

Recommendations on shift work scheduling – uptake by Danish authorities and social partners

Anne Helene Garde, professor, National Research Centre for the Working Environment (NFA)

AMM Vårnöte, Göteborg, 16. april 2026

Background

The work of developing research-based recommendations was initiated by the National Research Centre for the Working Environment (NFA) in order to:

- follow up on the latest evaluation from the IARC, which concluded that night work is probably carcinogenic
- meet a request from both authorities, employers and employees organizations to have a qualified, research-based basis for guidelines for the scheduling of night work
- contribute to the puzzle with pieces that address the link between night work scheduling and health from a public health perspective

Method

In January 2020, 15 primarily Nordic working time researchers gathered for a three-day workshop in Helsingør. The focus was on:

- **Night work either** as part of shift work, e.g. two or three shifts, or permanent night shifts. Other types of shifts, e.g. evening or early morning shifts, were not included.
- **Organisation of night work** – the possible significance of other factors such as lighting conditions or other conditions that can be changed in the workplace, or measures that employees themselves can implement, e.g. to improve their ability to sleep during the day, were not included.
- **Risk of cancer, cardiovascular disease, accidents and pregnancy-related health risks** – due to the seriousness of the outcome and because we knew that there were informative studies. Other outcomes such as well-being, productivity and patient safety are not included.



Night shift schedules

- Intensity of night shifts
- Consecutive night shifts
- Permanent night shift work
- Shift intervals
- Direction of rotation
- Shift duration

Short term physiological effects

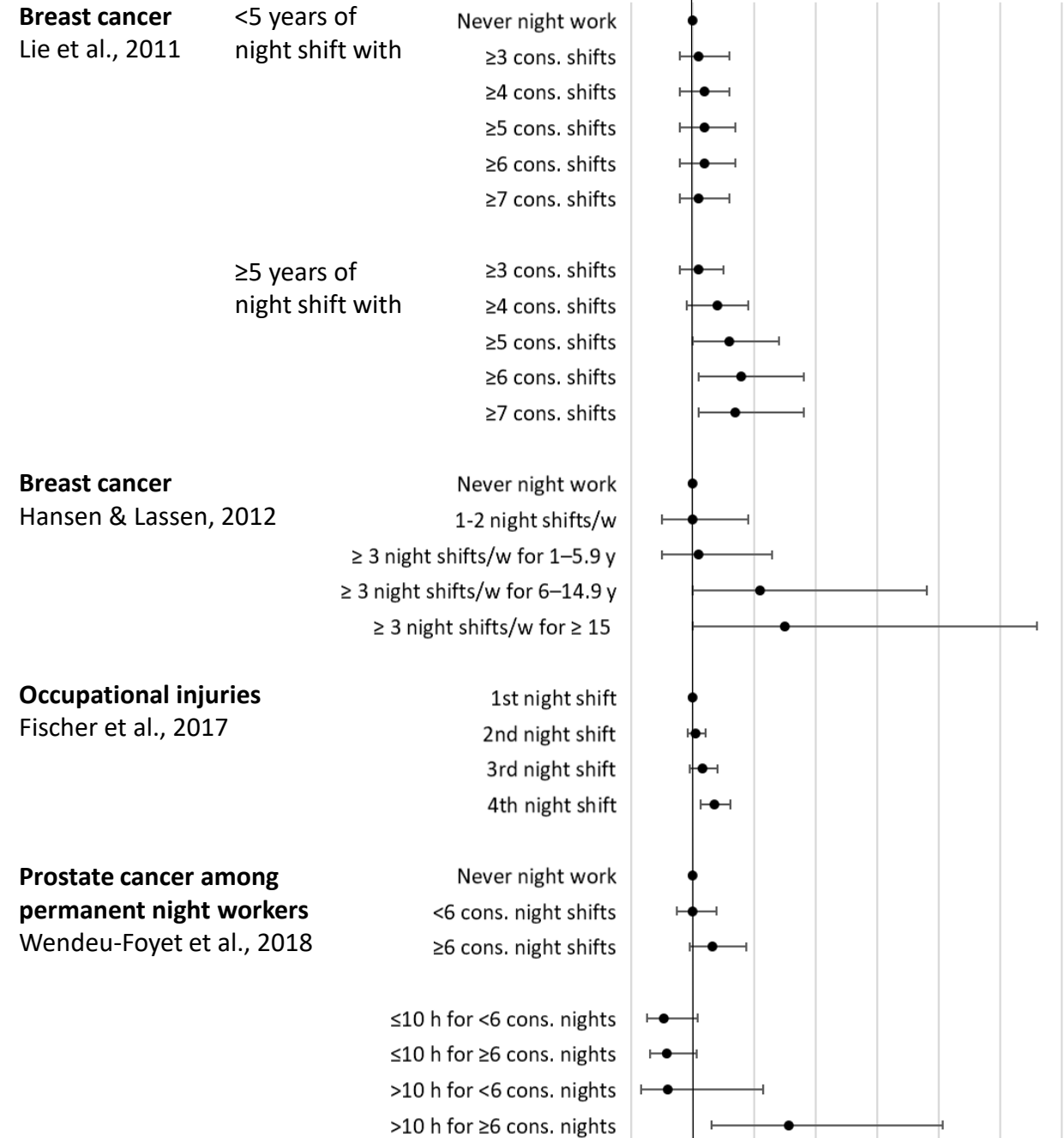
- Circadian disruption
- Inadequate sleep duration and quality
- Fatigue and sleepiness

