	Statutory Accident Insurance		The Swedish Information System on Industrial Injuries	Danish Working Environment Authority's (WEA's) Register on Report-ed Accidents

5.1 Finland

For overview of registries please refer to http://rekisteritutkimusen.wordpress.com/registers/ along with the article of Gissler M and Haukka J. Finnish health and social welfare registers in epidemiological research. Norsk Epidemiologi 2004; 14(1): 113–120.

1. Hospitalizations
National Hospital Discharge Register: dates and diagnoses of hospitalizations.

2. Sickness absence
The Social Insurance Institution of Finland: sickness absence spells with diagnoses for absences ≥11 days.

3. Prescription drugs
Drug Reimbursement Register of the Social Insurance Institution: granted special reimbursements for severe chronic illnesses with diagnoses and prescriptions of all purchased medicines based on the ATC-DDD (Anatomical Therapeutic Chemical) classification by the National Agency for Medicines.

4. Cancer
Finnish Cancer Registry; all cancer morbidity.

5. Accidents
Statutory Accident Insurance: occupational accidents, free-time accidents, commuting accidents.

6. Pensions
Finnish Centre for Pensions (different type of pensions), The Social Insurance Institution of Finland (disability pensions).

7. Mortality
Statistics Finland: cause-specific mortality.

5.2 Norway

For overview of registries please refer to:

- health registers:
  http://www.fhi.no/eway/default.aspx?pid=240&trg=Main_6664&Main_6664=6898:0:25,7847:1:0:0:::0:0
- and social welfare registers:
  http://www.nsd.uib.no/nsd/english/individualdata.html,
  http://www.nsd.uib.no/velferd/ (the latter only in Norwegian).

1. Hospitalizations
The Norwegian Patient Register contains information on everyone who is on a waiting list for treatment or who has received treatment at a hospital, medical outpatient's clinic or from contract specialists – what we call "the specialist health service". Patients are registered in the Norwegian Patient Register without their consent (From 2008).

2. Sickness absence
Register data on sickness absence and disability (FD-trygd).

3. Prescription drugs
The Norwegian Prescription Database (NorPD) contains data about dispensed drugs in Norway (From 2004).

4. Cancer
Cancer Registry of Norway: the Cancer Registry of Norway (CRN) provides incidence data on different cancers and the latest survival data.

5. Accidents
Norwegian Cardiovascular Disease Registry: The Norwegian Cardiovascular Disease Registry is a national person-identifiable health registry that does not require the consent of the registered individual. It is a registry of diseases of the heart and blood vessel (From 2012).

6. Military
The Registry of the Norwegian Armed Forces Medical Services is a registry that includes all people in Norway who has been employed in the military; this means in practice all Norwegian men and some women. Possible measure of men's health at the age of 18–20, before shift work exposure.

7. Cause of Death
Norway has a cause of death register.

8. Diabetes
The Norwegian Diabetes Register for adults (From 2012, but only from one region in Norway).

5.2.1 Demographic

9. Education
The National Education Database (education, mother and father; proxy for social class).

10. Tax
The Norwegian Tax Administration's register (income).

5.3 Sweden

For information on the Swedish registries please refer to:

- http://www.socialstyrelsen.se/register (only in Swedish).
- http://wwwforsakringskassan.se/sprak/eng/
- and https://osha.europa.eu/en/topics/osm/reports/swedish_system_004.stm

1. Hospitalizations
In the 1960's the National Board of Health and Welfare began to collect information regarding in-patients at public hospitals, the National Patient Register (NPR). Initially it contained information about all patients treated in psychiatric care, but only around 16% of patients were in somatic care. The register at that time covered six of the 26 county councils in Sweden. Since 1987 NPR includes all in-patient care in Sweden. NPR includes 50 million discharges for the period 1964 to 2006. The register contains, from 2001, also outpatient visits including day-surgery and psychiatric patients from both private and public caregivers. Primary care is not yet covered in the NPR.

The information in NPR can be divided into four different groups. These groups consist of several variables.

I. Patient data contains information on: personal registration number, sex, age and place of residence

II. Geographical data contains information on: county council, hospital/ clinic and department

III. Administrative data contains inpatients information on: date of admission, date of discharge, length of stay, acute/planned admission, admitted from, and discharged to and for outpatients information on: date of admission, date of discharge, acute/planned admission admitted from, and discharged to.

IV. Medical data contains information on: main diagnosis, secondary diagnosis, external cause of injury and poisoning and procedures

Information to NPR is delivered to the Centre for Epidemiology (EpC) at the National Board of Health and Welfare from each of the 21 county councils in Sweden. At present, the NPR is updated once a year. The drop-out rate for 2007 has been estimated to less than one percent. However, rapid changes of hospital organization in Sweden make it difficult to estimate the drop-out rate, particularly in the areas concerning psychiatric and geriatric care.

2. Sickness absence

Information on sickness absence is available from the National Health Insurance Agency. A sick leave period comprises several partial sick leave periods (e.g. one day of waiting period followed by three days of sick leave and further four days of prolonged sick leave). These parts give one sick leave period.

If there is a shorter brake between two partial sick leaves they still count into the same sick leave period.

Information is among other available on the number of days of the partial sick leave independent from the extent of the sick leave, the number of days of the partial sick leave taking the extent of the sick leave into account, start date for the partial sick leave, stop date for the partial sick leave, code for the diagnosis, start date for the sick leave period, stop date for the sick leave period, kind of the compensation, extent of the sick leave (100%, 75%, 50% or 25%).

3. Prescription drugs

The Swedish Prescribed Drug Register contains information about age, sex and the unique identifier of the patient as well as the prescriber's profession and practice. The register contains information about the drugs retrieved prescription or equivalent. The register can also be linked to other health data such as patient registry for linking drug use with different diagnoses.

The Prescribed Drug Register contains information on pharmaceuticals, supplies and food taken prescription or equivalent in pharmacy

from 1999 onwards. The number of unclaimed prescriptions is closer to 100 million a year. The register is updated with new data every month and contains information about: patient, prescriptions, costs, prescriber, prescriber's workplace and the pharmacy.

It is, however, not possible to identify the prescriber or the prescriber's workplace in the register, but just the prescriber's professional and specialist workplace respective counties and medical activity (clinic).

4. Cancer

The Swedish Cancer Registry was founded in 1958 and covers the whole population. Approximately 50,000 malignant cases of cancer are registered every year in Sweden.

It is compulsory for every health care provider to report newly detected cancer cases to the registry. A report has to be sent for every cancer case diagnosed at clinical, morphological or other laboratory examinations as well as cases diagnosed at autopsy.

Since the mid 80's there are six regional registries associated with the oncological centers in each medical region of Sweden where the registration, coding and major check-up and correction work is performed. The regionalization implies a close contact between the registry and the reporting physician, which in turn simplifies the task of correcting and checking the material.

There are three different types of information available in the Swedish Cancer Registry:

1) Data on the patient contains information on: personal identification number, sex, age and place of residence.
2) Medical data contains information on: site of tumor, histological type, stage, basis of diagnosis, date of diagnosis, reporting hospital and department, reporting pathology/cytology department and identification number for the tissue specimen.
3) Follow-up data contains information on: date of death, cause of death and date of migration.

5. Accidents

In Sweden, Arbetsmiljöverket is responsible for the Swedish industrial injury and occupational statistics. The Swedish Information System on Industrial injuries (ISA) is a countrywide directory comprising information on work accidents and occupational diseases. The register is based on occupational injuries that are reported to the Social Insurance according to the Law on occupational (LAF).

5.4 Denmark

For information on the Danish registries please refer to:

- http://www.ssi.dk/Sundhedsdataogit/Registre%20og%20kliniske%20databaser/De%20nationale%20sundhedsregistre.aspx (only in Danish)
- or Danish population-based registers for public health and health-related welfare research – a description of Danish registers and results from their application in research. Scandinavian Journal of Public Health. 2011; 39(Suppl 7):7–209.

1. Hospitalizations
Established in 1977 and contains information on inpatients from somatic wards. From 2007 it includes all types of patients in Danish hospitals (also outpatients and emergency wards). It includes information on hospitalization and discharge dates, diagnosis, treatments including surgery and additional information regarding births.

2. Sickness absence
DREAM is the acronym for the Register-based Evaluation of Marginalization and includes all persons who have received certain public transfer payments from 1991 onwards. On a weekly basis DREAM includes information if a person has been unemployed, on leave, early retirement, sick, on welfare benefits or been on publicly financed education.

3. Prescription drugs
Since 1994 all prescription drugs sold in Danish community pharmacies have been recorded. The Danish National Prescription Registry contains information on variables related to the drug user (e.g. age, gender, region of residence), dispensing variables (e.g. date of dispensing, product code, dose unit, indication for prescription etc.) and prescriber and pharmacy information.

4. Cancer
The Danish Cancer Registry was founded in 1942 and is a research register meant for use for statistical and research purposes. It contains records of all incidences of malignant neoplasms (and some pre-cancerous and benign lesions) from 1943 in Denmark and from 1953 also Greenland. Reporting to this registry has been mandatory since 1987.

The Danish Cancer Registry contains information on personal level (gender, age at diagnosis, marital status, occupation, cause of death etc.)

and about tumor characteristics (ICD-10 (previous 7) diagnose, morphology, topography, treatment, stage, grade etc.).

5. Accidents

The Danish Working Environment Authority's (WEA) register includes reported accidents along with records from emergency rooms. The WEA register gives information on accidents distributions of types of damages, harm ways, nationality, gender, age and industry. The number of reported accidents is calculated in proportion to the number of employed.

6. Causes of Death

Since 1875 the National Board of Health has maintained the register covering all deaths among citizens dying in Denmark and since 1970 has computerized individual records.

The National cause of death register includes information on name, address, personal security number, date of death, cause of death, age at the time of death, place of death etc.

When a person dies, a medical doctor conducts inquest, fills in and reports the death to the National Board of Health.

7. Pension

The Statistical Pension Registry – Pension statistics can be traced back to 1970. From 1983 the statistics are based on Statistic Denmark's pension statistics.

The statistical pension registry includes all persons who from January will receive a social pension, it includes "old-age" pensioners (aged 67 years and above) and recipients of disability pension or disability allowance aged 18–66 years.

6. Abstracts

6.1 Which groups are characterised by high or low work time control? A study in progress

Sophie Albrecht

Stress Research Institute Stockholm University

Aim: Few studies have examined what degrees of work time control (WTC) are prevalent in particular groups. The proposed study aims to investigate this matter in a national representative sample with cross-sectional as well as longitudinal data. More specifically, it will focus on (i) the factorial concept of WTC, (ii) group differences (e.g. gender, employment, family situation) in WTC, and (iii) the stability of WTC levels within groups over time.

