# Physicians' Work Hours and Patient Safety in a Norwegian Context

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## ABSTRACT

There has been growing attention in society to the question of whether physicians' work hour regulations constitute a challenge to patient safety due to extended work hours. The aim of the current study is to examine the practice of work hour regulations in a Norwegian context and explore possible risk factors by employing a qualitative case study design in a surgical hospital department. The study results emphasise that both framework conditions and work hours in the current work environment must be taken into consideration when assessing the risk of adverse events. Findings show that work hour regulations are violated more or less continuously in the current surgical department, especially during holiday periods. Despite this, the informants value the work load within existing work hour regulations as more influential when explaining the effects on patient safety than the work hour regulations themselves. Contextual factors such as workforce situation, coincidental work tasks, and safety awareness are seen as important framework conditions. We argue that the current practice with extended work hours (>12h) during night shifts constitutes a potential risk factor, a finding that is also supported by international research studies on work hour effects.

**Keywords**: Physicians, work hours, patient safety, adverse events, contextual factors

## INTRODUCTION

A growing awareness regarding possible health and safety effects of different work hours and concerns about these issues have resulted in various work hour regulations. Physicians, however, stand in a unique position compared to other occupational groups such as pilots and transportation workers, who have far more restrictive work hour regulations than physicians. This fact has recently generated increased attention among the media and the public, often with a critical view of physicians' extended work hours. Safety issues related to physicians' work hours may come as a result of the combination of extended work periods, insufficient sleep and circadian disruption (Gaba & Howard, 2002). The question is whether or not, and how, this might affect physicians' ability to deliver safe medical care.

The current literature on the effects of physicians' work hours on patient safety is equivocal and limited. Few studies have displayed the outcomes of work hour regulations related to patient safety indicators, such as complication rates, medical errors and misdiagnosis (Ehara, 2008). Studies in nursing, however, have revealed that extended work hours (>12h) increase the risk of adverse events and medical errors (Rogers et al., 2004). Similarly, studies from sectors other than healthcare suggest that extended work hours, especially during night shifts, increase the risk of adverse events (Folkard & Tucker, 2003; Folkard & Lombardi, 2006; Lie et al., 2008).

Due to global differences in work hour regulations, the results from international studies are, to some extent, difficult to apply in a Norwegian context, and research displaying the relationship between work hour regulations and patient safety is limited. The Norwegian Medical Association has signalled their concern with the work hour regulations for physicians. A survey on physicians' work hours conducted in 2005 and 2006 revealed that work hour regulations corresponded very little to the factual work hour arrangements (Medical Association, 2007). In this

study, we will explore the Norwegian work hour regulations for physicians by employing a qualitative case study design that includes in-depth interviews with physicians in a surgical department. The main objective of the study has been to create a framework to identify possible risk factors within the relationship between Norwegian work hour regulations and patient safety. Do physicians' work hours represent a latent condition that may contribute to adverse events and, thereby, challenge patient safety?

# PREVIOUS RESEACH

There is a complex relationship between patient safety, fatigued physicians, continuity of care, and education (Shojania et al., 2003). This section presents some of the existing literature studies that illustrate this "troublesome" relationship.

