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# Hospital physicians' on-call work and wellbeing. A cohort study with survey and register data

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# Introduction

- Majority of hospital physicians are required to work on call shifts. (Rosta 2007, Parvanne et al., 2016)
- Earlier survey research has linked physicians' working hours to negative outcomes, e.g., sleep problems, work-life conflict, and needle-stick injuries. (Knecht et al., 2010, Garus-Pakowska & Górajski 2019, Cottey et al., 2020)
- To our knowledge, no prior study had used objective data on physicians realized working hours to analyze the associations between working hour characteristics and wellbeing.

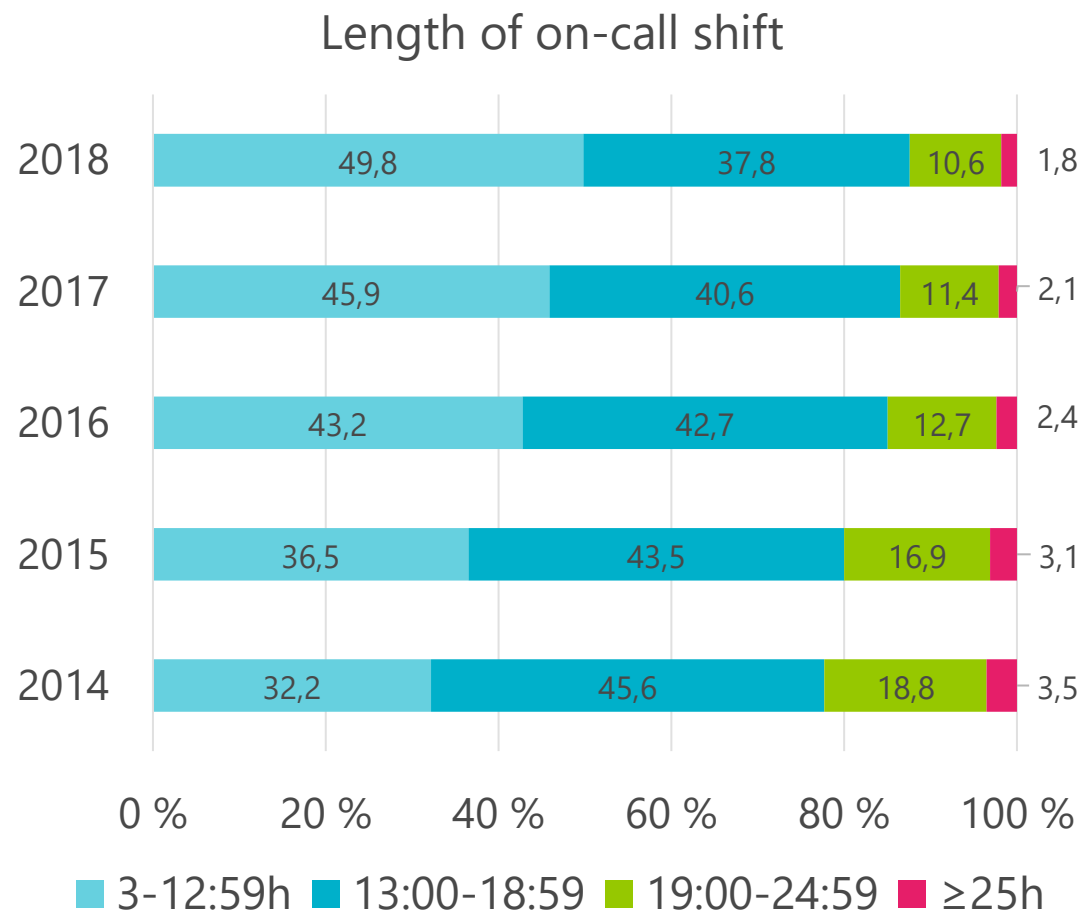
# Aim and participants

- The aim of this study was to investigate the associations between realized working times in regular and on-call work with wellbeing, sickness absence and occupational injuries among hospital physicians.
- All hospital physicians working in 12 hospital districts and having *at least one on-call working shift* in the data (n=14 704).



# Hospital physicians realized working hours (n=13 543)

- The average realized weekly working time was 43h.
- Over 25% had annual realized working time over 2000h.
- Annual working hour trends were similar in women and men.
- Physicians under 35 years had more on-call work duties than more senior physicians.
- Physicians over 50 years had more often at least seven-day spells of work and on-call work at home.