Methods: The study is based on data from the Swedish Longitudinal Occupational Survey of Health (SLOSH) which is a follow-up of an approximately representative sample of the Swedish working population aged between 16 and 64 years from 2003 to 2011. The survey has been conducted every other year since 2006. The current study is based on cross-sectional data from the 2014 data collection (n=38,657, response rate 52%). To assess WTC stability longitudinal data from 2008 (n=18,639, response rate 61%) will be included. WTC is measured using the established 6-item index developed by Ala-Mursula, Vahtera, Kivimäki, Kevin, and Pentti (2002). SLOSH includes information on age, gender, civil status, number of children, employment type (employer/sector, full-/part-time, self-employment), actual working hours and overtime per week. A principal component analysis with varimax rotation was performed to assess the factor structure of the WTC measure. Independent samples t-tests and one-way ANOVAs were performed to assess differences in mean WTC ranks between the particular groups.

Preliminary results: High internal consistency was found for WTC with Cronbach's alpha at 0.84. A single factor structure was found to underpin the WTC measure with 57% of the total variance being explained. Significant differences in the WTC mean rank were found within different groups. Men were found to have higher WTC mean ranks than

women. Within employment types, especially the private sector and self-employed people had higher WTC compared to the public sector and employed people. Working overtime at least once per week was associated with higher WTC than not working overtime. Being married or cohabiting was found to result in higher WTC mean ranks than living alone. People having at least one child reported higher WTC than those having no children. Stability of WTC levels over time will be assessed in a next step.

Preliminary conclusions: The findings strengthen earlier research regarding group differences in WTC. Objective measures of WTC should be used to investigate if the present results are based on reporting differences (i.e. if particular groups perceive WTC differently than others while objectively having the same levels of control) or if they reflect true differences in WTC levels.

6.2 Research needs in the field of working hours and reproductive health

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In the Nordic countries women of fertile age are contributing to the work force on equal terms with men and during pregnancy women are supposed to work until 1 or 2 months before expected delivery. Evening and night work is common in health- and elder care, where some 80% of employees are women. There are some indications that work at night may deteriorate male as well as female fertility that may call for additional research. Nevertheless, the most urgent research need seems related to working hours during pregnancy where the need for guidelines for general practise and workplaces calls for research. There are at least three main questions to address. One is whether long working hours and working night shifts is increasing the risk of adverse pregnancy outcomes such as spontaneous abortions, preterm birth and low birth weight. A second is about possible increased risk for pregnancy complications such as low back pain, preeclampsia and gestational diabetes. And a third is whether sick leave during pregnancy and coping with long working hours and work at night when pregnant is associated.

Adverse pregnancy outcomes. Systematic reviews published past few years conclude that there is a large body of high quality epidemiological evidence that indicate that long working hours and working night shift are not increasing the risk of preterm birth or fetal growth restriction and if there is a risk, it is most likely small in the range of few percent increase.[1–3] However, these conclusions are based upon "average" exposures in the workplace and do not account for more extreme exposures. Moreover, findings are less reassuring regarding spontaneous abortion occurring in some 10–12% of clinically recognised pregnancies.[4]

Adverse pregnancy disorders. Information on working hours and pregnancy related diseases is – contrary to adverse pregnancy outcomes – very limited.[1] Studies of disorders as preeclampsia and pregnancy related metabolic disorders are highly needed.

Sick leave. Danish and Swedish studies have consistently demonstrated dramatically increased rate of long-term sick leave in pregnant women compared to non-pregnant women of fertile age.[5] Rates are far higher than can be explained by pregnancy related disease and most

likely to a high degree reflect a mismatch between demands at work and capabilities during pregnancy. Working hours seems to be contributing to this mismatch.[5]

Payroll data with exact day-to-day information on working hours for large populations including a sufficient number of pregnancies is an excellent data source that will enable prospective studies with much better data on exposure and timing of exposure relative specific phases of fetal development than earlier studies. Studies should focus on more extreme exposures and stratify risk estimates on trimester of pregnancy whenever power is sufficient.

Intervention studies with the aim to examine specified efforts to reduce the high sick leave during pregnancy should among other issues focus on working hours.

References

1. Palmer KT, Bonzini M, Harris EC, Linaker C, Bonde JP. Work activities and risk of prematurity, low birth weight and pre-eclampsia: an updated review with meta-analysis. Occup Environ Med 2013. http://dx.doi.org/10.1136/oemed-2012-101032
2. Palmer KT, Bonzini M, Bonde JP. Pregnancy: occupational aspects of management: concise guidance. Clin Med 2013;13:75–9. http://dx.doi.org/10.7861/clinmedicine.13-1-75
3. Bonzini M, Palmer KT, Coggon D, Carugno M, Cromi A, Ferrario MM. Shift work and pregnancy outcomes: a systematic review with meta-analysis of currently available epidemiological studies. BJOG 2011;118:1429–37. http://dx.doi.org/10.1111/j.1471-0528.2011.03066.x
4. Bonde JP, Jorgensen KT, Bonzini M, Palmer KT. Miscarriage and occupational activity: a systematic review and meta-analysis regarding shift work, working hours, lifting, standing, and physical workload. Scand J Work Environ Health 2013;39:325–34. http://dx.doi.org/10.5271/sjweh.3337
5. Kaerlev L, Jacobsen LB, Olsen J, Bonde JP. Long-term sick leave and its risk factors during pregnancy among Danish hospital employees. Scand J Public Health 2004;32 (2):111–7 2004;32:111–7.

6.3 How do different definitions of night shift affect the exposure assessment of night work?

Anne Helene Garde,[1] Johnni Hansen,[2] Henrik A. Kolstad,[3] Åse Marie Hansen[1,4]

Introduction: Night shift is defined differently in most epidemiologic studies. Some studies describe an entire period within the "night", whereas others specify a shorter period e.g. at least 3 hours of work between 24:00 and 05:00 as suggested as a standard by Stevens *et al*. (Stevens *et al*., 2011). Start and ending times have also been used. Such differences in exposure assessment may consequently influence the proportion of exposed and non-exposed study subjects and thereby affect the risk estimate in epidemiological studies. The aim of the present study is to show how different definitions of night work affect the proportion off shifts classified as night shifts in the Danish health care sector.

Methods: We counted the number of night shifts based on pay-roll data from the Danish Working Hour Database (DWHD) from 2007–2013 using eight different frequently used definitions of night shifts: 1) at least 3 hours of work between 24:00 and 05:00 (reference); 2) the entire period between 24:00–5:00, or 3) the entire period between 24:00–06:00; 4) ≥3 hours between 23:00–06:00, 5) any hour between 01:00–04:00 hours, 6) beginning work after 19:00 and leaving work before 09:00 (graveyard shift); 7) starting between 19:00–4:00 and ending after 01:00; and 8) starting work after 22:00 hours (and before 6:00).

Results: More than 98% of the total night shifts are classified as night shifts by both the reference definition and definitions based on definitions 2–5. The corresponding overlap with definitions 6 and 7, based on a starting and ending time of the shift is 82.6% and 74.5%, respectively. The reference definition and the definition specifying only a starting time for the night shift (def. 8) captures 68.4% of the same shifts.

Conclusion: Different definitions of night shift period affect the proportion of classified night shifts. The problem is minor when night shifts are based on definitions including a specified (short) period of night

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time (e.g. definitions 2–5), whereas studies based on other definitions (e.g. 7–9) may be less comparable.

References

Stevens, R. G., Hansen, J., Costa, G., Haus, E., Kauppinen, T., Aronson, K. J. *et al*. (2011). Considerations of circadian impact for defining "shift work" in cancer studies: IARC Working Group Report. Occupational and Environmental Medicine, 68, 154–162. http://dx.doi.org/10.1136/oem.2009.053512

6.4 A comparison of information on working time from self-reports and pay-roll data – an example from Denmark

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Introduction: Most epidemiologic studies on working time rely on self-reports of previous work history. The validity of such memory based exposure may be imprecise and limit the interpretation of epidemiologic results. The utilization of objective information on working time from e.g. pay rolls may potentially solve this problem. On the other hand, available computerized pay-roll data is often only available for a more recent period of time and is normally not available for the early years of a working life. This may be critical for studying chronical diseases with an induction periods of typically decades between exposure and disease. The aims of the present study are 1) comparing self-reported working time obtained from a recent epidemiologic study on shiftwork and Parkinson's disease (PD) with objective working time information from the Danish Working Hour Database (DWHD), and 2) survey subjects from DWHD with respect to self-reported nightwork prior to 2007.

Methods: DWHD contains information on exact time of start and end of work on a daily basis during the period 2007–2013 for about 290,000 subjects working in the public health care sector in Denmark. In total about 3,800 PD cases and controls completed a questionnaire (2008–10), including information on lifetime working hours (Study B). Finally, 3822 female breast cases and controls were interviewed (2003–2005) concerning their entire work history and specific working hours (Study C). All subjects in the three studies can be identified by their unique Central Person Number, and therefore information can be linked across studies. In each study we defined a) day-work, b) evening work and c) night-work in a similar way.

Results: In total 54 subjects occurred in both DWHD and study B) and of 660 subjects in both DWHD and study C. Over 90% of subjects with

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self-reports (2008–10) of evening and/or night work in study B) had records of similar work in DWHD. When comparing subjects with no records of night work in DWHD (2007–2013), 66% of the subjects from study C reported that they had had nightwork prior to DWHD coverage (before 2007).

Conclusion: Based on a relatively small number of subjects there is good correlation between self-reporting of recent approximate working time (day, evening, night) and objective information from DWHD. In contrast, recent working time (2007–2013) is a poor predictor for night work earlier in life.

6.5 Number of consecutive nights and sleep

Åse Marie Hansen,[9,10] Marie Aarrebo Jensen,[1] Kirsten Nabe-Nielsen,[1] Jesper Kristiansen,[2] Anne Helene Garde[2]

Background: Shift and night work have an impact on health in the short and possibly also in the long run (1–4). The causality between shift work and increased risk of certain diseases is, however, heavily debated in the public as well as in the scientific community, and is yet unsettled. This is also true for the role of specific features of shift work schedules e.g. the number of consecutive nights in a schedule. So in spite of a rather comprehensive scientific literature on this subject, this study investigated sleep problems as the potential mechanism linking specific shift work schedules and disease are needed (5).

Aim: The purpose of the present study was to investigate whether the number of consecutive night shifts affected the degree of sleeping problems associated with night work.

