HEALTHY WORKPLACES SUMMIT 2025

How digital technologies may improve health and wellbeing of workers - Lessons and examples from Norway

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European Agency for Safety and Health at Work

Healthy Workplaces

Innovation Norway

- Innovation Norway is the government's tool to realize value creation within businesses in Norway.
- Through financing projects and increasing the competence to businesses with ambitions, we help create workplaces for the future. We offer services within financing, counselling, comepetence, network and profiling. On a daily basis we work with several different tasks, initatives, programs, and events.
- *It is all about making business in Norway better!*

Norwegian policy context

- Working Environment Act; Act relating to the working environment, working hours and employment protection, etc. Tripartite cooperation in municipalities (Hovedavtalen KS)
- Inclusive Working Life Agreement (IA-avtalen, 2019–2024)
- Privacy & control on the workplace (Datatilsynet + Arbeidstilsynet)
- Norway contributes to the 2023–2025 Healthy Workplaces campaign on “Safe and healthy work in the digital age.

”In Norway, digital OSH must be human-centred, co-designed and privacy-compliant—not merely technologically possible

Policy context

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Norway aims to become one of the most digitalized countries in the world, driven by a national strategy to accelerate digital transformation across society

How can wearable technologies implemented improve OSH?

- Smart monitoring systems offer great opportunities for improving safety and health at work. However, their use must be carefully tailored to each profession and context.
- For example, measuring heat stress in firefighters is highly relevant, but assessing stress levels in healthcare requires a more scientific and ethical approach.

- Before implementing digital monitoring, we must ask:

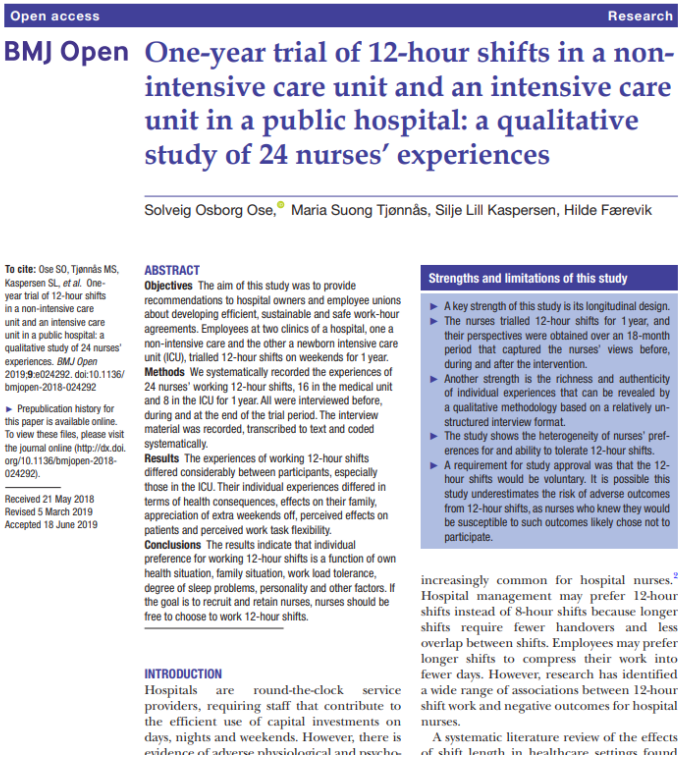
  - Why are we measuring?
  - How will we measure?
  - At what level?
  - Who will use the data?
  - Will these solutions truly improve health and wellbeing, or risk adding new stress factors?