## The risk related to extended work hours

It has been surprisingly hard to prove that sleep-deprived physicians and poor medical decisions are related (Watcher, 2008). Some studies indicate, however, that sleep deprivation and fatigue can affect clinical performance (Weinger & Ancoli, 2002) and may thus constitute an important factor when assessing the risk of adverse events. In a national survey conducted in the United States in 1991, researchers found that 41 % of 145 residents cited fatigue as a factor in relation to their most serious mistakes (Kwan & Levy, 2005). Similarly, Daugherty et al. (1998) suggested that the most common reason for physician impairment was lack of sleep. The existing literature on the effects of physicians' work hours is equivocal (Gaba & Howard 2002). Some studies show no substantial impact on surgical tasks performed by surgeons with sleep deprivation when compared to well-rested surgeons (Uchal et al., 2005; Ellman et al., 2005), while others indicate significant deficits in psychomotor performance after extended work hours and disturbed night sleep (Taffinder et al., 1998; Grantchararov et al., 2001). The study by Dawson and Reid (1997) indicated that sleep deprived residents cannot deliver an optimal quality of care because of the physical limitations of the human body. Humans often overestimate their abilities and underestimate their limitations (Watcher, 2008). A cross-sectional survey of medicine and aviation revealed that pilots were much less likely to deny the effects of fatigue on performance compared to physicians (Sexton et al., 2000). These findings are supported by Woodrow et al. (2008), showing that physicians and particularly surgeons are less willing to accept their natural limitations on individual performance due to sleep deprivation (Woodrow et al., 2008). Lewis et al. (2002) oppose this argument by their study finding that residents, even when sleep deprived, still had insight into their deficient performance. Studies within the nursing profession have revealed that the risk of errors significantly increases when work shifts are longer than 12 hours, when nurses work overtime, or when they work more than 40 hours a week (Rogers et al., 2004). Other studies within the nursing environment have linked extended work hours with reduced nurse-to-patient performance ratios (Needleman et al., 2001).Studies in sectors other than health care have, to an extent, documented the intuitive link between extended work hours and adverse events. Research conducted within the industry sector has demonstrated that extended work hours beyond 12 hours are associated with an increased risk of adverse events (Lie et al., 2008). In their study of the risk of adverse events in the industrial sector related to different shift arrangements, Folkard and Tucker (2003) estimated an 18% increase for evening shifts and a 30% increase for night shifts. However, the intuitive link between work hours and adverse events has not been well established within medicine (Watcher, 2008).

## The risk related to reduced work hours

In contrast to our intuitive concern with the risk related to extended work hours, one of the primary barriers to changes in physicians' work hours is related to the possible risk associated with discontinuity of patient care and patient handover (Mountain et al., 2007). Examples of such transitions for in-hospital patients are when daytime residents sign out to night float residents or when several specialists become involved in a patient's care. These transitions create a need for accurate information transfer between and among care providers to prevent adverse events. Errors related to handoff transitions are, in fact, among the most common and consequential errors in healthcare (Watcher, 2008). The link between discontinuity and patient safety may thus indicate an increased risk of adverse events.

Studies by Laine et al. (1993) and Bollschweiler et al. (2001) suggested that limiting physician work hours was associated with delayed ordering of clinical tests and increased in-hospital complications and re-interventions. However, these potentially deleterious effects on the quality of care did not result in statistically significant differences in serious patient outcomes (Laine et al., 1993). Similarly, Petersen et al. (1994) studied the relationship between house staff coverage schedules and the occurrence of preventable adverse events. They found that

potentially preventable adverse events were strongly associated with coverage by a physician from another team. Another study found that physicians commonly believe that discontinuity presents a greater threat to patient safety than residents' sleep deprivation (Keating et al., 2005). In the same study, however, residents were asked whether they would want a family member cared for by a team on a traditional call schedule (30 hours on call) or a shift schedule (16 hours interval). No resident expressed a preference for care under a traditional schedule (Keating et al., 2005). Furthermore, shift limitations automatically generate handoffs, as Watcher (2008) has emphasised: *"Duty hour limitations must be accompanied by efforts to improve handoffs, lest the safety gains from less fatigue be lost through poor transitions of care"*(s. 185). Another issue commonly raised when discussing limitations on residents work hours is the potential negative impact on residents' education due to reduced clinical exposure (Mountain et al., 2007). Several residents who served as respondents in Landigran et al.'s study (2004) felt that their learning was compromised by the intervention schedule with reduced work hours (Mountain et al., 2007).

# METHODOLOGY

An explorative case study design was chosen to obtain an in-depth understanding of the phenomenon in question: physicians' work hours and possible impacts on patient safety – and to investigate the phenomenon within its real context (Yin, 2003). The context chosen for the case study was a surgical department at a Norwegian hospital. The objective of the case study was to obtain knowledge of the physicians' experiences and thoughts concerning work hours and how those may contribute to or affect patient outcomes in a safety perspective. The surgical department was chosen because of their distributed responsibility for surgical preparedness covering planned surgery, intensive care and trauma patients.