Methods: The Danish police volunteered to participate in the study because the majority of the employees work night shifts as part of their work schedule. The labour union (in Danish: Politiforbundet) approved the participation in the study. Participants were recruited from five police districts and 73 policemen volunteered to participate in the intervention. Three interventions were scheduled: 2+2) two consecutive night shift followed by two consecutive day oriented work shifts or off work; 4+4) four consecutive night shift followed by four consecutive day oriented work shifts or off work; 7+7) seven consecutive night shift followed by seven consecutive day oriented work shifts or off work. The schedules were planned minimum six weeks in advance and the order of the interventions were planned to fit with the demands of policemen at work and individual needs. All participants scored their sleep problems (good sleep = low score), using six items from the Karolinska Sleepiness Diary on all days during the three interventions.

Results: We found that it was easier to fall asleep after a night working period compared to a day oriented period and that the 2+2 intervention was worst at night shifts and best in the following day oriented pe-

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riod. We found that disturbed sleep was in general more likely after intervention 2+2. The 4+4 intervention tended to be related to less disturbed sleep during night shift compared to 2+2 and 7+7. All participants perceived less disturbed sleep during night shift compared to day oriented period, independently of the intervention. Waking up too early was more common after night shifts compared to day oriented periods independently of intervention. We found the highest number of times awake during sleep after night shift in the 4+4 intervention. The participants reported that it was easier to get out of bed for 7+7 after the night shifts but more difficult in the 7+7 day oriented period. Feeling rested was best during in the day oriented period compared to night shifts.

Conclusion: We found some differences in sleep disturbances between the three interventions. However, no clear picture could be extracted from the results.

References

1. Hansen J: Risk of breast cancer after night- and shift work: current evidence and ongoing studies in Denmark. Cancer Causes Control 2006, 17: 531–537. http://dx.doi.org/10.1007/s10552-005-9006-5
2. Åkerstedt T, Wright KP: Sleep Loss and Fatigue in Shift Work and Shift Work Disorder. Sleep Med Clin 2009, 4: 257–271. http://dx.doi.org/10.1016/j.jsmc.2009.03.001
3. Haus E, Smolensky M: Biological clocks and shift work: circadian dysregulation and potential long-term effects. Cancer Causes Control 2006, 17: 489–500. http://dx.doi.org/10.1007/s10552-005-9015-4
4. Knutsson A: Health disorders of shift workers. Occup Med (Lond) 2003, 53: 103–108.
5. Stevens RG, Hansen J, Costa G, Haus E, Kauppinen T, Aronson KJ *et al*.: Considerations of circadian impact for defining "shift work" in cancer studies: IARC Working Group Report. Occup Environ Med 2011, 68: 154–162. http://dx.doi.org/10.1136/oem.2009.053512

6.6 A Register Study Examining the Association between Shift Work and Sickness Absence

Pernille U. Hjarsbech,[11] Jacob Pedersen,[1] Johnni Hansen,[12] Åse Marie Hansen,[1,13] Henrik Kolstad,[14] Ann D. Larsen,[1] Reiner Rugulies,[1,3,15] Anne Helene Garde[1]

Aim: The aim of this register study is to examine the impact of shift work on sickness absence among Danish employees doing person-related work. We hypothesize that the risk of sickness absence is higher among employees with work patterns that include displaced shifts, which can be disruptive for circadian rhythms. The expected mechanism behind the hypothesis is that circadian disruptions can increase susceptibility for disease and thus sickness absence.

Methods: For the study protocol we have drawn a random test sample of 1,000 unique persons from the Danish Working Hour Database (DWHD). We only include participants doing person-related work, yielding an analytic sample of 540 unique persons with 834,752 observations.

We calculate a displacement statistic for each registered shift and divided shifts into "non-displaced shifts" or "displaced shifts". Furthermore, each shift is linked to a continuous average of shifts worked in the past 28 days and categorized in three work patterns of: 1) no displaced shifts, 2) low degree of displaced shifts and, 3) moderate/high degree of displaced shifts. Sickness absence is measured as 2–7 days of sickness absence. As covariates we include sex, age, and occupational group.

A multi-state model is used to analyse transitions between three states: work, sickness absence and other states, e.g., holiday, sick children and maternity leave. Hazard ratios (HR) for sickness absence are calculated by the Cox Proportional Hazards Model.

Results: Preliminary results from the study protocol show an increased risk of sickness absence for work patterns of low degree of displaced shifts (HR=1.14; 95% CI: 0.99–1.31) and of moderate/high degree of displaced shifts (HR=1.26; 95% CI: 1.07–1.49) compared to the

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reference group of no displaced shifts. Adjustment for sex and age do not alter results; however, after adjustment for occupational group estimates are attenuated and do not reach statistical significance.

Conclusion: The study protocol describes the planned methods and analyses. After the study protocol is finished these methods and analyses will be used in a confirmatory study with a sample of 20% of the entire DWHD study population.

6.7 Developing measures to objectively assess working time patterns relevant to health

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Background: Epidemiologic studies suggest that adverse working times increase the risk of several diseases, but little is known about specific working time patterns that underlie this risk. The reviews of working time patterns have pointed out weaknesses in the exposure assessment; they have been crude, based on subjective reporting, and varied considerably between the studies. It is possible that the exposure assessments have missed the unhealthy components of working time patterns which affect the associations of long working hours, shift work and chronic conditions.

Material and Methods: We have developed and validated a register-based method to assess a wide range of working time patterns in two stages. First, pay-roll based electronic records from employer's working hour registers were obtained for 12,391 hospital employees and 14.5 million work shifts from 2008 to 2013. The quality and validity of these data were first examined. Next we developed a method to extract altogether 29 variables that assess four potentially health-relevant working time patterns: long working hours, shift work, shift intensity, and social aspects of working hours. We developed algorithms for calculating annual proportions of long working weeks, shifts, leave days and free weekends. For shift workers, additional variables were proportions of different shifts, short shift intervals and recovery periods after night shifts, and long spells of consecutive night shifts. Stability of these variables was estimated across the follow-up years.

Results: The collection of the company-based register data was feasible and the retrieved data corresponded to the original shift plans of the departments. The routinely produced work time records included < 2% errors (mostly duplicates). The comparison of the originally published six randomly selected 3-week shift plans from three different inwards showed a complete match between the original on-wall rotas of the hospital departments and the retrieved Titania registry data for shift starting and ending times, shift types and absences from work. As expected, the created working time variables differed sharply between the day-

and shift workers. We did not observe any unexpected distributions, based on our earlier knowledge and analysis of the working hours of the same or similar organizations and direct discussions with the persons responsible for the shift planning of the organizations. The 29 variables were stable across years of follow-up. Classification of the subjects into dayworkers, day- and evening shift workers and night shift workers based on the objective data showed that 45% of the sample were "day-workers", 18% had both morning and evening shifts and 36% were night shift workers with morning, evening and night shifts in 2013. The sensitivity and specificity of a separate questionnaire item "night shift worker" in a subpopulation of 3,225 subjects in 2013 was 98% and 82% compared to the objective data. However, the specificity of the questionnaire item "dayworker" was only 38% (with the sensitivity of 91%) due to many "dayworkers" having also evening shifts (14%) or night shifts (4%) based on the objective data.

Conclusions: The developed method allows a detailed measurement of working time patterns potentially relevant for health. The use of questionnaire items on shift work can cause misclassification of the dayworkers diluting the possible health effects of shift work in epidemiological studies. We propose the dimensions of the developed objective method as "a method for choice" to assess multidimensional exposure to working time patterns in large-scale observational studies on working hours and health.

6.8 Nonpharmacological treatments of insomnia among shift workers

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Aim: Cognitive behavioural therapy for insomnia (CBT-I) has been demonstrated to be efficacious in a wide variety of patient populations and settings. CBT-I can be implemented also among workers with irregular hours, and the delivery of the treatment by trained nurses of occupational health services (OHS) yields promising and long-lasting results (Järnefelt *et al*., 2014; 2012). However, we need more intervention studies among other groups of shift workers in order to make clear guidelines for the screening and the treatment of insomnia in this group of people. The main aim of this study is to investigate effectiveness of group and self-help based CBT-I among shift workers with different working time schedules, and in different contexts of OHS.

Methods: The study is planned to start in 2015 through cooperation between the Finnish Institute of Occupational Health, and cities of Turku and Helsinki, and Finnair. Participants of the study are shift workers with insomnia disorder. OHS physicians decide on inclusion and exclusion in the study. The sample size is 90 to 120. The study design is a RCT. The participants are randomized to a) group based CBT-I b) mainly self-help CBT-I, or c) waiting list control group where they get intervention b after the waiting period. The interventions are delivered by a nurse or a psychologist of OHS. Before the study the physicians, nurses and psychologists participate in a short course on evaluation and CBT of insomnia. Outcomes are assessed using a sleep diary, and at the same time online monitoring of sleep at home. The participants fill questionnaires e. g. about perceived severity of insomnia, other symptoms, quality of life, stress, and work ability. The measurements are conducted at three to five time points for a period of two years. In addition, cognitive performance tests are conducted prior and after the treatment. The measurements and the interventions are carried out mainly by computerized devices.

Discussion: By this study we will get information about effectiveness and implementation of CBT-I in different groups of shift workers and in different contexts of health services. In addition, we can compare effectiveness of self-help to group based CBT-I. By developing and investigating short and electronic self-help interventions we may have a better

chance to make nonpharmacological treatments of insomnia more accessible to a larger number of shift workers and it may be possible to decrease wide unfavourably consequences of insomnia to health, performance capacity and costs.

References

Järnefelt, H., Sallinen, M., Luukkonen, R., Kajaste, S., Savolainen, A., & Hublin, C. (2014). Cognitive behavioral therapy for chronic insomnia in occupational health services: Analyses of outcomes up to 24 months post-treatment. Behaviour Research and Therapy 56, 16–21. http://dx.doi.org/10.1016/j.brat.2014.02.007

Järnefelt, H., Lagerstedt, R., Kajaste, S., Sallinen, M., Savolainen, A., & Hublin, C. (2012). Cognitive behavioral therapy for shift workers with chronic insomnia. Sleep Medicine, 13, 1238–1246. http://dx.doi.org/10.1016/j.sleep.2012.10.003

6.9 Overview of on-going working time research projects at the Stress Research Institute

Göran Kecklund,[16] Torbjörn Åkerstedt[1] and Anna Anund[17] – Project leaders (coordinators)

Background: Stress Research Institute has a long tradition of doing quasi-experimental field studies and epidemiology related to shift and night work, and sleep/wakefulness, health/well-being and performance. This presentation will cover some on-going projects that are not included in the presentations by Albrecht, Leineweber, Lowden and Tucker.