## Results: Sleep (n=728)

- 26% of the physicians had a short ( $\leq 6.5$ h) habitual sleep duration.
  - Frequent night work was associated with short sleep duration (OR 1.87).
- One third (32%) of the physicians reported insufficient sleep.
  - Several working hour characteristics increased odds for having insufficient sleep.
- 47% of the physicians had at least one sleep difficulty often ( $\geq 2$  x week).
  - Frequent night work ( $> 6$  shifts/91 days) increased difficulties in initiating sleep (OR 2.43).

Insufficient sleep				
91d working hours		N	OR <sup>1</sup>	95%CI
Average working hours/week	<40	435	1	
	40–48	142	1.32	(0.88–2.00)
	>48	118	<b>1.78</b>	<b>(1.15–2.76)</b>
Number of on-call shifts	0	405	1	
	1–12	330	1.17	(0.83–1.65)
	$\geq 13$	55	<b>2.00</b>	<b>(1.08–3.72)</b>
Number of night work duties <sup>2</sup>	0	477	1	
	1–3	54	0.72	(0.37–1.43)
	4–6	79	1.55	(0.93–2.59)
	$\geq 7$	180	<b>1.60</b>	<b>(1.09–2.37)</b>
Number of weekend work duties <sup>3</sup>	0	458	1	
	1–4	222	1.22	(0.84–1.75)
	$\geq 5$	51	1.39	(0.74–2.60)
Number of $\leq 11$ -hour shift intervals	0	495	1	
	1–6	105	1.05	(0.66–1.68)
	7–12	91	1.56	(0.96–2.53)
	>12	91	<b>1.65</b>	<b>(1.01–2.69)</b>

<sup>1</sup> multinomial logistic regression analysis adjusted for age, gender, marital status, number of children, overall stressfulness of the life situation, control over working times and hospital district

<sup>2</sup> at least 3 hours of work between 23–06

<sup>3</sup> at least 3 hours of work between Fri 18:00 and Mon 08:00

# Results: Short sickness absences (n=2 845)

- A case-crossover design using conditional logistic regression (28-day case and control windows)
- The risk of short sickness absence was increased in association of
  - Long work shifts (> 12 or >24h)
  - Number of on-call shifts
  - Short shift intervals (<11h)

28d working hours	CRUDE MODEL		ADJUSTED MODEL <sup>1</sup>	
	OR	95 % CI	OR	95 % CI
<b>N:O OF VERY LONG (&gt;24H) WORK SHIFTS</b>				
0	1		1	
1-2	1.05	0.96-1.15	<b>1.14</b>	<b>1.03-1.26</b>
3-4	<b>1.23</b>	<b>1.04-1.46</b>	<b>1.51</b>	<b>1.30-1.75</b>
≥5	<b>1.70</b>	<b>1.13-2.56</b>	<b>2.62</b>	<b>1.61-4.27</b>
<b>N:O OF WORK SHIFTS</b>				
0	1		1	
1-2	1,09	0,83-1,44	<b>1,26</b>	<b>1,00-1,57</b>
3-4	1,21	0,90-1,63	<b>1,78</b>	<b>1,47-2,15</b>
≥5	1,12	0,71-1,77	<b>2,54</b>	<b>1,68-3,84</b>
<b>N:O OF ON-CALL SHIFTS</b>				
0	1		1	
1-2	<b>1,12</b>	<b>1,05-1,20</b>	<b>1,23</b>	<b>1,15-1,32</b>
3-4	<b>1,36</b>	<b>1,04-1,79</b>	<b>1,74</b>	<b>1,35-2,24</b>
≥5	1,22	0,89-1,65	<b>2,15</b>	<b>1,44-3,21</b>
<b>N:O OF SHORT(&lt;11 H) SHIFT INTERVALS</b>				
0-1	1		1	
2-4	<b>2,47</b>	<b>1,94-3,16</b>	<b>2,88</b>	<b>2,25-3,69</b>
≥5	<b>10,75</b>	<b>0,59-12,05</b>	<b>12,61</b>	<b>8,88-17,90</b>