- Digital innovation should empower workers, not burden them.
- Evidence-based, transparent, and participatory processes are essential to ensure technology supports not replaces—human judgment and care

Norwegian projects and relevant companies

1. Healthcare workers
2. Petroleum workers

Case 1; Health challenges for nurses
Nurses working 8 vs 12 hours shift



Open access Research

BMJ Open

One-year trial of 12-hour shifts in a non-intensive care unit and an intensive care unit in a public hospital: a qualitative study of 24 nurses' experiences

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ABSTRACT

Objectives The aim of this study was to provide recommendations to hospital owners and employee unions about developing efficient, sustainable and safe work-hour agreements. Employees at two clinics of a hospital, one a non-intensive care and the other a newborn intensive care unit (ICU), trialled 12-hour shifts on weekends for 1 year.

Methods We systematically recorded the experiences of 24 nurses' working 12-hour shifts, 16 in the medical unit and 8 in the ICU for 1 year. All were interviewed before, during and at the end of the trial period. The interview material was recorded, transcribed to text and coded systematically.

Results The experiences of working 12-hour shifts differed considerably between participants, especially those in the ICU. Their individual experiences differed in terms of health consequences, effects on their family, appreciation of extra weekends off, perceived effects on patients and perceived work task flexibility.

Conclusions The results indicate that individual preference for working 12-hour shifts is a function of own health situation, family situation, work load tolerance, degree of sleep problems, personality and other factors. If the goal is to recruit and retain nurses, nurses should be free to choose to work 12-hour shifts.

Strengths and limitations of this study

- A key strength of this study is its longitudinal design.
- The nurses trialled 12-hour shifts for 1 year, and their perspectives were obtained over an 18-month period that captured the nurses' views before, during and after the intervention.
- Another strength is the richness and authenticity of individual experiences that can be revealed by a qualitative methodology based on a relatively unstructured interview format.
- The study shows the heterogeneity of nurses' preferences for and ability to tolerate 12-hour shifts.
- A requirement for study approval was that the 12-hour shifts would be voluntary. It is possible this study underestimates the risk of adverse outcomes from 12-hour shifts, as nurses who knew they would be susceptible to such outcomes likely chose not to participate.

INTRODUCTION

Hospitals are round-the-clock service providers, requiring staff that contribute to the efficient use of capital investments on days, nights and weekends. However, there is evidence of adverse physiological and psycho-

increasingly common for hospital nurses.[2] Hospital management may prefer 12-hour shifts instead of 8-hour shifts because longer shifts require fewer handovers and less overlap between shifts. Employees may prefer longer shifts to compress their work into fewer days. However, research has identified a wide range of associations between 12-hour shift work and negative outcomes for hospital nurses.

A systematic literature review of the effects of shift length in healthcare settings found

What are the health risks and factors?

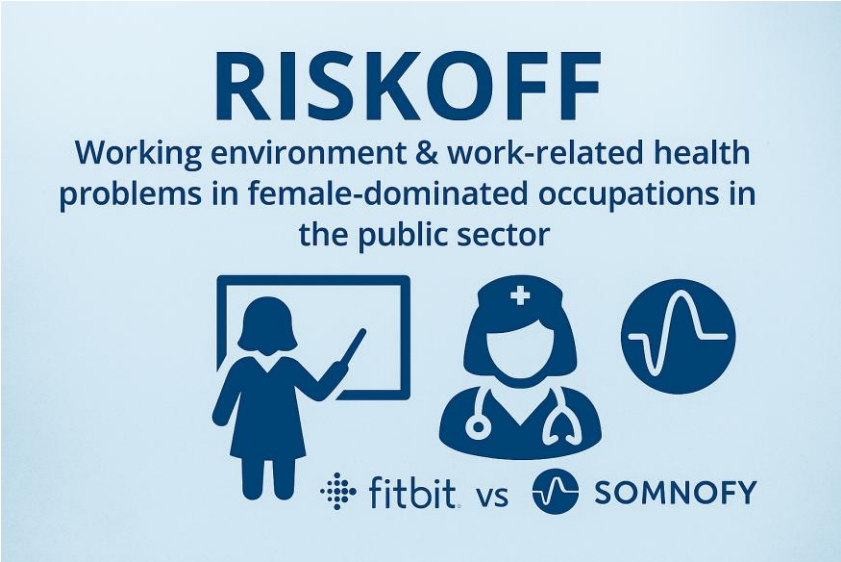
- Fatigue and physical strain
- Sleep problems
- Mental health and burnout
- Higher risk of error
- Patient safety
- Impact on family and social life
- Work environment and job satisfaction
- Need for individual flexibility