Night work and cancer (PI: Torbjörn Åkerstedt): A basis for linking work hours to health is the existence of the main health registers in Sweden – the Patient Registry, The Cancer Registry and others. The Swedish Twin Registry is one of the largest in the world with >85,000 monozygotic and dizygotic twins. It was started in 1973 and contains repeated waves of data on health and health-related behaviour. This includes shift work / day work and one question on number of years with night work. It also contains questions on sleep and fatigue. Present ideas involve linking exposure to shift work with various health registers (e.g. cancer). A preliminary result shows no association between night work and breast cancer.

Shift work, psychosocial work factors and disturbed sleep (PI: Torbjörn Åkerstedt): There are few prospective studies on shift work and other kinds of difficult working time arrangements (e.g. overtime) and disturbed sleep. This analysis is based on the SLOSH cohort and includes physical as well as psychosocial work characteristics. 4 827 individuals participated in the prospective analysis and the data was analysed with structural equation modelling. The results showed that work demands, but not physical work characteristics, shift work nor overtime work, predicted disturbed sleep. In addition, disturbed sleep predicted subsequent higher work demands, perceived stress, lower social support and lower control suggesting reversed causality.

Bus driver work situation and its relation to fatigue: Bus drivers often have irregular working hours and their work involve high levels of

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stress. These factors can lead to severe fatigue and the purpose of this study is to highlight how the working hours affect sleep, stress, fatigue and driving performance.

The project includes four studies: Questionnaire, sleep diaries and actigraphy, analyze of rosters and an experiment on real road with bus drivers.

Conclusion: The overall results showed that early morning work and split shifts were common. Sleep duration was reduced with approx. 2 hours prior to early morning work. Split shifts were also associated with sleep loss and fatigue, and the drivers that napped during the long break were more alert at work and had a more positive attitude to split shifts. The field experiment with an instrumented bus compared a split shift with a day off and showed higher sleepiness and longer reaction times in connection with the split shift. However, there were no differences in physiological sleepiness and driving performance.

6.10 The SLOSH cohort – with emphasizes on work time related measures

Constanze Leineweber

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The overall aim of the SLOSH study is to further work environment research by a longitudinal approach in a nationally representative survey of the Swedish working population.

Description of the database: In order to create a longitudinal, nationally representative cohort study – the Swedish Longitudinal Survey of Health (SLOSH) – Stress Research Institute commissioned a follow-up of the Swedish Work Environment Survey (SWES) 2003 in early 2006. Further follow-ups have been conducted biannually (until now 2008, 2010, 2012 and 2014). In 2008 also SWES 2005 participants were added, resulting in a study population of 18,915 individuals. To refresh the study population, in 2014 SWES 2007, 2009 and 2011 participants were added, yielding a total population of 38,657 individuals. The response rate varies from 65% (5,985 respondents) in 2006 to 52% in 2014 (20,316 respondents).

Since each SWES is a stratified random sample of those respondents to the Swedish Labour Force Survey (LFS) who were actively in work at the time of LFS, SLOSH is approximately representative of the Swedish working population 2003–2005/2011. All labour market sectors and all major occupations are represented, and the numbers of male and female participants are approximately equal.

Questionnaires. The respondents choose from two questionnaires, one for currently working individuals (12 hours a week or more), and one for those who are currently not in gainful employment.

The questionnaire for workers is divided into three parts, the first focussing on work environment. Work stress is measured by established scales (e.g. demand control questionnaire and effort-reward imbalance), but also by items developed to cover the special demands of today's working life. Work-time control is measured by a well-established index of seven items, developed by Ala-Mursula. The items cover aspects of length of the working day, start and ending time, breaks, short term leave, vacation, which days to work and possibility to handle private errands during a day. Further, comprehensive information on several aspects of work time is also available, e.g. weekly working hours, working time arrangements, mandatory and voluntary overtime. A measure

on total work load provides information about time allocated to different activities (e.g. commuting time, house work, family activities, child care, and relaxation). Detailed information about occupations is available in the form of the Swedish Standard Classification of Occupations (SSYK). Health indices are measured by well-established scales and include among others emotional exhaustion, a wide range of sleep information, and depression.

The questionnaire for respondents who are not in gainful employment is also divided in three parts, where parts two and three are almost identical to the corresponding parts of the worker questionnaire. The first part, however, concerns the current situation (retired, unemployed, studying etc.), the reason for not working, and positive and negative aspects of not working.

Register data. Data from public registers include demography, occupation, income from work and old-age pension, information about the main workplace, disability pension, receipt of unemployment and social benefits, subsidies for studies and salary for military service, detailed information about sickness absences, hospitalisations (incl. admission and discharge date, as well as diagnoses), cancer diagnoses, purchase of prescription drugs (incl. ATC codes and number of defined daily dosages, DDD), date and cause of death. Registers also provide financial information about the participant's main workplaces, as well as about downsizing and changes in staffing levels. Register data are linked both prospectively and retrospectively for all respondents and cover varying time periods. Information about work place and organisational variables is available until 2007. Complete sickness absence records are available from 1994 until 2009, from 2005 also with diagnoses. Records of purchased drugs are available from July 2005 until 2012. Information about hospitalisation including diagnoses is available until 2011. Up-dates of registry data are planned for 2014 and beyond.

6.11 Studies of health outcome and sick leave, based on survey data from Statistics Norway

Jenny-Anne S. Lie

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Population-based sample surveys in Norway describe the prevalence of sick-leave, and trends in sick-leave, however reveal little about causality.

Sick-leave is a complex phenomenon influenced by many factors. The influence of different causal factors varies from one individual to another.

By studying individuals over time and compare different groups of workers subjected to different work exposures, it is possible to identify potential risk factors.

At STAMI, several studies have been conducted based on data from the Survey on Working Condition and Working Environment (LKU-arbeid), evaluating the impact of e.g. mechanical, psychosocial, organizational risk factors in the work environment with respect to sick-leave. The studies include assessment of sick leave in different occupational groups, prevalence of long-term sick leave, self-reported and physician-certified sick-leave and gender differences.

In 2006 a new department was established at STAMI, called the "National Surveillance System for Work Environment and Occupational Health" (NOA). NOA is a surveillance system that is intended to coordinate, systematize and communicate knowledge on work environment and health. NOA shall procure and improve pertinent data and information and make these available to users. Several of the studies on sick leave have been conducted by researchers at this department.

6.12 Importance of natural daylight exposure in healthy shiftwork

Arne Lowden

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Lack of natural light during winter at Northern latitudes exerts a strong influence on sleep problems and depressive illness (Lindblom *et al*., 2002; McLaughlin *et al*., 2008; Grimaldi *et al*., 2009; Kegel *et al*., 2009; Kripke, 2011; Borisenkov *et al*., 2012). An adequate light exposure pattern may help to prevent or even reverse health problems associated with circadian disruption (Palinkas *et al*., 2000; Fetveit *et al*., 2003; Hayashi *et al*., 2003; Ciesielczyk *et al*., 2004; McLaughlin *et al*., 2008; Terao and Hoaki, 2010; Martinez-Nicolas *et al*., 2011).

We have in some studies tried to promote safety and alertness in shiftwork by use of light interventions. But also the adaptation to shiftwork and effects on sleep has been considered (Lowden & Åkerstedt 2012). This track of research will continue and new innovative light solutions will be developed and especially evaluated in connection to rapidly rotating shiftwork with few influences of daylight at work. A special consideration will be that of the changes in light exposure levels across the year for shiftworkers. Initiatives to compare extreme Swedish samples from the Arctic with workers living at a 12/12 light dark cycles in Brazil are in progress.

Another track is directed towards improving mental health among groups that suffer from sleep problems, lack of energy and depressed mood states in winter (subSAD). The database SLOSH can be used to describe the relation between light exposure and health outcomes from an epidemiological perspective. Initiatives have been taken at a more detailed level to measure activity and light among burdened groups by use of actigraphy. One possible research question would be to investigate if natural light exposure during free time may buffer for the development of subSAD.

6.13 Hyperalgesia after experimental and work-related sleep restriction

Andersen MR,[18] Nilsen KB,[1,19,20] and Matre D[1]

Aim of investigation: Sleep restriction is reported to increase the sensitivity to experimental pain. Whether sleep restriction due to night work has the same effect on pain sensitivity is not known. The aim of this study was to determine if night work leads to increased pain sensitivity, and to compare the effects with changes in pain sensitivity after experimental sleep restriction.

Methods: In study I, twenty-two healthy volunteers (14 females) and in study II 24 nurses (17 females) received experimental pain stimuli in the laboratory twice; after 2 nights with normal sleep (study I and II) and after 2 nights of experimental 50% sleep restriction (study I) or after 2 nights of work (study II). The order of sleep conditions was randomized. Heat pain at intensity 6/10 (heat pain-6) was delivered to the forearm and the pressure pain threshold (PPT) was assessed from the trapezius muscle. Subjective heat pain was rated continuously on a 10 cm visual analog scale (VAS). Subjective sleepiness was measured by the Karolinska sleepiness scale (KSS). The effect of sleep restriction or night work on heat pain-6 and PPT was analyzed using a linear mixed model (LMM) random intercept and random slope. Sleep restriction was the independent factor, PPT and heat pain-6 was dependent variables. KSS, PPT and heat pain-6 was compared between groups after normal sleep. Difference scores between the different sleep conditions were calculated for each outcome variable. Difference scores were compared between study I and II by independent t-tests (PPT and pain-6) and the Mann-Whitney U test (KSS).

Results: Subjective sleepiness (KSS), PPT or pain-6 ratings did not differ between study I and II after normal sleep ($p > 0.47$). Subjective sleepiness (KSS) increased both after experimental sleep restriction ($p < 0.001$) and after night work ($p < 0.001$) vs. after normal sleep. The increase in sleepiness did not differ between study I and II ($p = 0.43$). Heat pain was rated higher both after experimental sleep restriction ($p < 0.001$) and after night

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work ($p = 0.001$) vs. after normal sleep. The increased heat pain ratings did not differ between study I and II ($p = 0.15$). PPT was lower after experimental sleep restriction vs. after normal sleep ($p = 0.007$). PPT was unchanged after night work vs. after normal sleep ($p = 0.632$). The sleep restriction-induced difference in PPT between study I and II was, however, not significant ($p = 0.16$).

Conclusion: Both experimental- and night work-induced sleep restriction leads to increased subjective sleepiness and higher pain ratings of experimental heat pain. The sensitivity to pressure pain was higher after experimental sleep restriction, but was not affected by night work-induced sleep restriction. However, this difference was not significant.

6.14 Working hours and accidents

Simone Visbjerg Møller, Pernille Hjarsbech and Anne Helene Garde

The National Research Centre for the Working Environment, Denmark
Collaboration: The project is conducted in collaboration with University of Copenhagen, Aarhus University Hospital, Danish Cancer Society Research Center and Bispebjerg Hospital.