## Selection of informants

A total of 16 qualitative interviews were conducted with purposely selected informants (seven residents in training, six chief physicians, and three interns). Several studies reported in the current literature used empirical data from residents in training and interns, and we wanted to include this group in the selection of interviewees. Chief physicians were selected due to their experience and responsibility for residents' and interns' training and learning. Age, sex, and distribution among ward units were also used as selection criteria.

## Data collection

In-depth, face-to-face interviews were employed as the data collection method. Interviews were conducted in the interviewees' own working environment to help them feel more comfortable during the interview session. Interviews lasted between 45-90 minutes and occurred over a two-week period during spring 2009. The first author (registered nurse, master in change management) and second author (safety science researcher) conducted all interviews using a structured interview guide (approximately 40 questions) with the following main themes: (a) work hour regulations, (b) adverse events and patient safety, (c) the causality of adverse events and influence of work hours, (d) the organizational work environment. Follow-up questions were posed to encourage the participants to elaborate their descriptions. To achieve more spontaneous replies and avoid pre-planned answers, questions were not distributed to the interviewees in advance.

## Data analysis

After the interviews were transcribed in detail, the data material comprised 120 pages of textual information. The first author reduced and summarised the data from each interview to what was considered its essential elements. Common areas or patterns with frequent quotations were identified, creating categories of meaning with belonging sub-themes (Miles & Huberman, 1994). Data material was clustered according to sub-themes with belonging quotations to be able to see different statements in relation to the themes and to see each individual interviewee in relation to the entirety. The first author and the co-author discussed and reflected upon the categories of meaning and sub-themes to strengthen the validity of the analysis process. Representativeness and differences in opinions were the criteria for selecting quotations.

## Physicians work hours in Norway

In Norway, the Work Environment Act applies to physicians, but they are exempted from some of the work provisions of the Act due to an agreement with the Medical Association. The agreement allows physicians to work up to 19 hours continually per duty day and 60 hours a week. However, the work week shall contain a minimum of two hours of continuous free time, and a minimum eight hour work break is required between two work shifts. Physicians are only exempted from the Work Environment Act to the extent that the Medical Association has agreed to the exemptions. However, legislation allows the implied parties to contract local agreements across hospitals. In principle this means that physicians, can voluntarily extend their work hours beyond the agreed-upon exemptions from the Work Environment Act. Today there are no upper limitations on work hours regarding what the parties can include in a local agreement. The involved parties are local physicians` representatives, on the one hand, and employer representatives, on the other hand (Kvavik, 2007). The Work Environment Act emphasises employers' responsibility for arranging work hours so that safety concerns should be taken care of and not neglected (Lovdata, 2005). It is explicitly stated that overtime should be applied in accordance with the Work Environment Act's provisions for working overtime. The right to impose overtime on employees is limited to 10 hours per week, 25 hours per four weeks, and 200 hours per year (Kvavik, 2007).

### Work hour practice at the surgical department

No local agreement has been negotiated to exceed the legislative work provisions in the surgical department of our case study. Surgical department physicians are practising a work hour regulation that sets the weekly work hours at an average of 40 hours. Physicians at the department work extended consecutive work hours in connection with on-call night shift duties, which exceed 17 hours. In principle, physicians are supposed to get some sleep during these shifts. Residents and interns constitute the active surgical preparedness team during night shifts. Chief physicians covering different specialities constitute passive on-call duty, keeping themselves in preparedness at home to return to the hospital and assist if needed.