Health and safety risks

- Cancer
- Cardio-metabolic disease
- Injuries
- Pregnancy related outcomes

Consecutive night shifts

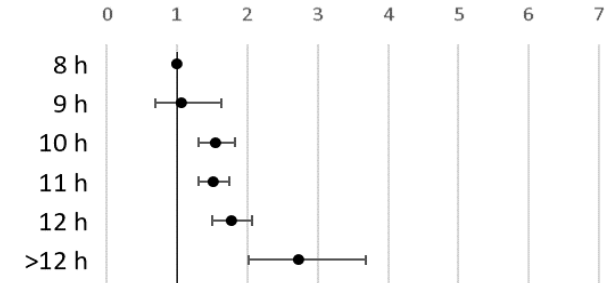
- Taken together risk of accidents and possibly breast cancer is reduced with a maximum of 3 consecutive night shifts.



Shift duration

- The results support that risk of accidents and possibly cancer is reduced, if shift duration is 9 hours or less

Occupational injuries
Fischer et al., 2017



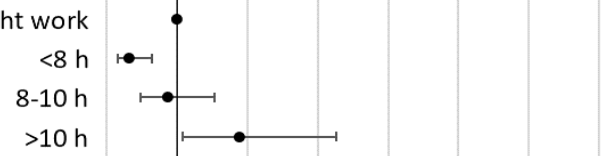
Breast cancer
Pre-menopausal women
Cordina-Duverger et al., 2018

Never night work
<8 h
8-9 h
≥10 h



Prostate cancer
Permanent night workers
Wendeu-Foyet et al., 2018

Never night work
<8 h
8-10 h
>10 h



≤10 h for <6 cons. nights
≤10 h for ≥6 cons. nights
>10 h for <6 cons. nights
>10 h for ≥6 cons. nights



Prostate cancer
Rotating night workers
Wendeu-Foyet et al., 2018

<8 h
8-10 h
>10 h



≤10 h for <6 cons. nights
≤10 h for ≥6 cons. nights
>10 h for <6 cons. nights
>10 h for ≥6 cons. nights