<sup>1</sup> Adjusted for weekly working hours and ≤12h shifts

## Results: Occupational injuries (n=556)

- A case-crossover design using conditional logistic regression (7-day case and control windows)
- The risk of occupational injury was increased in association with
  - Consecutive workdays
  - High number of on-call duties
  - High weekly working time
- The risk of occupational injury was decreased in association with
  - Number of short work shifts

7d working hours	OR	95 % CI
<b>N:O OF CONSECUTIVE WORKDAYS</b>		
1-2	1	
3-4	3,24	2,29-4,60
5-6	3,23	2,18-4,80
7	4,10	2,20-7,63
<b>N:O OF ON-CALL SHIFTS</b>		
0	1	
1-2	1,24	0,79-1,94
3-4	3,54	2,11-5,92
≥5	na	na
<b>WEEKLY WORKING TIME</b>	1,03	1,01-1,04
<b>NUMBER OF SHORT (≤12H) WORK SHIFTS</b>	0,79	0,64-0,98

## Limitations

- Survey response was available from less than 40% of the physicians.
- The register data did not allow analysis between different medical specialties.
- Register data did not include possible working hours outside the studied hospital districts.
- These results are likely generalizable to other EU countries that comply with the EU Working Time Directive.



# Conclusions

- Finnish hospital physicians have rather long realized weekly and annual working times.
- Impaired sleep, short sickness absences and occupational injuries were associated with several strenuous working hour characteristics.
- To maintain hospital physicians' wellbeing and occupational safety
  - long work weeks and long work shifts should be avoided
  - amount of short shift intervals and night-time on-call shifts should be reasonable.



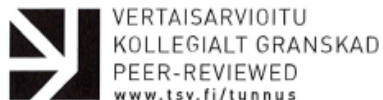
# Publications

ALKUPERÄISTUTKIMUS

Suom Lääkäril 2022; 78 : e32668 www.laakarilehti.fi/e32668 (Julkaistu 22.6.2022)

## Päivystävien sairaalalääkärien kokonaistyöaika kasvoi – Toteutuneet työajat 2014–2018

Kati Karhula, Jenni Ervasti, Tarja Hakola, Veli-Matti Isoviita, Ilkka Kivimäki, Mika Kivimäki, Aki Koskinen, Tuula Oksanen, Sampsa Puttonen, Mikko Härmä

CHRONOBIOLOGY INTERNATIONAL  
https://doi.org/10.1080/07420528.2021.1993238

ORIGINAL ARTICLE

OPEN ACCESS

### Association of working hour characteristics and on-call work with risk of short sickness absence among hospital physicians: A longitudinal cohort study

Annina Ropponen <sup>a,b</sup>, Aki Koskinen <sup>a</sup>, Sampsa Puttonen <sup>a</sup>, Jenni Ervasti <sup>a</sup>, Mika Kivimäki <sup>a,c,d</sup>, Tuula Oksanen <sup>e</sup>, Mikko Härmä <sup>a</sup>, and Kati Karhula <sup>a</sup>

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Karhula et al. *BMC Health Services Research* (2022) 22:943  
https://doi.org/10.1186/s12913-022-08336-0

BMC Health Services Research

RESEARCH

Open Access



## Hospital physicians' working hour characteristics and sleep quality: a cross-sectional analysis of realized working hour and survey data

Kati Karhula<sup>1\*</sup>, Aki Koskinen<sup>1</sup>, Jenni Ervasti<sup>1</sup>, Tarja Hakola<sup>1</sup>, Veli-Matti Isoviita<sup>2</sup>, Ilkka Kivimäki<sup>1</sup>, Sampsa Puttonen<sup>1,3</sup>, Tuula Oksanen<sup>4</sup> and Mikko Härmä<sup>1</sup>

DOI: 10.1002/1348-9585.12322

BRIEF REPORT

Journal of Occupational Health  
 WILEY

## Working hours, on-call shifts, and risk of occupational injuries among hospital physicians: A case-crossover study

Annina Ropponen<sup>1,2</sup> | Aki Koskinen<sup>1</sup> | Sampsa Puttonen<sup>1</sup> | Jenni Ervasti<sup>1</sup> | Mika Kivimäki<sup>1,3,4</sup> | Tuula Oksanen<sup>5</sup> | Mikko Härmä<sup>1</sup> | Kati Karhula<sup>1</sup>

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# Thank you!

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