## FINDINGS

### Work hour regulations are violated

The interviewees report that they are generally satisfied with the agreed-upon regulation of work hours. However, findings reveal that work hour regulations are violated more or less continuously at the surgical department, especially during holiday periods. A majority of the interviewees agree that the current workforce situation is marginal and vulnerable, representing a major challenge when it comes to complying with the (work hour) legislation. Sick notes, leaves of absence and vacancies expose a vulnerable staff; the rate of absenteeism they cause necessarily forces physicians to work more frequently now than previously. Consequently, violations of work hour regulations seem unavoidable. Someone has to fill the watch. As the interviewees noted, this may in turn negatively reinforce the effects, leading to further challenges with sick notes, turnover and recruitment problems. Many of the physicians encourage their employers to address the situation more seriously. According to several statements, it did not appear uncommon for weekly work hours during holiday periods to approach 70 hours, even for a longer period of time. No substitutes are replacing those physicians who are on holiday. Physicians must cover for each others` absence internally in the department. Several of the interviewees expressed concerns regarding this tendency and call for greater concern by the employer. There is a mutual understanding amongst the physicians as expressed by one of the residents:

*"It does not appear as if the employer is interested in whether or not the work hours are practiced in compliance with work hour regulations. They know that people get pregnant, and are exempted from night shift duties. They know that people have temporary and long term sick notes. Despite this, they do not employ more physicians. In fact this week I have been working more or less 70 hours because of extra duties, and I do not feel that the employer cares. They are just concerned with getting people to fill in the duties".*

When chief physicians have on-call duties at home, they have a 24–hour duty. The way this is currently organised is that chief physicians are expected to conduct their work as normal the following day. In principle, this means they can risk conducting active work hours far beyond the boundaries set in legislation. Even though it may occur seldom, a chief physician confirmed the possibility of it happening:

*"Even if we have on-call duty at home and are able to sleep, it occurs that we have an accident at 22 pm, and must return to the hospital to assist. This way, we may work the entire night and still have a full outpatient clinic duty the next day. As chief physicians we are fully booked with patient appointments the day before and the day after duty. If*

*we are unlucky we may be needed at work during the entire night, consequently resulting in shifts with 30- 35 hours without sleep"*

## Vulnerable night shifts

The majority of the interviewees do not perceive work hour regulations by themselves to constitute a comprehensive risk for the safety of patients. Some physicians refer to night shifts as vulnerable regarding adverse events. Many of the interviewees also believe that adverse events are more likely to occur during evening and night shifts due to a reduced staff level, more intense workload and extended work hours. Several physicians confirm that busy duties with little sleep may affect concentration and performance that in turn can influence the quality of delivering health care services. The majority of the interviewees clearly state that they have experienced and are experiencing such business during evening and night shifts. In contradiction to this, an experienced resident stated: *"I have not experienced that extended work hours have influenced my ability to perform or affected my professional decisions in any way. However, this may probably be due to poor self-insight"*. Despite their acknowledgement of the effects of workload on concentration and performance, the physicians are less likely to admit that these conditions will affect the quality of care and cause adverse events in emergency situations. A chief physician described it as follows:

*"Whether extended work hours in themselves affect the quality of health care services is difficult to answer. Because if an emergency occurs, we get some sort of an adrenaline kick that leads to alertness and intensified presence in the situation"*

The interviewees emphasise that the opportunity to rest is of great importance for the quality of on-call duty during night shifts. To get some sleep during the night is seen as beneficial regarding the physicians' alertness, vigilance, concentration and performance. However, a majority of the residents and interns rarely experience the opportunity to rest during night shift duties due to the heavy workload. Some physicians are sceptical and question whether it is reasonable to work extended work hours in conjunction with night shifts. One chief physician said: *"I have at several occasions felt very tired. So if it was possible, I think it would be reasonable to reduce the work hours during night shifts"*. Another chief physician also emphasised the fact that, like other people, physicians are in need of sleep and rest to function optimally. *"I totally agree with the literature stating that physicians are not different from other human beings regarding sleep. We do not tolerate it better than others. We may try to give such an impression, but it is guaranteed that we do not"*.