Background: Each year more than 40,000 work accidents are reported in Denmark. A number of studies suggest an association between daily working hours, shift work including night work and the risk of accidents. Also, permanent night shifts seem to be associated with work accidents. Poor sleep is a possible mechanism linking working hours and accidents. Night work and long working hours can cause sleep deprivation and sleep problems, and short sleep as well as fatigue is associated with an increased risk of accidents. However knowledge about the effect of age, gender and educational level on this association is needed.

Aim: The overall purpose of the project is to investigate the impact of shiftwork on the risk of work accidents, and to further investigate how this association is affected by age, gender and level of education. Types of shiftwork to be examined include working hours that might involve circadian disruptions such as regular night work and varying working hours with and without night work. Furthermore, working hours that potentially compromise restitution i.e. long weekly working hours will be examined in the study. The study will focus on young workers in particular.

Method: Information on working hours will be derived from the Danish Labour Force Survey (DLFS) which has been conducted continuously since 1994 by Statistics Denmark. Each year approx. 85,000 Danes aged 15–74 years are interviewed about their employment status and actual working hours. In addition the participants have answered questions about work accidents and injuries in 1999, 2007 and 2013. Relevant data will be obtained through record linkage between LFS and relevant national registers such as the Danish National Prescription Register, the Hospital Patient Register supplied with different registers for work accidents. Possible associations between working hours and accidents will be conducted by design of a cross sectional study using self-reported accidents as well as a follow up study using national registers for accidents.

Perspective: Data from the DLFS was only recently made accessible to researchers and this study is the first to examine the impact of working hours on risk of accidents by linking DLFS to national registers.

6.15 Sleep, sleepiness, and sleepiness countermeasures in safety-critical industries: field studies on truck drivers and airline pilots

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Aim: I will introduce two ongoing field studies on long-haul truck drivers and airline pilots, and make a collaboration proposal to create a Nordic database on working hours, sleep, sleepiness and the use of sleepiness countermeasures in safety critical industries.

Methods: The two ongoing studies on long-haul truck drivers and airline pilots include several methods to record working hours, sleep and sleepiness, such as a diary, actigraphy, hear rate variability recordings, the Karolinska Sleepiness Scale, and the Psychomotor Vigilance task. In addition, we have employed a multiple selection list to obtain data on the sleepiness countermeasures the truck drivers and pilots use to reduce their sleepiness while on duty (Anund *et al*. 2008).

Results: The methods we have used in the two field studies have proven feasible to use in occupational settings and in groups of highly mobile workers. For example, the field data on truck drivers show large differences in sleep, sleepiness and the use of sleepiness countermeasures between different shift types.

Discussion and conclusion: Our experience from the truck driver and airline pilot studies is that having standardized methods for collecting data on working hours, sleep, sleepiness, and the use of sleepiness countermeasures would provide us with a good opportunity to create a database across multiple projects. This kind of database would significantly increase our chances to collaborate and make comparisons between the Nordic countries and different occupational groups.

Reference:

Anund A, Kecklund G, Peters B, Åkerstedt T. Driver sleepiness and individual differences in preferences for countermeasures. Journal of Sleep Research 2008; 17: 16–22.

6.16 Quick returns and night work as predictors of sleep, recovery & wellbeing.

P. Tucker,[21] A. Dahlgren,[22] P. Gustavsson,[23] A. Rudman[3]

Aim: Quick returns (short intervals between the end of one shift and the start of the next) restrict opportunities for sleeping and other non-work activities between shifts. Consequently, they are associated with shorter sleeps and increased fatigue on the subsequent shift. Recent evidence suggests that shift workers regard quick returns as being more problematic than night work (1). The aim of the current study is to compare quick returns and night work in terms of their impact on sleep, unwinding, recovery, exhaustion, satisfaction work hours and work-family interference. We also examine mediators of the relationship between quick returns and exhaustion.

Method: Data from the 2006 cohort of Swedish nursing students within the national Longitudinal Analysis of Nursing Education (LANE) study (2) were analysed (N=1459). Respondents completed a questionnaire in their last semester prior to graduation (response rate 69.2%) and then annually for the three years after graduation. The analyses examined associations between measures taken at the last measurement occasion, while adjusting for age, gender, type of employment, morningness (all measured at the last measurement occasion); self-reported health, sleep quality, living with children and previous experience of night work (all measured prior to graduation).

Results: Frequency of quick returns was a significant predictor of sleep problems, short sleeps, unwinding, exhaustion, satisfaction with work hours and work-to-family interference. In each case, higher frequency predicted more negative outcomes. It did not predict recovery after rest days. Frequency of night work did not predict any of the outcomes. Problems unwinding, difficulty falling asleep and work-family interference were all partial mediators of the association between frequency of quick returns and exhaustion, while frequency of short sleeps was not.

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Discussion: While it could be expected that quick returns might have a greater impact than night work on social factors, it is rather more surprising that this extends to impacts on sleep and health (c.f. 1). However, the current observation of relatively benign effects of night work on sleep is consistent with other survey findings (3). Unexpectedly, short sleeps did not mediate the relationship between quick returns and exhaustion – possibly because the definition used (sleeps <5 hours) was insufficiently sensitive.

Conclusions: Insufficient recovery opportunity between shifts is an important determinant of sleep, recovery and wellbeing.

References

1. Kecklund G, Ingre M, Åkerstedt T. What characterizes good and bad shift schedules. Sleep Science 2013;6:s28.
2. Rudman A, Omne-Pontén M, Wallin L, Gustavsson PJ. Monitoring the newly qualified nurses in sweden: The longitudinal analysis of nursing education (LANE) study. Hum Resour Health 2010;8:10. http://dx.doi.org/10.1186/1478-4491-8-10
3. Akerstedt T, Ingre M, Broman JE, Kecklund G. Disturbed sleep in shift workers, day workers, and insomniacs. Chronobiol Int 2008, Apr;25(2):333–48. http://dx.doi.org/10.1080/07420520802113922

6.17 Night work and quick returns as predictors of sick leave and medication use in health personnel

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Background: Shift and night work is widespread, where in 2012 about one third of the Norwegian work force worked outside normal daytime.

Aim: The main aims of this registry and survey study are twofold. The first is to generate more knowledge and to increase our understanding of the negative health effects of shift work, and to identify personality variables that might be related to shift work tolerance. The second main aim is to contribute with novel methodological approaches to shift work research in order to improve quality of research and thereby strengthen the validity of the conclusions. The latter will be achieved by putting emphasis on objective registry data of shift work, sick leave as well as use of psychotropic drugs.

Methods: A total of 4,889 health personnel in Helse Bergen were invited to participate in this registry and survey study. Participants were first asked to complete an online questionnaire on personality, job satisfaction and subjective health complains. Together with the invitation to participate, the heath personnel were also asked to give their consent to the linking of their questionnaire answer to payroll data, registry data of sick leave (both short and long-term) and to the national prescription registry, all of which will be gathered from the period 2009 throughout 2013. Twelve hundred and ninety five answered the questionnaire online; two reminder letters were sent out on paper where another 831 answered. The final response rate was 43.5%. The mean age of the sample was 42.6 yrs. (SD = 11.8 yrs.) and the gender ratio was 85.0% female.

Status and planned publications: The survey data collection is completed and is ready for analysis. The payroll data is still under preparation before it gets merged with the survey data, sick leave data and the

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national prescription registry. Based on these data, we specifically want to investigate if objective records of number of night shifts and number of quick returns predict future sick leave and medication use. Furthermore, we want to examine whether personality variables such as morningness, flexibility and languidity, and the big five personality traits moderate the relationship between the abovementioned shift characteristics and sick leave and medication use.

6.18 Using pay-roll data to study night-shift work and risk of breast cancer

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Aim: The aim is to use objective and detailed data about night-shift work in studying exposure to night-shift work and risk of breast cancer.

Methods: We used pay-roll data from the Danish Working Hour Database (DWHD) with information about date, hour, and minute for the beginning and end of every work duty. DWHD encompasses payroll data as of 2007 and is updated on an annual basis. For this analysis we defined night work as at least 3 hours of work between midnight and 05:00.

From national health registries, information about breast cancer diagnosis and different confounders were retrieved up to and including 2012.

We used the cumulated amount of night-shift work since their start of follow-up and during their last year with lag-time of both 0 years and 1 year. We also identified events of ≥4 consecutive night-shifts followed by ≥4 consecutive days without night-shifts. These events were cumulated since their start of follow-up and during their last year with lag-time of both 0 years and 1 year.

Results: From DWHD we identified 155,569 female employees without breast cancer diagnosis at baseline. We had information about their exposure to night-shift work in the period 2007–2012.

Discussion: The hypothesis linking night-shift work to increased breast cancer risk is based on experimental animal studies showing that decreased nocturnal melatonin production due to light at night increases the growth of the breast cancer tumor. There is limited knowledge about how real night-shift work influences the circadian rhythm and the melatonin production, and we might not have captured the most disruptive night-shift patterns.

From the experimental animal studies we do not know if night-shift work is an initiator or a promoter for breast cancer. If we are to say something about the risk of initiating breast cancer based on these data, we cannot leave out, that there is a risk of misclassification due to the fact that we only have a short follow-up period in proportion to their overall work history and therefore have no exposure information prior to 2007. If night-shift work is a promoter our follow-up period will cover more of the relevant exposure time and the risk of misclassification will

be smaller. Looking at groups with high risk of aggressive breast cancer types, like women <40 of age, will narrow the relevant exposure time even further.

Conclusion: Not all analysis have been performed so far, but when looking at cumulated night-shift work since start of follow-up without lag-time, there is no overall risk of breast cancer associated with night-shift work. When looking at different age groups, there seems to be a non-significant increased risk for women <40 years of age with for example 1–29 cumulated night-shifts compared to no cumulated night-shifts (adjusted RR of 1.28 (0.83–1.99) 95% CI).