RISKOFF – SINTEF 2022-2024 (Municipal services)

- **What emotional elements of the work create a burden that contributes to poorer health among employees in nursing and kindergarden services?**

- **How can objective health outcome measures (sleep, physical exertion) and self-reported health (stress, mental factors) be used to develop good working environment interventions?**

- **How can triparty cooperation contribute to a working environment that prevents health problems, sick leave and early departure from working life?**



Emotional stress and sleep – What We Learnt

Kindergarten

- *"Most of us are here because we want to work with our profession, because we know something about it, and that's what gives us energy and enthusiasm in our work. But when, over a long period, we don't get to do it... You have this bad conscience, and you're tired because you're constantly on the go... You're on your heels for several days in a row, and you feel like you're not getting your job done. It's burdensome."*
- *(Union representative, kindergarten 2)*

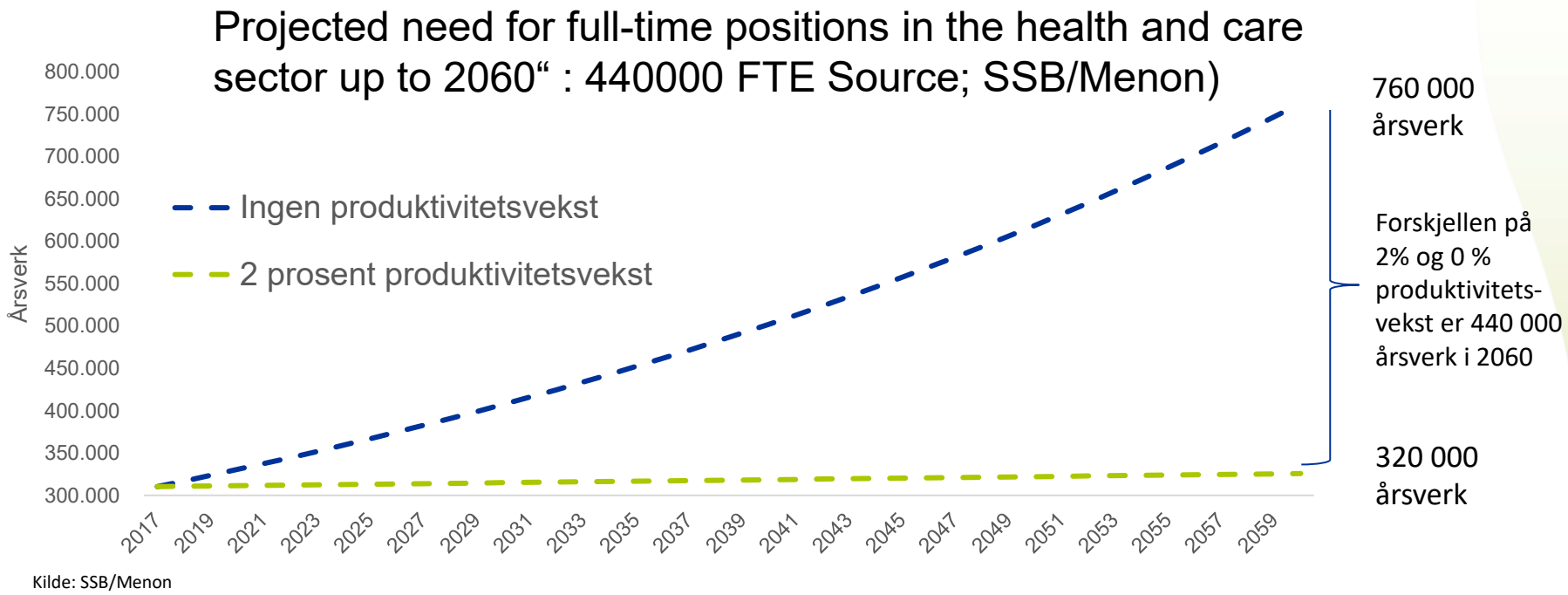
Nursing home (dementia ward):

