

Work Duration and Work Scheduling for Hospital Doctors

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Abstract: In spite of their high responsibility for patients health work practiced schedules and work duration of medical doctors widely offend legal limits. This situation is a consequence of putting economic pressure on a formerly charity-based work organization. Actual court decisions enforce a complete rearrangement of clinical shift scheduling, to some extent with questionable consequences. Scheduling of clinical shifts must consider numerous peculiarities. In contrast to industrial workplaces, most hospitals must organize a non periodic shift order. This impedes knowledge transfer. Optimization of hospital work scheduling requires additional knowledge about consequences of arrhythmic activity and sleep periods.

Keywords: Shift work, Hospital, Workload, Human error.

1. Situation: Excessive work hours¹

Like many other executives, medical doctors have demanding work conditions which frequently require to work more and longer than usual. The clinical environment with its variable case density and often unpredictable treatment requirements may not allow postponement of actions in order to keep work schedule.

Beyond regular daily activities, clinical personnel must ensure overnight and weekend presence. Whereas nursing staff is commonly scheduled in a classic 3-shift cycle and department heads stay 'on call' at home, resident² doctors execute casual presences in the hospital. Usually, each resident performs 3 to 10 overnight or weekend attendances per month additionally or alternatively to daily surgery work (75% additionally, 25% alternatively, according to Kaiser & Kortmann, 2001). This (historically grown) type of organization ensures continuity in patient care and suitable distribution of competencies and education potentials.

About 50% of non-executive medical staff (residents and interns) work already 50 hours and more per week in day shift. Additionally, this group performs average 4 to 6 (and up to 10) overnight attendances per month. Work during overnight attendances is quite intensive: 80% of all night shifts require active work for at least half of the total time. Typically, clinical doctors spend between 60 and 100 hours weekly in the hospital. High work density, as a consequence of manpower shortage, makes it more and more likely to be continuously active for at least 25 hours (day shift + overnight attendances +handing over of patients), in the case of unpredicted treatment demands up to 30 to 40 hours and even more.

2. Physiological, social and economic effects of work scheduling in hospitals

The intensive human resource exploitation as a general structural problem of a large majority of hospitals rises up questions about the responsibility in case of human error. There is no chance to undo an action, but any mistake or error risks a subjects health or life.

Due to the complexity of clinical work systems only vague indicators are available about limits and effects of human resource exploitation on patient safety. Being killed due to human error in clinical environment is estimated to be the eighth most common cause for death. Thus

¹ This refers to the German situation only. Although many statements may be valid for other countries too, the different peculiarities in different countries do not allow any generalization or comparison at this place.

² in German: "Assistenzärzte"

it would be more likely to be accidentally killed in an hospital than in public traffic. Considering the influence of fatigue, Taffinder et al. (1998) found a 20% increase of error rate if surgeons did not have a night rest (measured during minimal-invasive operations performed at 8 am in a simulator). On a more elementary resource level, Dawson and Reid (1997) examined motor coordination performance. After 18 hours of sleep deprivation performance was decreased similar to a blood alcohol concentration of 0.05%, after 24 hours even similar to 0.1%. Jeffers and Jeys (2002) thus characterized this fact by "... unfit to drive but fit to operate". Nevertheless, such findings have to be interpreted carefully, because of (1) much uncertainty to differentiate between human error and other causes for failure, (2) much uncertainty to estimate the contribution of fatigue to the genesis of human error in a complex team work process, and (3) much uncertainty to consider the boost of activation triggered by critical situations (which possibly appears as a temporary suppression of fatigue).

From a subjective point of view, numerous studies concerning motivation and job satisfaction were performed. Generally speaking, work duration is highly relevant for an individual, but due to interferences and offset effects, the indication of long term physical, psychical and social effects of work scheduling remains vague.

One might ask the question why such uneven conditions may be everyday life for most clinical doctors whereas strict regulations were implemented for other professionals being responsible for human inviolacy (like flying and driving personnel).

Although common regulations (e.g. directive 93/104/EG) are valid for the medical domain as well, any formal violations can be simply inhibited by constituting a fixed work schedule on the clinical side. Thus, at first there is no need to record real work hours. Secondly, any request for exemptions from this rule were formally rejected. There is no risk for break in business, however, because medical doctors are obliged not to refuse medical aid. Hence, employees with exhaustive work duration formally act against advice of executives. Departments using electronic work time recording may act similar in a way that employees are formally made responsible not to exceed legal limits. So employees return immediately after leaving to perform training, research or other activities.

Internally, residents can be squeezed to a large extent by a strong hierarchy and the obedience to the head physician which controls task assignment and, by this way, also controls the chance to acquire qualification credit points required for later board exam. In former times, board certified doctors could expect very high incomes, making candidates (= residents) willing to comply.

From a monetary point of view, overnight and weekend presences are paid from 20 to 80% of regular hourly wages (depending on work density classification), and, typically this is the only way to have an additional income. This effect splits the group of residents in two fractions of about same size, one preferring to be compensated by free time and the other one preferring to be compensated by additional payment.