7. Previous studies (list of publications from 2013–)

7.1 Publications from Finland

1. Aho V, Ollila HM, Rantanen V, Kronholm E, Surakka I, van Leeuwen WM, Lehto M, Matikainen S, Ripatti S, Härmä M, Sallinen M, Salomaa V, Jauhiainen M, Alenius H, Paunio T, Porkka-Heiskanen T. Partial sleep restriction activates immune response-related gene expression pathways: experimental and epidemiological studies in humans. PLoS One. 2013 Oct 23;8(10):e77184. doi: 10.1371/journal.pone.0077184.
2. Burdorf A, Järvholm B, Härmä M. The importance of preventing work-related disability. Scand J Work Environ Health. 2014 Jul;40(4):331–3. http://www.ncbi.nlm.nih.gov/pubmed/24897425
3. Henelius A, Sallinen M, Huotilainen M, Müller K, Virkkala J, Puolamäki K. Heart rate variability for evaluating vigilant attention in partial chronic sleep restriction. Sleep. 2014 Jul 1;37(7):1257–67. doi: 10.5665/sleep.3850.
4. Heponiemi, T., Aalto, A-M., Puttonen, S., Vänskä, J., Elovainio, M. Comparing psychiatrists and other medical specialists: Work-related stress, resources and well-being. Psychiatric Services. [Epub ahead of print]. doi: 10.1176/appi.ps.201300200
5. Heponiemi, T. Puttonen, S., Elovainio, M. (2014) On-call work and physician's wellbeing: testing the potential mediators. Occupational Medicine (Lond). 4, 352–357.
6. Hintsanen, M., Puttonen, S., Kylie, S., Jokela, M., Pulkki-Råback, L., Hintsa, T., Merjonen, P., Dwyer, T., Raitakari, O.T., Venn, A., Keltikangas-Järvinen, L. (2014). Five-factor Personality Traits and Sleep: Evidence from Two Population-based Cohort Studies. Health Psychology. 33, 1214–1223.

7. Härmä M. Promoting older worker's job retention and health by working hour patterns In: Sustainable Working Lives – Managing Work Transitions and Health throughout the Life Course, eds. Vuori, J., Blonk, R. & Price R. Springer publishing company: "Aligning Perspectives on Health, Safety and Well-being" edited by Stavroula Leka (University of Nottingham), Aditya Jain (Nottingham Business School) and Gerard Zwetslooter (TNO) (in press)
8. Härmä M. Psychosocial work characteristics and sleep – a well-known but poorly understood association. Scand J Work Environ Health. 2013 Nov 1;39(6):531–3.
9. Järnefelt, H., Sallinen, M., Luukkonen, R., Kajaste, S., Savolainen, A., & Hublin, C (2014). Cognitive behavioral therapy for chronic insomnia in occupational health services: Analyses of outcomes up to 24 months post-treatment. Behaviour Research and Therapy, 56, 16–21. dx.doi.org/10.1016/j.brat.2014.02.007.
10. Järvelin-Pasanen S, Ropponen A, Tarvainen MP, Karjalainen PA, Louhevaara V. Differences in heart rate variability of female nurses between and within normal and extended work shifts. Ind Health. 2013;51(2):154–64. Epub 2012 Dec 26.
11. Järvelin-Pasanen, S., Ropponen, A., Tarvainen, M., Paukkonen, M, Hakola, T., Puttonen, S., Karjalainen, P. A., Lindholm, H., Louhevaara, V., Pohjonen T. (2013). Effects of implementing an ergonomic work schedule on heart rate variability in shift working nurses. Journal of occupational health, 55, 225–233.
12. Karhula K, Henelius A, Härmä M, Sallinen M, Lindholm H, Kivimäki M, Vahtera J, Puttonen, S. (2014). Job strain and vagal recovery during sleep in shift working health care professionals. Chronobiology International 31; 1179–89.
13. Karhula K, Härmä M, Sallinen M, Lindholm H, Hirvonen A, Elovainio M, Kivimäki M, Vahtera J, Puttonen S. 2014. Association of job strain with cortisol and alpha-amylase among female shift workers in laboratory and field. Accepted for publication in Biological Research for Nursing.
14. Karhula, K., Härmä, M., Sallinen, M., Hublin, C., Kivimäki, M., Vahtera, J., Puttonen, S. (2013). Job Strain, Sleep and Alertness in Shift Working Health Care Professionals -a Field Study. Industrial Health, 51, 406–416.
15. Karhula, K., Härmä, M., Sallinen, M., Hublin, C., Virkkala, J., Kivimäki, M., Vahtera, J., Puttonen, S. (2013) Association of job strain with

working hours, shift-dependent perceived work load, sleepiness and recovery. Ergonomics, 56; 1640–51.

16. Kubo T, Takahashi M, Sallinen M, Kubo Y, Suzumura H. [How are leisure activity and shiftwork schedule associated with recovery from fatigue in shiftwork nurses?]. Sangyo Eiseigaku Zasshi. 2013;55(3):90–102. Epub 2013 Mar 1
17. Kärkkäinen S, Pitkäniemi J, Silventoinen K, Svedberg P, Huunan-Seppälä A, Koskenvuo K, Koskenvuo M, Alexanderson K, Kaprio J, Ropponen A. Disability pension due to musculoskeletal diagnoses: importance of work-related factors in a prospective cohort study of Finnish twins. Scand J Work Environ Health. 2013 Jul;39(4):343–50. doi: 10.5271/sjweh.3345. Epub 2013 Jan 28.
18. Nätti J, Oinas T, Härmä M, Anttila T, Kandolin I. Combined effects of shiftwork and individual working time control on long-term sickness absence: a prospective study of Finnish employees. J Occup Environ Med 2014 Jul;56(7):732–8. http://www.ncbi.nlm.nih.gov/pubmed/24988101
19. Ollila H, Aalto V, Johannes Kettunen, Olli Pietiläinen, Vilma Aho, Kaisa Silander, Markus Perola, Timo Partonen, Jaakko Kaprio, Mikael Sallinen, Mikko Härmä, Veikko Salomaa, Olli Raitakari, Tarja Porkka-Heiskanen and Tiina Paunio. Genome-wide association study of sleep duration in the Finnish population. J Sleep Res. 2014 Aug 11. doi: 10.1111/jsr.12175. [Epub ahead of print]
20. Puhkala J, Kukkonen-Harjula K, Mansikkamäki K, Aittasalo M, Hublin C, Kärmeniemi P, Olkkonen S, Partinen M, Sallinen M, Tokola K, Fogelholm M Lifestyle counseling to reduce body weight and cardiometabolic risk factors among truck and bus drivers – a randomized controlled trial. Scand J Work Environ Health. 2014 Oct 13. pii: 3463. doi: 10.5271/sjweh.3463
21. Ropponen A, Alexanderson K, Svedberg P. Part-time work or social benefits as predictors for disability pension: a prospective study of Swedish twins. Int J Behav Med. 2014 Apr;21(2):329–36. doi: 10.1007/s12529–013–9303–4. Erratum in: Int J Behav Med. 2014 Feb;21(1):210. PubMed PMID: 23479342.
22. Sallinen M Rest breaks--a countermeasure for work-related injuries? Scand J Work Environ Health. 2014 Mar;40(2):105–7. doi: 10.5271/sjweh.3418.
23. Sallinen M, Onninen J, Tirkkonen K, Haavisto ML, Härmä M, Kubo T, Mutanen P, Virkkala J, Tolvanen A, Porkka-Heiskanen T. Effects of

cumulative sleep deprivation on self-perceptions while multitasking. J Sleep Res. 2013 Jun;22(3):273–81. doi: 10.1111/jsr.12013. Epub 2012 Nov 22.

24. Sulkava S, Ollila HM, Ahola K, Partonen T, Viitasalo K, Kettunen J, Lappalainen M, Kivimäki M, Vahtera J, Lindström J, Härmä M, Puttonen S, Salomaa V, Paunio T. (2013). Genome-wide scan and three replications link the variant of UST to job related exhaustion. Human Molecular Genetics, 15, 3363–72.
25. Viitasalo, K., Hemiö, K., Puttonen, S., Hyvärinen, H.K., Leiviskä, J., Härmä, M., Peltonen, M., Lindström, J. (2014) Occupational Health Care in prevention of diabetes and cardiovascular disease: feasibility and effectiveness. Primary Care Diabetes, doi: 10.1016/j.pcd.2014.07.008
26. Viitasalo, K., Puttonen, S., Kuosma, E., Lindström, J., Härmä, M. (2014) Shift rotation and age – interactions with sleep-wakefulness and inflammation. Ergonomics, 17:1–10.
27. Vuori, M., Akila, R., Kalakoski, V., Pentti, J., Kivimäki, M., Vahtera, J., Härmä, M., Puttonen, S. (2014). Association between long-term exposure to work stressors and cognitive performance. Journal of Occupational and Environmental Medicine.56, 354–360.

7.2 Publications from Sweden

1. DiMilia L, Kecklund G. The distribution of sleepiness, sleep and work hours during a long distance morning trip: a comparison between night- and non-night workers. Accident Analysis and Prevention, 2013, 53:17–22.
2. Flo E, Pallesen S, Åkerstedt T, Magerøy N, Moen BE, Grønli J, Nordhus IH, Bjorvatn B. Shift-related sleep problems vary according to work schedule. Occupational and Environmental Medicine, 2013, 70:238–245.
3. Hallvig D, Anund A, Fors C, Kecklund G, Åkerstedt T. Real driving at night – predicting lane departures from physiological and subjective sleepiness. Biological Psychology, 2014, 101:18–23.
4. Ingre M, van Leeuwen, W, Klemets T, Ullvetter C, Hough S, Kecklund G, Karlsson D, Åkerstedt T. Validating and extending the three process model of alertness in airline operations. PLoS One, 2014 Oct 20;9(10):e108679.

5. Leineweber C, Kecklund G, Theorell T, Åkerstedt T, Alexanderson K, Westerlund H. Inflytande över arbetstiden och sjuknärvaro/sjukfrånvaro [Work-time control and sickness absence/presenteeism]. Arbetsliv & Arbetsmarknad, 2013; 4:87–99.
6. Salo P, Ala-Mursula L, Rod NH, Tucker P, Pentti J, Kivimäki M, Vahtera J. Work time control and sleep disturbances: prospective cohort study of finnish public sector employees. Sleep, 2014, 37:1217–1225.
7. Teixeira L, Lowden A, Luz AA, Turfe SL, Moreno CR, Valante D, Nagai-Manelli, Louzada FM, Fischer FM. Exposure to bright light during evening class hours increases alertness among working college students. Sleep Medicine, 2013, 14:91–97.
8. Tucker P, Byrne A. The tiring anaesthetist. Anaesthesia. 2014, 69: 6–9.
9. Van Leeuwen WM, Kircher A, Dahlgren A, Lützhöft M, Barnett M, Kecklund G, Åkerstedt T. Sleep, sleepiness, and neurobehavioral performance while on watch in a simulated 4 hours on/8 hours off martime watch system. Chronobiology International, 2013, 30:1108–1115.
10. Åkerstedt T, Hallvig D, Anund A, Fors C, Schwarz J, Kecklund G. Having to stop driving at night because of dangerous sleepiness awareness, phyisology and behaviour. Journal of Sleep Research, 2013, 22:380–388.
11. Åkerstedt T, Anund A, Axelsson J, Kecklund G. Subjective sleepiness is a sensitive indicator of insufficient sleep and impaired waking function. Journal of Sleep Research, 2014, 23:240–252.
12. Øyane NM, Pallesen S, Moen B, Åkerstedt T, Bjorvatn B. Assocations between night work and anxiety, depression, insomnia, sleepiness and fatigue in a sample of Norwegian nurses. PLoS One, 2013, Aug 7;8(8):e70228.
13. Marquie, J-C., Tucker, P., Folkard, S., Gentil, C., Ansiau, D. (in press). Chronic effects of shift work on cognition: Findings from the VISAT longitudinal study. Occupational & Environmental Medicine.
14. Tucker, P., Bejerot, E., Kecklund, G., Aronsson, G, & Åkerstedt, T. (2014). The impact of work time control on physician's sleep and wellbeing. Applied Ergonomics, 47, 109–116.
15. Geurts, S.A.E., Beckers, D.G.J. & Tucker, P. (2013). Recovery from demanding work hours. In M. Peeters, J. De Jonge & T. Taris (Eds.), People at Work: An Introduction to Contemporary Work Psychology. Wiley-Blackwell.