- *"You get a bit exhausted if you've had a conversation \[with relatives], you become very tired and drained afterwards. It's almost like your head feels heavy. Maybe I think about what I said—did I say it the right way? It can be a bit difficult to let go."*
- *(Employee, nursing home 2)*

Menon Economics Analysis . What is the beneft of health technology?

- Facing an increasingly aging population, a higher disease burden, and a shortage of healthcare personnel, there is a need for more healthcare with fewer resources in the health sector.
- Health technology can help increase productivity and improve health of the workers
- Experience-based report: Describes how health technology has provided such benefits and what hinders and promotes implementation and scaling, based on the public health sector as a test arena

Technology will be an important part of the solution – more health with fewer resources



Kilde: SSB/Menon

Norwegian companies with «Personell saving technologies»

Company	Solution	Key Features / Benefits
Sensio	Digital supervision (RoomMate)	Reduces need for night shifts, improves patient safety, frees up staff
Deepinsight	AI for bed resource and operations planning	Optimizes capacity, reduces waiting times, improves efficiency
Diffia	Digital home monitoring and follow-up	Enables remote care, reduces physical visits, frees healthcare personnel
Vitalthings	Sensor technology for sleep and health	Continuous monitoring, improves patient care, reduces manual checks
Retrams	Tracking system for surgical instruments	Streamlines logistics, increases operating room efficiency
SynPlan	Workforce optimization platform	Predictive analytics for staffing, demand forecasting, and shift planning
Dynamon AS	Advanced scheduling and resource management	Dynamic shift allocation, real-time adjustments, and compliance with labor laws

Technology / Case	Annual Savings (EUR)	Main Benefit
RoomMate (Sensio)	1,617,000	Reduced patient transport costs/frees staff
HomeLab (Diffia)	383,000	Reduced blood sampling costs/Travel/Frees staff
Guardian M10 (Vitalthings)	1,156,500,000	Fewer/shorter hospitalizations, staff time saved,
Deepinsight Hero	160,000,000	More efficient use of operating rooms/frees staff

NB; All numbers are approximate extrapolations
All conversions use 1 EUR ≈ 11.5 NOK

Case 2; Petroleum Workers: Digital worker - Ergonomic Analysis

Research and development of OSH technologies in Equinor

Digital Worker –Goal:
Enable safe, healthy, and productive digital work in demanding industries.

- **Main Components:**
  - Use of wearable sensors and digital tools for real-time monitoring (ergonomic analysis/AI models)
  - Field studies, lab tests, and user feedback
  - Frameworks for digitalization and improved work environments
- **Approach:**
  Multidisciplinary, participatory, and focused on practical solutions

Ill.: SINTEF

Case 2; Petroleum workers (Ergonomics)

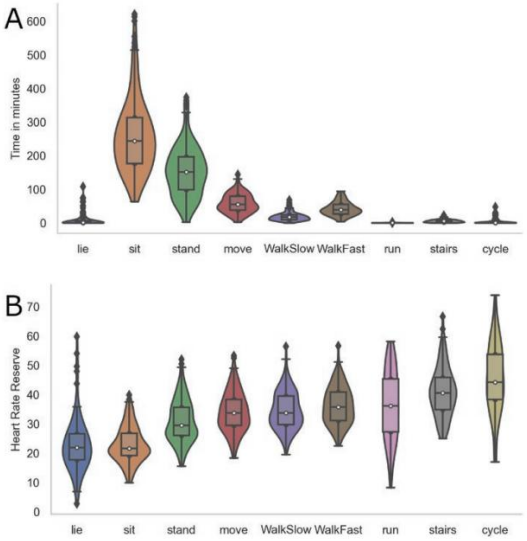


Figure 2. Time in minutes during work for 46 onshore maintenance petroleum workers spent in work-related physical activity (A) and the corresponding percent heart rate reserve (B) using device-based measurements. The violin plots depict information about the distribution of the data. The box shows the median, 25th and 75th percentile, and the black lines indicate the rest of the distribution.