Executives have very few possibilities to react on external cost pressure, shortage of manpower and, as a consequence, clinical overload. Tragically, the most simplest reaction – not doing anything – works in a way that employees being responsible for patient aid were effectively forced to compensate resource bottlenecks by a more exhaustive exploitation of their own human resources. This pushes a fatal spiral: Costs are only related to the number of heads. Hence, the resources employed do not play a role for the cost situation, and, accordingly, manager do not really need to worry about the effectiveness of work processes (e.g. administrative tasks).

Whereas the ancient charity-based system was balanced by a low night work density which allowed idle time and rests, economic pressure destabilizes this system in a way that residents neither have authority for organizational optimization nor have any possibility to pass pressure to anybody else.

Public debate about work duration in Germany was intensified by the adjudication of the European Court in October 2000. It basically consists of two main decisions:

1. Any period of time being present in the hospital has to be considered as working time. Employees do not have sufficient autonomy in the hospital to legitimate inactive phases as privacy phases. Consequently, any presence time is to be classified as full working time, whether employees are in fact working or not.
2. The EU directive 93/104/EG is to be adopted for all employees, including medical doctors. Thus, daily work duration must not exceed 8 hours on average and 10 hours maximum. One daily rest period of at least 11 hours must be provided. Maximum weekly work duration is limited to 48 hours.

The judgment triggered a long and widespread discussion because of its far-reaching consequences. Would it be strictly realized, another 5k to 15k medical doctors would have to be employed in Germany (but were not at all available on the job market!), increasing total health cost by appr. 1-2 Billion €. Politicians claimed „there must not be an exhaustively fatigued doctor in hospital. Executives are in duty to find forms of organization that do not provoke exhaustion” (German Minister of Labor, Nov. 2, 2001) and announced a (singular) financial compensation for hospitals of 100 Mio. € for 2003. German courts found diverse decisions, and actually no general juristic guideline is to be anticipated.

3. Concepts of clinical work schedule and its impact on Human Factors

Traditional work schedules consist of a 24h presence, starting with regular work in the morning. A rarely practiced variant starts with regular work end in the late afternoon. This type of shift work requires one day free after each presence phase, and, thus can not be practiced continuously. Presence phases usually take place quite randomly.

Actually discussed and initially practiced work schedules base either on a 3x8h or on a 2x12h cycle. Although only the 3x8h cycle complies to common legislation, it requires the double number of employees working arrhythmic compared to a 2x12h shift cycle. Furthermore, any crew change requires additional time to pass over patient information, it decreases medical attendance and increases error probability. Due to the fact that most treatment activities take place during the day shift, no symmetric team rotation can be applied for night and weekend presences. The 2x12h cycle is even asynchronous to the day shift. Whereas large (university) hospital may be organized by two teams, one working only day shifts and the other one doing periodic shift work, small and medium sized hospitals require individual, and, thus, non-periodic schedules. For such hospitals, which represent the vast majority in number, scheduling is further complicated by the very different qualification status of the medical staff members. Young residents require to cooperate with experienced colleagues (during day shift), so that alternative attendances have to be scheduled. Furthermore, an operational robustness to cope variable case density, emergency cases and illness of staff member has to be ensured.

In spite of its intention to protect clinical employees against exhaustive work conditions, the EU court decision provokes an oppositional effect from the operational management side: If any presence in hospital has to be considered as full working time, managers will consequently try to keep employees working with full intensity for the whole time. Thus, nights and weekends will be filled with documentation and other work which does not need to be executed during daytime. Larger hospitals even plan to keep the operating room open for at least 2x8 hours. Finally, night work will be intensified only for economic reasons.

On the physiological side, effects of shift work were extensively studied for many years. Beside the fact that it does not exist any smooth form of shift work, a slowly forward rotating shift cycle is recognized physiologically as the most appropriate type of shift work. But, as explained above, this can only be realized in large hospitals.

4. Prospects for Human Factors research

The fact that most medical doctors actually work and will have to work with irregular night shifts raises the question about guidelines for most appropriate schedules. The sheer number of variables to define such types of shift work (e.g. rests before and after work shifts, interferences with past work shifts, sleep pattern, etc.) and the large variability of stressors explains the lack of knowledge in this area of research (Akerstedt, 1998; Eppstein et al., 2000). In particular it is of importance whether or not a 2x12h cycle would induce less work strain than a 3x8h cycle.

A general challenge of clinical research concerns the measurement of fatigue and recovery. In contrast to industrial workplaces performance may not be measured directly as a result of work. Subjective ratings (e.g. Kirchler & Schmidl, 2000; Krings, 2000) interfere with social and emotional factors which are highly important but not sufficient for an objective evaluation expressing possible fatigue induced risks for patient treatment. This is even true for psychophysiological measures in order to calibrate strain indicators.

A more general question concerns the meaning of an increasingly compressed work regime during nighttime. Total work strain possibly increases although work duration decreases. Thus, for the night shifts it might be more ergonomic to increase work duration but at the same time to decrease (average) work intensity in order to stay in natural rhythm as far as possible. Extended research is required to answer the question, if the ancient regime, supplemented by some flexible rules to prevent exhaustive fatigue would induce less work strain and provide fewer error rates than the more preventive approach of strictly limited work hours.

However, the economic dimension of clinical shift work (salaries sum up to 30 to 35 billion € per year) would legitimate such efforts.

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