ISRCTN21603406 https://doi.org/10.1186/ISRCTN21603406

Effects of blue-depleted indoor lighting on hospital ward employees

Submission date
19/12/2018

Recruitment status
No longer recruiting

Registration date
28/12/2018

Overall study status
Completed

Last Edited
17/08/2022

Condition category
Other

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
As humans we have specialized our primary life functions to daylight conditions. As such, our daily bodily rhythms dispose us to be awake and active during the day when it is light outside, and to sleep or rest during the night when it is dark outside. However, the demands of the modern 24-hour society forces some employees to work in the early morning, evening, and during night time. This inevitably leads shift workers to be exposed to artificial light at times that can cause a shift in the daily bodily rhythms. The discovery of a new type of receptor cell in the retina of the eye, which specifically reacts to light of certain wavelengths in the blue spectrum (wavelengths < 530 nanometers, nm), has led to an increased understanding of how light affects the human daily bodily rhythm system. The aim of this study is to investigate how different types of light conditions at the workplace might influence shift workers' health and sleep.

Who can participate?
Nursing staff currently working at the acute ward at St Olavs Hospital, Østmarka in Norway

What does the study involve?
Nursing staff over a 12-week period rotate between two work sites (6-week work period on each work site). The two work sites are structurally and clinically identical, with the exception that one of the sites has evening/nightly (18.30 to 07.00 hours) blue-depleted indoor lighting (lights with wavelengths of less than 530 nm filtered out), whereas the other work site has normal lighting. All nurses work at both work sites over the 12-week period, and they are asked to answer questionnaires in the middle of each 6-week work period, and to keep a work- and sleep diary and wear an activity monitor for 2/3 weeks in each 6-week work period.

What are the possible benefits and risks of participating?
Blue-depleted indoor lighting during evening and night shifts might help shift workers maintain a stable daily bodily rhythm. This can have health-promoting effects for the workers. Furthermore, having evening shifts in blue-depleted lighting might make it easier for the shift workers to fall asleep after the evening shift. Blue-depleted lighting might help maintain a more stable daily bodily rhythm when working during night shifts, as compared to working during nights in normal lighting. In turn, this can lead to a faster re-adaption to a normal day rhythm

and better recovery from night work during off-duty periods.
A possible risk of blue-depleted indoor lighting during evening and night shifts is that the light may make the workers sleepier during the shifts. This can potentially increase the risk of accidents during the shifts, or it can increase the risk of car accidents when driving home after an evening/night shift.

Where is the study run from?
This study is run from the Department of Health Promotion, Norwegian Institute of Public Health in Bergen in Norway. The study is carried out in collaboration with the Department of Mental Health at the Norwegian University of Science and Technology and the psychiatric ward at St Olavs Hospital, Østmarka, in Trondheim, Norway. The intervention takes place at the psychiatric ward at St. Olavs Hospital in Norway.

When is the study starting and how long is it expected to run for?
August 2018 to February 2020 (updated 29/08/2019, previously: February 2019)

Who is funding the study?
The study is funded by internal funds at the institutions involved in the project

Who is the main contact?
Dr Øystein Vedaa

Contact information

Type(s)
Scientific

Contact name
Dr Øystein Vedaa

Contact details
Department of Health Promotion
Norwegian Institute of Public Health
Zander Kaaes gate 7
Bergen
Norway
5015

Additional identifiers

EudraCT/CTIS number

IRAS number

ClinicalTrials.gov number

Secondary identifying numbers
2018/1516

Study information

Scientific Title
Effects of blue-depleted indoor lighting during evening and night shifts on psychiatric hospital ward employees

Study objectives
Questions:
1. What are the effects of blue-depleted indoor lighting during evening and night shifts on nursing staffs job performance, impact on physical and mental wellbeing, symptoms of headache and eyestrain, and satisfaction with their work environment compared to working in normal light conditions?
2. What are the effects of working evening shifts and night shifts in blue-depleted indoor lighting on sleep, mood and the risk of accidents compared to working in normal light conditions?

Hypotheses:
1. The intervention will not influence job performance, impact on physical and mental wellbeing, symptoms of headache and eyestrain, and satisfaction with their work environment compared to working in normal light conditions.
2. The intervention will be associated with improved sleep after evening shifts, and improved re-adaption of sleep timing after spells of night shifts, compared to working in normal light conditions.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Regional Committees for Medical and Health Research Ethics in central Norway, 10/10/2018, ref: 2018/1516/REK Central

Postal address:
NTNU/REK midt, Det medisinske fakultet, Postboks 8905, 7491 Trondheim
Office address:
Øya Helsehus, 2. floor
Mauritz Hansens gate 2, Trondheim
Telephone: 73597511
Email: rek-midt@mh.ntnu.no

Study design
Single-center non-randomized cross-over study

Primary study design
Interventional

Secondary study design
Non randomised study

Study setting(s)
Hospital

Study type(s)
Other

Participant information sheet

Health condition(s) or problem(s) studied
Sleep and health of shift working nurses at a psychiatric ward at various light conditions at work

Interventions
The intervention that will be tested in this study is altered light conditions during evening and night shifts for nursing staff at a psychiatric ward at St. Olavs Hospital, Østmarka in Norway. This psychiatric ward has two separate work sites that are structurally identical. One of the work sites will have evening/nightly (18.30 to 07.00 hours) blue-depleted lighting (< 530 nm) in 20 patient rooms and common areas, and normal lighting in the morning/day. The other work site will have normal lighting in 20 patient rooms and common areas. Half of the nursing staff /participants will start on the work site with evening/nightly blue-depleted lighting (< 530 nm), and the other half will start on the work site with normal lighting. All nurses will change work site and light conditions after six weeks.