16. Marquié, J-C., Tucker, P., Folkard. S & Ansiau, D. (2013). Pénibilité et soutenabilité du travail posté: indices liés au sommeil, au métabolisme et á la cognition dans l'étude longitudinale VISAT. (Hardship and sustaintability of shift work: Indices related to sleep, metabolism and cognition in the VISAT longitudinal study.). In J-C. Marquié & M. C. Amauger-Lattes (Eds.) Pénibilité et de la santé: les conditions d'effort durable au travail.Toulouse: Octarès Editions.

7.3 Publications from Norway

1. Di Milia L, Waage S, Pallesen S, Bjorvatn B. Shift work disorder in a random population sample – prevalence and comorbidities. PloS ONE 2013: 8(1): e55306.
2. Roelen CAM, Magerøy N, van Rhenen W, Groothoff JW, van der Klink JJL, Pallesen S, Bjorvatn B, Moen BE. Low job satisfaction does not identify nurses at risk of future sickness absence: results from a Norwegian cohort study. International Journal of Nursing Studies 2013; 50: 366–373.
3. Thun E, Bjorvatn B, Moen BE, Magerøy N, Flo E, Pallesen S. Robuste og aktive sykepleiere tåler skiftarbeid. Sykepleien 2013; 101 nr 2: 44–46.
4. Flo E, Magerøy N, Moen BE, Pallesen S, Bjorvatn B. Skiftarbeid gir søvnproblemer. Sykepleien 2013; 101 nr 3: 68–69.
5. Saksvik-Lehouillier IB, Bjorvatn B, Hetland H, Sandal GM, Moen B, Magerøy N, Åkerstedt T, Pallesen S. Individual, situational and lifestyle factors related to shift work tolerance among nurses who are new to and experienced in night work. Journal of Advanced Nursing 2013; 69: 1136–1146.
6. Waage S, Pallesen S, Moen BE, Bjorvatn B. Sleep and health in oil rig workers – before and after a two week work period offshore. Industrial Health 2013; 51: 172–179.
7. Flo E, Pallesen S, Åkerstedt T, Magerøy N, Moen BE, Grønli J, Nordhus IH, Bjorvatn B. Shift work related sleep problems vary according to work schedule. Occupational and Environmental Medicine 2013; 70: 238–245.
8. Vedaa Ø, Bjorvatn B, Magerøy N, Thun E, Pallesen S. Longitudinal predictors of changes in the morningness-eveningness personality among Norwegian nurses. Personality and Individual Differences 2013; 55: 152–156.

9. Bjorvatn B, Waage S. Bright light improves sleep and psychological health in shift working nurses (Commentary on Huang *et al*.). Journal of Clinical Sleep Medicine 2013; 9: 647–648.
10. Fossum IN, Bjorvatn B, Waage S, Pallesen S. Effects of shift work and night work in the offshore petroleum industry: A systematic review. Industrial Health 2013; 51: 530–544.
11. Øyane N, Pallesen S, Moen BE, Åkerstedt T, Bjorvatn B. Associations between night work and anxiety, depression, insomnia, sleepiness and fatigue in a sample of Norwegian nurses. PLoS One 2013; 8: e70228.
12. Eldevik MF, Flo E, Moen BE, Pallesen S, Bjorvatn B. Insomnia, excessive sleepiness, excessive fatigue, anxiety, depression and shift work disorder in nurses having less than 11 hours in-between shifts. PloS One 2013; 8: e70882.
13. Warpe H, Bjorvatn B, Waage S, Hovlid E, Pallesen S. Vet lite om helsefarene ved turnusarbeid. Sykepleien 2013; 11: 54–57.
14. Roelen CAM, Bültmann U, Groothoff JW, van Rhenen W, Magerøy N, Moen BE, Pallesen S, Bjorvatn B. Physical and mental fatigue as predictors of sickness absence among Norwegian nurses. RINAH 2013; 36: 453–465.
15. Storemark SS, Fossum IN, Bjorvatn B, Moen BE, Flo E, Pallesen S. Personality factors predict sleep related shift work tolerance in different shifts at two year follow-up. A prospective study. BMJ Open 2013;3:e003696.
16. Kunst JR, Løset GK, Hosøy D, Bjorvatn B, Moen BE, Magerøy N, Pallesen S. The relationship between shift work schedules and spillover in a sample of nurses. International Journal of Occupational Safety and Ergonomics 2014; 20: 139–1473–11.
17. Reknes I, Pallesen S, Magerøy N, Moen BE, Bjorvatn B, Einarsen S. Exposure to bullying behaviors as a predictor of mental health problems among Norwegian nurses: results from the prospective SUSSH-survey. International Journal of Nursing Studies, in press.
18. Lallukka T, Overland S, Haaramo P, Saastamoinen P, Bjorvatn B, Sivertsen B. The joint contribution of pain and insomnia to sickness absence and disability retirement: a register-linkage study among Norwegian and Finnish employees. European Journal of Pain 2014; 18: 883–892.

19. Roelen CAM, van Rhenen W, Schaufeli WB, van der Klink JJL, Magerøy N, Moen BE, Bjorvatn B, Pallesen S. Mental and physical health-related functioning mediates between psychological job demands and sickness absence among nurses. Journal of Advanced Nursing 2014; in press.
20. Reknes I, Bjorvatn B, Einarsen S, Pallesen S, Magerøy N, Thun E, Moen BE. Nye funn om turnusarbeid: Nattarbeid, roterende turnusarbeid og mindre enn 11 timer mellom skift er spesielt problematisk for søvnen. Sykepleien 2014; nr. 07: 36–39.
21. Thun E, Bjorvatn B, Torsheim T, Moen BE, Magerøy N, Pallesen S. Night work and symptoms of anxiety and depression among nurses. Work & Stress 2014 in press.
22. Roelen CAM, Heymans MW, Twisk JWR, van Rhenen W, Pallesen S, Bjorvatn B, Moen BE, Magerøy N. Updating and prospective validation of a prognostic model for high sickness absence in healthcare: results from a 3-wave longitudinal cohort study of Norwegian nurses. International Archives of Occupational and Environmental Health 2014 in press.
23. Flo E, Pallesen S, Moen BE, Waage S, Bjorvatn B. Short rest periods between work shifts predict sleep and health problems in nurses at 1 year follow-up. Occupational and Environmental Medicine 2014; 71: 555–561.
24. Moen BE, Waage S, Ronda E, Magerøy N, Pallesen S, Bjorvatn B. Spontaneous abortions and shift work in a cohort of nurses in Norway. Occupational Medicine and Health Affairs 2014; 2: 160.
25. Waage S, Pallesen S, Moen BE, Magerøy N, Flo E, di Milia L, Bjorvatn B. Predictors of shift work disorder among nurses – a longitudinal study. Sleep Medicine in press.
26. Saksvik-Lehouillier I, Pallesen S, Bjorvatn B, Magerøy N, Folkard S. Towards a more comprehensive definition of shift work tolerance. Industrial Health in press.
27. Roelen CAM, Heymans MW, Twisk JWR, Laaksonen M, Pallesen S, Magerøy N, Moen BE, Bjorvatn B. Health measures in prediction models for high sickness absence: single-item self-rated health versus multi-item SF-12. European Journal of Public Health in press.
28. Waage S, Pallesen S, Moen E, Magerøy N, Flo E, Di Milia L, & Bjorvatn B. Shift Work Disorder among Norwegian nurses – a follow up study (Available online 17 September 2014 in Sleep Medicine).

29. Edyta Reszka, Beata Peplonska, Edyta Wieczorek, Wojcieck Sobala, Agnieszka Bukowska, Jolanta Gromadzinska, Jenny-Anne Lie, Helge Kjuus, Wojciech Wasowicz: Circadian gene expression in peripheral blood leucocytes of rotating night shift nurses. Scand J Work Environ Health. 2013; 39(2): 187–194. Doi:10.5271/sjweh.3303
30. Jenny-Anne S. Lie, Helge Kjuus, Shan Zienolddiny, Aage Haugen, and Kristina Kjærheim: Breast Cancer Among Nurses: Is the Intensity of Night Work Related to Hormone Receptor Status? Am. J. Epidemiol. 2013 178: 110–117
31. Shan Zienolddiny, Aage Haugen, Jenny-Anne S. Lie, Helge Kjuus, Kristina Haugen Anmarkrud and Kristina Kjærheim: Analysis of polymorphisms in the circadian-related genes and breast cancer risk in Norwegian nurses working night shifts. Breast Cancer Research 2013, 15:R53

7.4 Publications from Denmark

1. Hansen ÅM, Nabe-Nielsen K, Albertsen K, Hogh A, Lund H, Hviid H, Garde AH, Self-rostering and psychosocial work factors – A mixed methods intervention study. Applied Ergonomics (2015) 47:203–10.
2. AH Garde, ÅM Hansen, R Persson, K Österberg, P Ørbæk, B Karlson, A Olsen, J Kristiansen. Month-to-month variation in sleep among healthy, Scandinavian daytime workers (2014) Scand J Clin Lab Invest. 2014 May 14:1–9. [Epub ahead of print]
3. AH Garde, ÅM Hansen, A Holtermann, F Gyntelberg, P Suadicani. Sleep duration and ischemic heart disease mortality and all-cause mortality. Prospective cohort study on effects of tranquilizers/hypnotics and perceived stress. Scand J Work Environ Health. (2013) 39(6):550–558. Doi: 10.5271/sjweh.3372.
4. K Nabe-Nielsen, H Lund, J Ajslev, ÅM Hansen, K Albertsen, H Hvid, AH Garde. How do employees prioritise when they schedule their own shifts? Ergonomics (2013) Vol. 56, No. 8, 1216–1224, http://dx.doi.org/10.1080/00140139.2013.815804
5. K Albertsen, AH Garde, K Nabe-Nielsen, ÅM Hansen, H Lund, H Hvid. Work life balance among shift workers – results from an intervention study about self-rostering. Int. Arch. Occup. Environ. Health. (2014) 87:265–74. DOI 10.1007/s00420–013–0857–x