## The importance of contextual factors

A central finding in the case study is that physicians stress that work hours cannot be viewed separately when considering the risk of adverse events. The picture is complex, and work hours must be studied in relation to the context of which the work hour regulations are a part. Workload is the single most important factor in this respect. According to the physicians, this may also pose a risk for adverse advents. The interviewees believe work hour regulations must be seen in relation to their current working conditions, with which they are dissatisfied. The following statement by a chief physician was common: *"How long one should work, and under what circumstances, is the issue that needs to be discussed."*

When describing contextual factors, the conditions that are emphasised are workforce situation, coincidental work tasks/simultaneous responsibilities, and inadequate reporting and documentation. A majority of physicians see a discrepancy between tasks and resources and believe that this mismatch might also influence patient safety. The combination of long work shifts and heavy workload is seen as the most dominant risk factor that may increase the likelihood of adverse events. A chief physician stated:

*"We have several functions to fill at the same time, so we run from one task to another. Of course this affects the quality of our work tasks"*.

The discrepancy between tasks and resources gives rise to what physicians refer to as coincidental work task conflicts. They are supposed to appear in several places and perform several tasks at a time. They are supposed to undertake operations, doctors' rounds in the wards, receive patients in the outpatient clinic, and answer external calls and enquiries. They are also supposed to be available for incoming traumas and injuries. These work task conflicts are a daily challenge and are referred to as a substantial reason for stress. Several physicians believe that stress itself can lead to more frequent mistakes and, in turn, adverse events. One chief physician emphasised it like this:

*"Stress I think is a key issue. Stress or time pressure or whatever you may call it, the fact that you need to be several places at the same time. I am convinced that it is something that makes you disposed for adverse events".*

Interviewees emphasise that the coincidental work task problem cannot be solved only with reduced work shifts, but also require an increased number of employees and a better shift organisation. There is dissatisfaction with the shift organisation. The evening and nights shifts are perceived as too long. For interns and residents, nightshifts start at 4 p.m. and end at 8.30 a.m. the next morning. These work shifts are described by some of the interviewees to comprise variable and unpredictable workloads. The staffing situation on these shifts often results in extensive workloads with more or less complex responsibilities. Many physicians characterise the practice of having one intern and one resident in active work to cover the need for surgeons during evenings and at night as irresponsible. When on duty, they then have the sole responsibility for their speciality at the hospital. Several residents state that this responsibility is pressing. Some of them strongly object to this organisation and state that the emergency ward is driven in principle by unqualified workers. After lengthy discussions, several resident posts have been established. This will lead to a reorganisation of today's practice, where two residents will be on call during night shifts, supposedly from fall 2009.

Due to extended workloads and busy on-call duties, patient documentation receives a lower priority. Several physicians confirmed that sometimes the documentation is deficient. Several believe that the shortage of secretaries during weekends may be critical, increasing the likelihood of adverse events. The lack of such functions at weekends causes the surgical descriptions to be undocumented in written form. This might result in patient information being based on second-hand and third-hand information. Interviewees also find that the procedures and systems for information transfers during shift overlaps and handovers are insufficient. A chief physician stated the following: *"There are probably some handovers that could have been better than they are. Undoubtedly an area of improvement"*

## Strive for the best balance

Despite vulnerable night shifts and different contextual factors of importance, there exist good reasons for upholding a flexible attitude towards work hour regulations. The majority of the interviewees are not convinced that reduced work hours represent a good solution. The consequence is frequent shift handovers for the physicians, which most of them do not want. All interviewees relate shorter shifts to less continuity and more complex information transfers. Several express their concern, and a resident stated it as following: *"Reducing the length of the shifts will actually decrease the quality of patient care. In my opinion it certainly will. Even if you have the problem with a more tired surgeon, too much information will be lost along the way".*

The scepticism toward three-part shifts, as is the case for nurses, is considerable. Several of the interviewees refer to this as a poor solution. Physicians agree that patients are better served by the continuity of care that extended work hours represent. Continuity is thus weighted as the most important consideration when assessing the total quality of delivering health care services. However, this represents a difficult balancing act in which continuity should be weighted against the negative effects of extended work hours. Some interviewees are, nevertheless, unconvinced that shorter shifts will necessarily affect the continuity of patient care negatively. One resident shared this experience: *"If you drive in one track with constant speed, you can very easily become speed-blind. I think that if you are at work and see the same patient continuously, you will to some extent not be able to see what speed you are driving in. But if you change, and fresh eyes review the problem from a different angle and with no former knowledge of the situation, it might actually constitute a quality assurance and increase patient safety".*