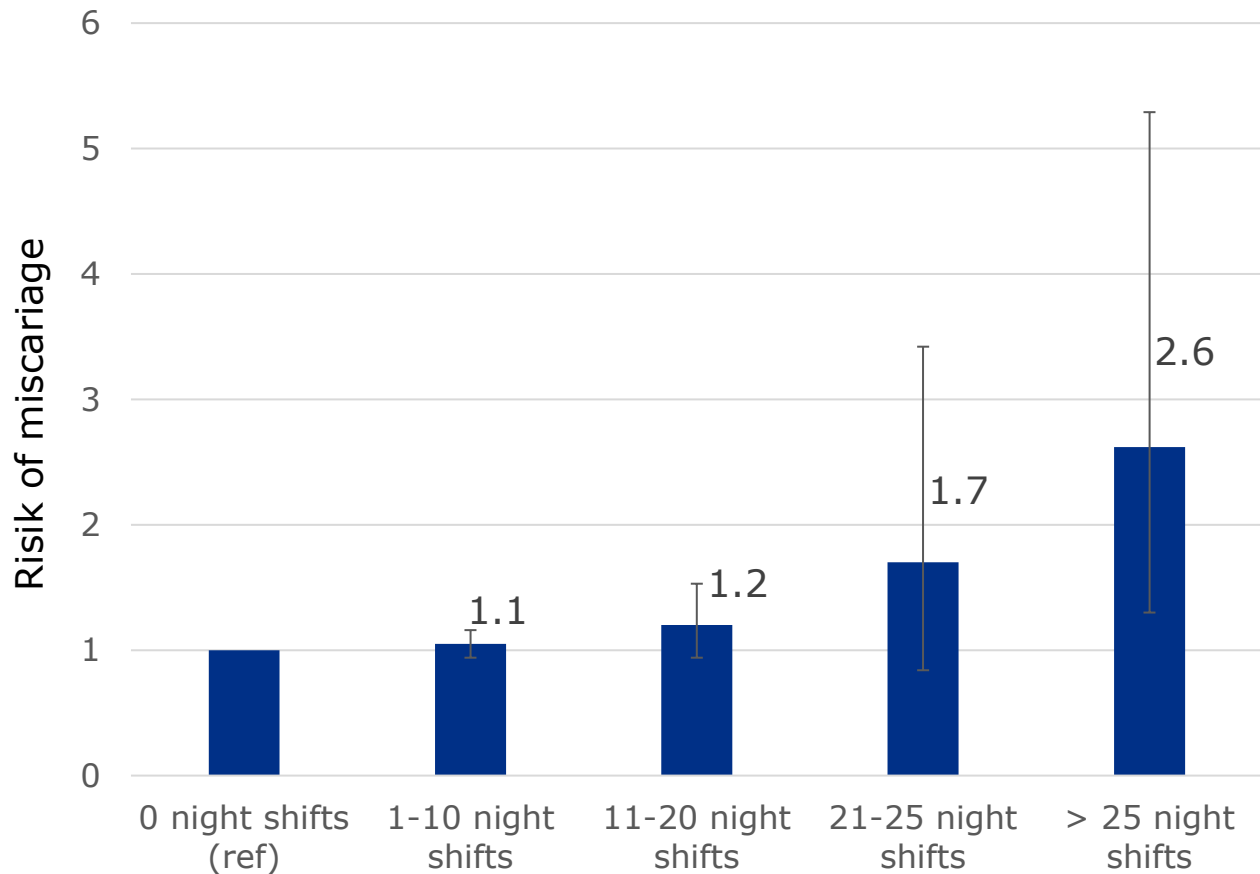


Injuries
Härmä et al. 2020

≥ 12 hours



Miscarriage



Adjusted for age of mother, BMI, smoking during pregnancy, socioeconomic status and previous miscarriage.

- Previous research indicate that employees with permanent night work have increased risk of miscarriage
- More night shifts – higher risk of miscarriage
- Large Danish study shows that women with two or more night shifts the previous week had 30% increased risk of miscarriage.
- This corresponds to 5.5 cases of miscarriage from the 9th to the 22nd week of pregnancy among 100 pregnant women, who have more than one night shift in a week. By comparison, there are 4.2 cases of miscarriage among women who only have day shifts.
- **Taken together, the evidence supports that pregnant women should not work more than one night shift in a week.**

Conclusion

- Based on the limited, existing literature, we recommend that in order to reduce the risk of injuries and possibly breast cancer, night shift schedules have:
 - ≤ 3 consecutive night shifts;
 - shift intervals of ≥ 11 hours; and
 - ≤ 9 hours shift duration.
- In special cases – eg, oil rigs and other isolated workplaces with better possibilities to adapt to daytime sleep – additional or other recommendations may apply.
- To reduce risk of miscarriage, pregnant women should not work more than one night shift in a week.

How to schedule night shift work in order to reduce health and safety risks

by Garde AH, Begtrup L, Bjorvatn B, Bonde JP, Hansen J, Hansen ÅM, Härmä M, Jensen MA, Kecklund G, Kolstad HA, Larsen AD, Lie JA, Moreno CRC, Nabe-Nielsen K, Sallinen M



Ny forskning 72

2020

Forskningsbaserede anbefalinger om tilrettelæggelse af natarbejde


Narværende forskningsbaserede anbefalinger har til formål at mindske risikoen for ulykker, kraft og graviditetskomplikationer i forbindelse med natarbejde. Der kan sandsynligvis opnås ved at tilrettelægge natarbejde, så søvn og kroppens døgnrytme forstyrres mindst muligt, altså at have få nattevagter i træk, tilstrækkelig tid mellem to vagter, og at den enkelte vagt er af kortere varighed. Der konkluderer en række forskere inden for arbejdstid, helbred og ulykker.