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Original Article

BOHS British Occupational Hygiene Society — The Chartered Society for Worker Health Protection — OXFORD

Physical Work Demands of Maintenance Workers on Onshore Petroleum Facilities in Norway: An Observational Study Utilizing Wearable Sensor Technology

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Abstract

Objectives: High physical work demands can cause musculoskeletal disorders and sick leave in petroleum workers. However, our knowledge of their physical work demands is scarce and based on self-report. The objective of our study is to work towards closing this knowledge gap by assessing the physical work demands of onshore petroleum maintenance workers using body-worn sensors.

Methods: A total of 46 of 69 eligible maintenance workers (37 mechanics and 9 process technicians) from three onshore petroleum facilities in Norway filled in a questionnaire and diary and wore five accelerometers and a heart rate sensor for up to six consecutive workdays. Work-related physical activity and postures were classified using rule-based modelling in a modified version of the validated Activ4 software.

Results: The onshore maintenance petroleum workers were working an average of 10 h a day and spent on average this time with 48% (SD = 16.5) sitting, 1% (SD = 2.8) lying down, 39% (SD = 16.2) in light physical activity, and 9% (SD = 3.8) in moderate to vigorous physical activity. During work hours while at feet, we found arm elevation ≥60° to be 11% (SD = 7.1) (68 min), and forward bending of the trunk ≥60° to be 2% (SD = 2.2) (14 min). The workers spent 2% (SD = 2.5) (12 minut of the workhours kneeling. We observed a high inter-individual variation for all these work exposures. Moreover, 26% (12) of the workers conducted static standing for >30% of the workday, and 17% (8) spent more than half of the work hours >33% of their estimated maximal cardiovascular capacity.

Conclusions: While onshore maintenance petroleum workers on average spend about half of the workday sitting or lying down, the remaining worktime is spent with a rather high duration of arm elevation and forward bending. Quite high fraction of the workers spends much of the workhours in static standing and kneeling. We see a substantial variation in these work exposures between the workers. The findings indicate a need for preventive measures in how work is organized and performed.

Keywords: accelerometry; ergonomics; human factors; manual labour; occupational health and safety; occupational physical activity; physical exposures; work-related physical activity

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HEALTHY WORKING ENVIRONMENTS FOR ALL AGES: AN EVIDENCE-DRIVEN FRAMEWORK

Coordinator; SINTEF, Norway

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Horizon Europe, 2023–2027

Our Mission

Help organisations create healthier, more inclusive workplaces by understanding how physical load, psychosocial factors, and ageing intersect.

What We're Doing

- Studying real work in manufacturing & services (500+ workers so far)
- Combining sensor data, surveys, and contextual factors
- Co-designing solutions with workers, unions, and employers
- Developing a secure Occupational Health Data Space

Our main output, the WAge Index;

A single, integrated tool that turns complex data into practical guidance for preventing risks and supporting wellbeing.

wagehealth.eu

Key Take Aways

- Digital technologies can improve health, wellbeing, and productivity in Norwegian workplaces.
- Success depends on thorough analysis, staff involvement, and ethical implementation.
- Technology should support workers, protect privacy, and address real needs—not just efficiency.
- Collaboration between research, industry, and social partners is essential for effective solutions.
- Digitalization is a prerequisite for meeting the challenges posed by an ageing population and the demands facing the healthcare sector

Thank you for listening!

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