## Calling for safety awareness and safety management

The interviewees request a more explicit focus on, and an overall consciousness of, safety at the hospital and in their department. Several feel that there is no active and visible safety preventive work in the wards. All of the physicians feel that it is easy to report generally unsatisfactory conditions, but they call for increased monitoring and action. Several perceive that the focus on safety and prevention in the hospital system is deficient. They draw parallels to other sectors in society and have stated that the healthcare sector has much to learn. One resident expressed this: *"I think physicians have a lot to learn, but not necessarily restricted to work hour practise. It concerns safety in general. There is currently too little system understanding regarding safety in the health care system sector. Too much focus is on the individual, and I feel that they are not interested in revealing explanations beyond this".*

The majority of the interviewees underline that safety-related work should be a priority where more resources should be applied, such as on the use of risk and vulnerability analyses. They drew parallels to other occupational groups in high-risk industries that have more strict responsibilities and work hour regulations than do physicians. Several of the interviewees find this paradoxical, as a chief physician expressed it *"In many ways, physicians have been in a special situation with a tradition for long work hours. But as a starting point, it is difficult to understand that we function differently in comparison with other occupations, e.g. pilots that perform work tasks requiring intense concentration"*.

# DISCUSSION

In this study we explored physicians' experiences and thoughts regarding the relationship between work hours and patient safety. The physicians clearly emphasised that additional contextual factors must be taken into account when assessing the risks related to work hours. Workforce situation, workload, coincidental work task conflicts, inadequate reporting and documentation, and an overall lack of safety awareness and safety management are valued as of equal importance when explaining the effect on patient safety. Figure 1 presents the overall risk factors that emerged from the case study.