Forskningsbaserede anbefalinger
På baggrund af en gennemgang af eksisterende videnskabelige undersøgelser vurderes det, at natarbejde kan medføre mindre risiko for ulykker og sandsynligvis mindre risiko for brystkræft, når det tilrettelægges efter følgende anbefalinger:

- Højest 3 nattevagter i træk.
- Mindst 11 timer mellem to vagter.
- Højest 9 timers varighed pr. vagt.

Ligeledes anbefales det, at:

- Gravidt normalt arbejder maksimalt 1 nattevagt om ugen for at mindske risikoen for spontan abort og andre graviditetskomplikationer.
- Disse forskningsbaserede anbefalinger er udarbejdet på baggrund af forskernes samlede vurdering af videnskabelige undersøgelser om sammenhæng mellem tilrettelæggelse af natarbejde i forhold til kraft, graviditetsrelaterede sygdomme og ulykker.
- Vurderingen er der inddraget viden om mulige biologiske mekanismer som døgnrytme- og søvnforstyrrelser samt træthed. Den mulige betydning af andre forhold som fx lyfthold eller andre forhold, som kan ændre på arbejdsindsatsen, eller ting, som de ansatte selv kan kvikskaffe, fx for at forbedre deres mulighed for at sove om dagen, er ikke inddraget.
- Anbefalinger om tilrettelæggelse af natarbejde afhænger af arbejdsopgaverne. Arbejdet med at udvælge forskningsbaserede anbefalinger er igangsat af Det Nationale Forskningscenter for Arbejdsmiljø (NFA) for at:
- vurdere forskningsresultater om helbreds- og ulykkerisiko ved forskellige former for natarbejde. Disse resultater er blandt andet fremskomet ved brug af Dansk Arbejdsindsatsundersøgelse (DANSK), der konsekvent er blevet anvendt til at følge op på den nyeste viden om arbejdsmiljø, herunder om natarbejde og sandsynligvis er kvantitative data, der kan anvendes til at udvikle forskningsbaserede anbefalinger om tilrettelæggelse af natarbejde.



Regulation of night work in Denmark

- The recommendations were included in the collective agreements in the private sector in 2023 – and partially in the public sector in 2024.
- Definition used by the Work Environment Authority: at least 3 hours of daily worktime in the night period (typically between 22-05) or at least 300 hours of work during the night within a period of 12 months
- Health control: to be offered before employment with night work and regularly at least every 3 years thereafter
- The recommendation regarding pregnant women and miscarriage has been included in the collective agreements in the private and public sectors in 2023 and 2024, respectively.
- Executive Order on the Performance of Work: Employers must ensure that work is organised so that pregnant employees work night shifts no more than once in a week. If, as an employer, you are unable to offer the pregnant employee alternative suitable work, she is entitled to take leave, which is covered by the maternity pay rules.

FIOH Working Time Traffic Light (WTTL) recommendations

	Recom- mended	Increased workload	Overload	High overload
1. Length of the working hours				
1.1. The length of working hours between 2 free days (h)	≤40	>40 - 48	>48 -55	>55
1.2. The length of work shifts (full-time work, h)	4-9	>09 - 12	>12 -14	>14
1.3. No of consecutive workdays (full-time work)	3-5	6 or 2	7	≥8 or 1
2. Timing of working hours				
2.1. No of work shifts starting before 06:00 (in 4 weeks)	0-2	3-6	7-11	≥12
2.2. No of consecutive evening shifts	0-3	4	5	≥6
2.3. No of night shifts (3 hours btw 23-06 in 4 weeks)	0-2	3-6	7-11	≥12
2.4. No of consecutive night shifts	0-2	3	4-5	≥ 6
3. Recovery				
3.1. No of <11 h quick shift intervals btw 2 free day spells	0	1	2	≥3
3.2. No of <11 h quick shift intervals (in 4 weeks)	0-1	2-4	5-11	≥12
3.3. The length of free time after last night shift (h)	>48	28-48	11- ≤28	<11
3.4. Weekly rest time (Mon 00:00-Sun 24:00, h)	>48	35-48	24- ≤35	<24
4. Social aspects of working hours				
4.1. No of free weekends (Sat-Sun in 4 weeks)	2-4	1	0	
4.2. No of single free days (in 4 weeks)	0-1	2-3	4	≥5
4.3. No of split (<4) shifts (in 4 weeks)	0	1	2-3	≥4
5. Worktime control				
5.1. Possibilities for shift wishes	yes		no	



Thank you for your attention

ahg@nfa.dk