6. Hansen J. 0200 Night shiftwork and breast cancer survival in Danish women. Occup Environ Med 2014 Jun;71 Suppl 1:A26.
7. Hansen J, Lassen CF. [Shift work and risk of cancer and coronary heart diseases.]. Ugeskr Laeger 2014 Jan 20;176(2).
8. Tilma VH, Helene GA, Marie HA, Hansen J, Christiansen P, Kolstad H. 0222 Night work and breast cancer risk among women in the public Danish health care sector – a short-term follow up of a large scale population. Occup Environ Med 2014 Jun;71 Suppl 1:A30.
9. Jacobs DI, Hansen J, Fu A, Stevens RG, Tjonneland A, Vogel UB, *et al*. Methylation alterations at imprinted genes detected among long-term shiftworkers. Environ Mol Mutagen 2013 Mar;54(2):141–6.
10. Shi F, Chen X, Fu A, Hansen J, Stevens R, Tjonneland A, *et al*. Aberrant DNA methylation of miR-219 promoter in long-term night shiftworkers. Environ Mol Mutagen 2013 Jul;54(6):406–13.
11. Stevens R, Hansen J. Letter to the editor, re: night-shift work and risk of breast cancer (Kamdar *et al*., doi:10.1007/s10549–013–2433–1). Breast Cancer Res Treat 2013 May;139(1):291–4.
12. Stevens RG, Hansen J, Schernhammer ES, Davis S. Response to Ijaz S, *et al*. "Night-shift work and breast cancer--a systematic review and meta-analysis". Scand J Work Environ Health 2013 Nov;39(6):631–2.
13. Jensen, TK, Andersson, A-M, Skakkebæk, NE, Joensen, UN, Jensen, MB, Lassen, TH, Nordkap, L, Olesen, IA, Hansen, ÅM, Rod, NH, Jørgensen, N. Association of sleep disturbances with reduced semen quality: A cross-sectional study among 953 healthy young Danish men. AJE. 2013 May 15;177(10):1027–37.10.1016/j.psyneuen.2013.03.013.
14. Hansen, ÅM, Darsø, L, Christensen, U, Lund, R, Holterman, A, Avlund, K. (2014) Psychosocial factors at work and the development of mobility limitations among adults in Denmark. SJPH. 42;417–424.
15. Merkus, S, Holte, KA, Huysmans, MA, Hansen, ÅM, van de Ven, PM, van Mechelen, V, van der Beek, AJ. (2014) Neuroendocrine recovery after compressed and extended day and night shifts: an 11-day follow-up. IAOEH (DOI 10.1007/s00420–014–0954–5).
16. Clark, A, Dich, N, Lange, T, Jennum, P, Hansen, ÅM, Lund, R, Rod, NH. (2014) Impaired sleep is associated with a higher allostatic load: the Danish Copenhagen Aging and Midlife Biobank. Sleep. 15, 1571–1578.

17. Liu R, Jacobs DI, Hansen J, Fu A, Stevens RG, Zhu Y (2014). Aberrant methylation of miR-34b is associated with long-term shiftwork: a potential mechanism for increased breast cancer susceptibility. Cancer Causes Control. [Epub ahead of print]

References

(1) Costa G, Akerstedt T, Nachreiner F, Baltieri F, Carvalhais J, Folkard S, *et al*. Flexible working hours, health, and well-being in Europe: some considerations from a SALTSA project. Chronobiol Int 2004;21(6):831–44. http://dx.doi.org/10.1081/CBI-200035935

(2) Haus E, Smolensky M. Biological clocks and shift work: circadian dysregulation and potential long-term effects. Cancer Causes Control 2006 May;17(4):489–500. http://dx.doi.org/10.1007/s10552-005-9015-4

(3) Sallinen M, Kecklund G. Shift work, sleep and sleepiness – differences between shift schedules and systems. Scand J Work Environ Health 2010 Feb 1;36(2):121–33. http://dx.doi.org/10.5271/sjweh.2900

(4) Dula DJ, Dula NL, Hamrick C, Wood GC. The effect of working serial night shifts on the cognitive functioning of emergency physicians. Ann Emerg Med 2001 Aug;38(2):152–5. http://dx.doi.org/10.1067/mem.2001.116024

(5) Griffiths JD, McCutcheont C, Silbert BS, Maruff P. A prospective observational study of the effect of night duty on the cognitive function of anaesthetic registrars. Anaesth Intensive Care 2006 Oct;34(5):621–8.

(6) Knutsson A, Bøggild H. Gastrointestinal disorders among shift workers. Scand J Work Environ Health 2010 Jan 26;36(2):85–95. http://dx.doi.org/10.5271/sjweh.2897

(7) Folkard S, Tucker P. Shift work, safety and productivity. Occup Med (Lond) 2003 Mar;53(2):95–101. http://dx.doi.org/10.1093/occmed/kqg047

(8) Morikawa Y, Nakagawa H, Miura K, Soyama Y, Ishizaki M, Kido T, *et al*. Shift work and the risk of diabetes mellitus among Japanese male factory workers. Scand J Work Environ Health 2005 Jun;31(3):179–83. http://dx.doi.org/10.5271/sjweh.867

(9) Suwazono Y, Sakata K, Okubo Y, Harada H, Oishi M, Kobayashi E, *et al*. Long-term longitudinal study on the relationship between alternating shift work and the onset of diabetes mellitus in male Japanese workers. J Occup Environ Med 2006 May;48(5):455–61. http://dx.doi.org/10.1097/01.jom.0000214355.69182.fa

(10) Knutsson A, Bøggild H. Gastrointestinal disorders among shift workers. Scand J Work Environ Health 2010 Jan 26;36(2):85–95. http://dx.doi.org/10.5271/sjweh.2897

(11) Bøggild H, Knutsson A. Shift work, risk factors and cardiovascular disease. Scand J Work Environ Health 1999 Apr;25(2):85–99. http://dx.doi.org/10.5271/sjweh.410

(12) Costa G, Haus E, Stevens R. Shift work and cancer – considerations on rationale, mechanisms, and epidemiology. Scand J Work Environ Health 2010 Feb 2;36(2):163–79. http://dx.doi.org/10.5271/sjweh.2899

(13) Bonde JPE, Andersen JH, Frost P, Kærgaard A, Kolstad HA, Thulstrup AM. Helbredsundersøgelser ved natarbejde. Ugeskr Laeger 2007 May 21;169(21):2005–7.

(14) Frost P, Kolstad HA, Bonde JP. Shift work and the risk of ischemic heart disease – a systematic review of the epidemiologic evidence. Scand J Work Environ Health 2009 May;35(3):163–79. http://dx.doi.org/10.5271/sjweh.1319

(15) Wedderburn A. Guidelines for shiftworkers- Bulletin of European Shiftwork Topics. European Foundation for the Improvement of Living and Working Conditions; 1991. Report No.: 3.

(16) Bonde JP, Hansen J, Kolstad HA, Mikkelsen S, Olsen JH, Blask DE, *et al*. Work at night and breast cancer – report on evidence-based options for preventive actions. Scand J Work Environ Health 2012 Feb 20;38(4):380–90. http://dx.doi.org/10.5271/sjweh.3282

Sammenfatning

Denne rapport omhandler projektet med den engelske titel "Co-ordination of research on working hours and health in the Nordic countries" og den workshop, der blev afholdt på det finske Arbejdsmiljøinstitut fra d. 23. til d. 24. oktober 2014.

Det overordnede formål med projektet var at skabe en platform for samarbejde og udvikling af højkvalitets forskningsprojekter relateret til arbejdstid i de nordiske lande. I alt deltog 28 personer fra ni forskellige nordiske forskningsmiljøer.

Projektet er støttet af Nordisk Ministerråd og nærværende rapport opsummerer præsentationer og diskussioner fra workshoppen.

Projektets vigtigste resultater:

- Igangværende arbejdstidsforskning i de nordiske lande er beskrevet i 18 abstracts, hvoraf hovedparten blev præsenteret på workshoppen.
- Nøglevariable, der skal inkluderes ift. arbejde med større arbejdstidskohorter i de nordiske lande, blev diskuteret på workshoppen, og arbejdet fortsættes i en mindre gruppe med repræsentanter fra Norge, Finland, Sverige og Danmark. Formålet med dette er at publicere en videnskabelige artikel, hvor arrangeringen af arbejdstider blandt sygeplejersker sammenlignes.
- Identifikation af relevante nordiske registre med forskellige helbredsudfald med henblik på fremtidige samarbejdsprojekter.

Fremtidige samarbejdsmuligheder og muligheder for fælles ansøgninger af forskningsmidler blev yderligere diskuteret. Projektet har allerede givet mulighed for at indsende tre forskningsansøgninger, hvor deltagere fra projektet har deltaget.

Projektet har støttet samarbejdet og udviklingen af forskningsprojekter inden for feltet arbejdstid og helbred i de nordiske lande, herunder:

- Netværket etableret ifm. workshoppen "Co-ordination of research on working hours and health in the Nordic countries 2013" fortsætter i et mere formelt konsortium: "Working hours In the Nordic Countries" (WINC). Formålet med WINC er at muliggøre samarbejdet

mellem de nordiske lande i relation til højkvalitets forskning inden for arbejdstid og helbred.

- En WINC-hjemmeside er blevet etableret (http://www.arbejdsmiljoforskning.dk/WINC). Siden kan bruges til introduktion af WINC samt til inklusion af nye medlemmer.
- Det 22. internationale symposium om skiftearbejde og arbejdstid løber af stablen i Danmark i juni 2015. Det videnskabelige udvalg vil inkludere repræsentanter fra WINC.

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Nordic Council of Ministers

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Working hours and health – 2014

The 2014 workshop on "Co-ordination of research on working hours and health in the Nordic countries" was held at the Finnish Institute of Occupational Health on the 23rd–24th October 2014. The overall purpose of the workshop was to provide a platform for cooperation and development of high-quality research projects on working hours and health in the Nordic countries. The project is supported by the Nordic Council of Ministers. The present report summarizes the presentations and discussions at the workshop with main focus on opportunities for future collaborations.

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