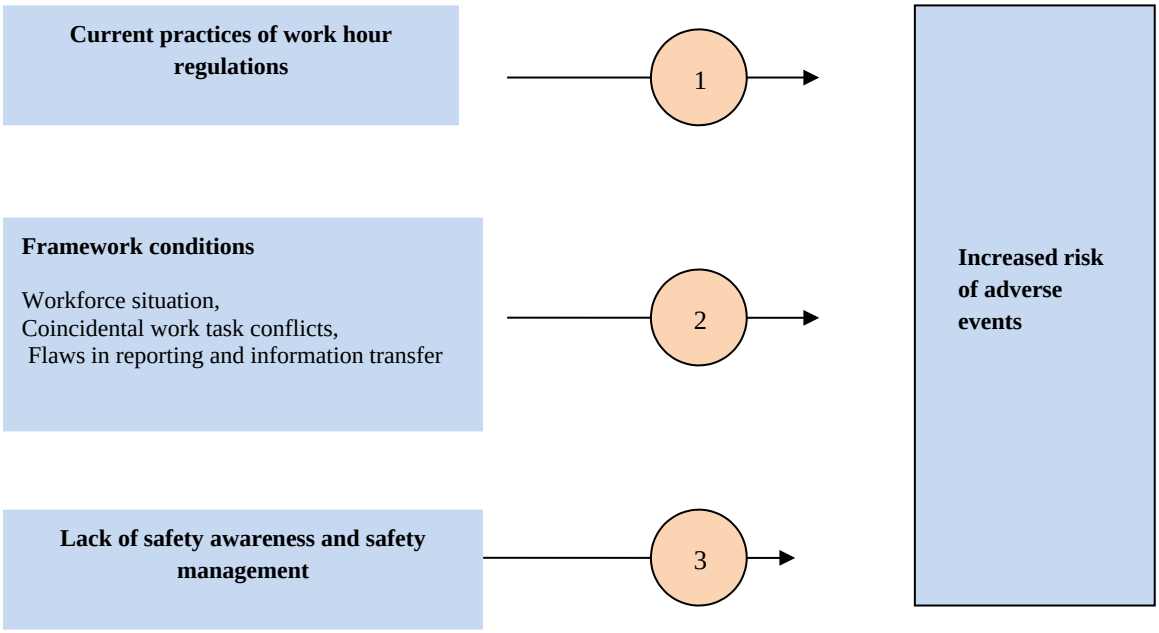


Figure 1: A framework for assessing possible work hour-related risk factors

Overall, the findings indicate that physicians are satisfied with their current work hour regulations. In their opinion, it is the actual practise of the regulations that causes a possible risk factor. The fact that physicians' work hour regulations are violated more or less continuously, especially during holiday periods, poses in our opinion an increased risk for adverse events. A marginal workforce is vulnerable and is used to explain why the demands of the work hour regulation are not always met. The situation may generate fatigued and distressed physicians and increase the likelihood of adverse events. The literature also states that factors such as staffing and qualifications are critical to achieving a high level of safety for patients and satisfactory working conditions for healthcare personnel. Realistic estimates of sick leaves and pregnancy among the staff is essential in this regard (Wergeland, 2009). Based on the literature from several studies, it seems likely that, in many cases, the level and type of physician staffing affect patient outcomes and the efficiency of care (Volpp, 2008).

Work hour arrangements within the healthcare sector are worth reconsidering due to the practice of extended work hours during night shifts. We assume that poor staffing levels, combined with heavy workload, especially during night shifts and little sleep, plus extended hours of work, will increase the likelihood of adverse events. It might be questioned whether 17 hours of work during night shifts, which is the case for several of the surgeons, should be reconsidered. The researchers behind the report "*Work hours and health*" pointed to the controversy of truck drivers

having stricter work hour regulations and rest time than do surgeons (Lie et al., 2008). Even if it is controversial to draw parallels to other occupational groups due to differences in work tasks and operations, night shifts for truck drivers and train drivers are restricted to eight hours. Scientific evidence shows that, due to human physiology, the performance of physicians is reduced and the patient outcome is poorer at night time compared to day time. Alertness, vigilance and cognitive reasoning are at their lowest during night shifts. This fact applies to physicians as much as to other night shift workers (Hooroks & Pounder, 2006).

In some cases, if chief physicians must return to the hospital and assist during night shifts, they run the risk of 24-hour sleep deprivation, since they are part of the workforce the day preceding the night shift and the following day after. Such work arrangements make physicians particularly vulnerable to fatigue and sleep deprivation. Research studies have shown that the ability to perform surgery clearly decreases after 17 hours of continuous work (Grantcharov et al., 2001; Taffinder et al., 1998). The study by Lewis et al. (2001) revealed conversely that physicians had insight into their deficient performance when sleep deprived, indicating that sleepy physicians may deliberately take longer over a task or recognise that they need to ask for a second opinion, which, in turn, may prevent adverse events (Lewis et al., 2001). The question, then, is whether we can rely independently on such assumptions. There is some support for this in a study indicating that adverse events due to sleep deprivation do not lead to serious patient harm due to a physician's ability to compensate for sleep loss in crises or other novel situations (Samkoff & Jacques, 1991). In contrast, other studies have pointed out that physicians are less willing to accept their natural limitations on performance due to sleep deprivation (Sexton et al., 2000; Woodrow, 2008). This indicates that healthcare professionals have only partially acknowledged the substantial impact of their physical, cognitive and emotional functioning due to acute or chronic sleep loss on the safety and quality of healthcare delivery (Buysse et al., 2002). A likely barrier to this resistance can be explained by professional rigidity and difficulties in changing the medical culture of working long hours with the associated financial benefits. Åkerstedt suggests that neither the employer nor the physicians are willing to discuss or dig into questions related to work hours, due to their own profitability (Åkerstedt in Holender, 2009). Further more, physicians' ways of working and current practices need to be discussed and challenged to create more sustainable working environments that protect the patient safety.