After three weeks of work in the respective light conditions, the nurses will be asked to complete the questionnaires at work (which can be during day, evening and night shifts depending on their current shift schedule and the nurse's convenience). All questionnaires specifically instruct participants to answer the questions based on their experience during night- and evening shifts the last two weeks. All nurses will complete the questionnaires twice - once in each light condition.

Intervention Type
Other

Primary outcome measure
Measured after 3 weeks of work in the respective light conditions:
1. The nurses' effort, concentration, and estimated performance at work assessed using three items based on the Psychological Variables Questionnaire (Pilcher & Walters, 1997)
2. Nurses' subjective evaluation of the lighting conditions assessed using eight semantic differential adjective items rated on a 7-point scale (Smolders & de Kort, 2014)
3. Symptoms of eye strain assessed using the Headache and Eye Strain Scale (H&ES)
4. Headache related to the altered light conditions assessed with eight self-reported items (Viola, James, Schlangen, & Dijk, 2008)
5. The nurses' psychological distress assessed using the Kessler Psychological Distress Scale (K10) (Kessler et al., 2003)
6. The nurse's physical health assessed using the Physical Health Questionnaire (PHQ)(Schat, Kelloway, & Desmarais, 2005)

Secondary outcome measures
1. Self-report measures of work and sleep schedules derived from a work- and sleep diary that the nurses will be instructed to keep during the last 2/3 weeks of each light condition. The work diary provides information on the day-to-day shift schedule of the nurses (shift start and end times), level of sleepiness during each shift, and work-related incidents (accidents/near-accidents). The sleep diary provides daily estimates of the nurses sleep episodes, including sleep onset latency, wake after sleep onset, total sleep time, etc.
2. Motor activity in the day and sleep at night measured objectively for 80 nurses with an actigraphy device for the last 2/3 weeks in each light condition. Nighttime data from the actigraph will be used in parallel with the sleep diary for a more accurate assessment of the participants sleep.

Overall study start date
05/08/2018

Completion date
28/02/2020

Eligibility

Key inclusion criteria
All nursing staff currently working at the acute ward at St Olavs Hospital, Østmarka (>= 40% of full time equivalent) will be invited to participate

Participant type(s)
Health professional

Age group
Adult

Sex
Both

Target number of participants
106

Total final enrolment
25

Key exclusion criteria
1. Not working at the acute ward at St Olavs Hospital, Østmarka in Norway
2. Having less than 40% of full time equivalent position at the acute ward at St Olavs Hospital

Date of first enrolment
12/11/2018

Date of final enrolment
28/02/2020

Locations

Countries of recruitment
Norway

Study participating centre
St Olavs Hospital, Østmarka
Østmarkveien 15
Trondheim
Norway
7040

Sponsor information

Organisation
Norwegian University of Science and Technology

Sponsor details
Department of Mental Health,
Olav Kyrres gate 9
Trondheim
Norway
7030
+47 (0)73 59 11 00
kontakt@iph.ntnu.no

Sponsor type
University/education

Website
https://www.ntnu.no/

ROR
https://ror.org/05xg72x27

Organisation
Department of Health Promotion, Norwegian Institute of Public Health

Sponsor details
Zander Kaasgate 6
Bergen
Norway
5015
+47 (0)21 07 70 00
folkehelseinstituttet@fhi.no

Sponsor type
Research organisation

Website
https://fhi.no/

Funder(s)

Funder type
University/education

Funder Name
Norges Teknisk-Naturvitenskapelige Universitet

Alternative Name(s)
Norwegian University of Science and Technology, The Norwegian University for Technology an Sciences, Universidad Noruega de Ciencia y Tecnología, NTNU

Funding Body Type
Government organisation

Funding Body Subtype
Universities (academic only)

Location
Norway

Results and Publications

Publication and dissemination plan
The study will be described as an ancillary study in a protocol of a randomized controlled treatment trial at the same unit. This will be updated when the protocol has been published. The results from the present study will be published in an international peer reviewed journal during 2019.

Intention to publish date
28/02/2021

Individual participant data (IPD) sharing plan
Data will not be available outside the core research group until completion of key analyses and relevant manuscripts have been published. However, researchers who are interested in this study can contact the main investigator (Øystein Vedaa) if they have any questions regarding the data. The participants will receive written information about what the study involves and sign a consent form before entering the study.

IPD sharing plan summary
Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		18/07/2022	17/08/2022	Yes	No