This study has documented that continuity is crucial to ensure quality of care and patient safety. This is supported by studies showing that a reduction of physicians' work hours results in delayed diagnosing and extended patient hospitalisation (Laine et al., 1993; Bollschweiler et al., 2001). Nevertheless, the findings imply that neither patients nor physicians benefit from today's work hour regulations as long as the work load is comprehensive. This will necessarily be at the expense of continuity of care as physicians are unable to follow up with their patients optimally because of current workloads and time pressures.

This study has revealed that, in addition to a discrepancy between tasks and resources, the current staffing situation results in what the interviewees refer to as coincidental work task conflicts. This implies that responsibilities and tasks to perform are often supposed to take place simultaneously. These priority conflicts give rise to time pressures and predispose for stress, which in turn may decrease the quality of care. However, individual differences exist when dealing with stress. Coincidental work task conflicts are perceived to have a higher influence on the risk of adverse events than the work hour regulations themselves. Studies have revealed a moderate to strong correlation between stress, high workload and the risk of adverse events made by physicians (Rosenthal & Sutcliffe, 2002). There are, however, few studies that address these topics (Watcher, 2008). Nursing research has shown that heavy workloads adversely affect patient safety (Lang et al., 2004).

Inadequate documentation and reporting is another risk factor that, taken together with the other factors in Figure 1, may increases the likelihood of adverse events. Extended work hours may decrease adverse events due to fewer handoffs and transitions. Several studies have expressed major concerns in this regard due to the negative correlation revealed between adverse events and information transfers (Wachter, 2008). Despite this, little emphasis is placed on this correlation in practicing clinical care. It is important to establish adequate systems and procedures to handle information transfer between physicians (Wachter, 2008). The question may not be whether fatigued physicians make more mistakes, but instead, whether the errors caused by fumbled handoffs and subtle information exceed those caused by fatigue (Watcher, 2008).

A lack of safety awareness and safety management alone constitute a risk for both physicians and patients. This study has shown a lack of overall understanding and awareness related to patient safety matters among physicians. Management commitment to deal with and prioritise safety issues is also called for in the study. Employers are obliged, according to the regulations, to ensure that working conditions do not undermine safety issues. The labour inspection should evaluate local agreements that exceed the agreed-upon work hours in the legislation. What are the

risk assessments related to local work hour arrangements based on? Physicians' judgments about their own capacity to work extended shifts should be cautiously interpreted. On the other hand, competence and availability should be important issues when discussing local agreements. Mercurio and Peterec (2009) defend the physicians' opportunity to work with no work time limitations based on arguments of competence, availability, and voluntariness. A major challenge today is that up to 95% of the physicians in training are employed in temporary positions. Employers are then in a powerful position. Physicians who want to prolong their engagement, and plan for a career within a specific speciality, might find it hard to resist a request for extended work hours (Young Physicians Association, Norway, 2004).

# CONCLUSION

This paper has explored the risk related to physicians' work hours based on the physicians' own experiences. The main objective has been to create a framework identifying possible risk factors and challenges in a Norwegian context. The study has revealed the critical importance of considering both the framework conditions in the work environment and the work hours themselves when assessing risk factors. Relationships between the practice of work hour regulations, framework conditions (workforce situation, coincidental work task conflicts, reporting and information transfer), and safety awareness and safety management may increase or decrease physicians' ability to perform and provide safe medical care. We also argue that extended work hours, when combined with considerable work load, especially during night shifts, puts patient safety at risk. These findings are supported by the international research literature on work hour effects (Rogers et al., 2004; Landigran et al., 2004; Folkard & Tucker, 2003; Taffinder et al., 1998; Grantcharov et al., 2001; Lie et al., 2008). In an era of increased public awareness of medical errors and professional pressures to improve patient safety, further research is needed to clarify evidence-based links between physicians' work hours and patient safety and to find the best balance between work hours, workload and continuity of safe patient care. Improving and optimising patient care and patient safety despite extended work hours requires an understanding of both the contextual factors and the performance-shaping factors that are known to play a role and influence human performance.

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