RESEARCH

CHRISTMAS 2014: ON THE WARDS, IN THE SURGERY

Silent night: retrospective database study assessing possibility of “weekend effect” in palliative care

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Abstract

Objective To compare the mortality of patients in a palliative care unit on working days with that on weekends and public holidays.

Design Retrospective database study.

Setting Palliative care unit in Germany.

Population All admissions to palliative care unit between 1 January 1997 and 31 December 2008.

Main outcome measure The impact of day type (working days or weekends and public holidays) on mortality was analysed using Poisson regression models.

Results A total of 2565 admitted patients and 1325 deaths were recorded. Of the deaths, 448 (33.8%) occurred on weekends and public holidays. The mortality rate on weekends and public holidays was 18% higher than that on working days (mortality rate ratio 1.18, 95% confidence interval 1.05 to 1.32; $P=0.005$).

Conclusion Patients in the palliative care unit were at higher risk of dying on weekends and public holidays. In the absence of a prospective study, the exact reasons for this correlation are unclear.

Introduction

The influence of weekends and public holidays on the quality of healthcare and the associated mortality of patients is known as the “weekend effect.”¹ Authors from intensive care and surgical settings, as well as obstetrics, emergency medicine, and neurology, have reported an effect of weekends and public holidays on inpatient mortality.^{2–5} In retrospective analyses, almost all publications have confirmed such an increased mortality of patients on these days even if the results were adjusted for potential confounders.⁶ Most authors have assumed that a decreased availability of trained healthcare professionals

and deficits in the continuity of care were responsible for the increase in mortality.^{7–9}

Many inpatient palliative care units admit exclusively or predominantly severely ill patients in far advanced stages of a disease, for whom prolongation of life is not a realistic treatment goal.¹⁰ Therefore, one would not assume such a “weekend effect” in this setting. A thoroughly performed review of the available literature did not find any studies that examined this question from a palliative care perspective. Therefore, we did a retrospective review of admissions in the years 1997 to 2008 to compare the mortality of patients in a palliative care unit on working days with that on weekends and public holidays.

Methods

We retrospectively analysed the admissions to our palliative care unit from 1 January 1997 to 31 December 2008. We retrieved data from the hospital’s electronic admission and discharge system. The database provided daily numbers of discharged or deceased patients and the hospital room occupancy. Double counts (two patients per bed per day) were possible if a patient was discharged (or died) and another patient was admitted to this room (bed) the same day. The database does not provide pooled or individual demographic (for example, sex or age) or clinical data. Therefore, approval by the local ethics committee and informed consent were not necessary.

The palliative care unit analysed was an inpatient ward with 15 regular beds. Patients admitted were almost exclusively in the final stage of cancer with complex symptoms and no or very limited options for disease modifying or life prolonging treatment. Admissions to the palliative care unit were more frequent on working days, so the room occupancy differed

between working days and weekends/public holidays. On weekends and public holidays, staffing levels were reduced (absence of grand rounds; one single physician's round on Saturday; one nurse less during daytime; physiotherapy limited to patients with special needs; no psycho-oncology, music, or art therapy available; spiritual care only on special demand). The training level of staff (experience) was not reduced on weekends and public holidays.

We analysed the effect of day type on mortality by using a Poisson regression model including the exposure (that is, the number of patients on the palliative care unit on each day) as an offset term. To account for differences in room occupancy structure, we fitted a second Poisson regression model including room occupancy (three categories: <10 patients, 10-15 patients, >15 patients) as a confounder. We reported mortality rate ratios with corresponding 95% confidence intervals and P values (Wald test) for both regression models.¹¹ All P values were generated using two sided tests. The analyses were regarded as explorative, and we present the P values for descriptive reasons only. We used R version 3.0.2 for statistical analysis.

Results

The study period covered 4383 days (3001 working days, 1382 weekends and public holidays). During this time, 2565 patients were admitted; the average number of patients in the palliative care unit was 11.7 (range 3-21). A total of 1325 deaths were recorded, with a maximal number of three deaths a day (table 1). We found a considerable effect of day type on mortality: the mortality rate on weekends and public holidays was 18% higher than that on working days (mortality rate ratio 1.18, 95% confidence interval 1.05 to 1.32; $P=0.005$). The room occupancy differed between weekends/public holidays and working days (table 2). After adjustment for occupancy structure, the effect of day type on mortality was reduced but still noticeable (mortality rate ratio 1.14, 1.02 to 1.28; $P=0.025$). To capture over-dispersion, we fitted quasi-Poisson models in a sensitivity analysis; this adjustment made little difference (data not shown).

Discussion

On weekends and public holidays, specialist staff are not as available as on normal working days in many clinical settings. This can affect the quality and type of medical care, with the associated higher mortality in patients that is known as the weekend effect.¹² Palliative care focuses on the prevention and reduction of suffering rather than the prolongation of life.¹³ Therefore, one would not assume such a weekend effect in this setting. Surprisingly, our study provides strong indications for an increased mortality in palliative care on weekends and public holidays.

Strengths and weaknesses of study

A thoroughly performed review of the available literature did not find any previous studies that examined this research question for palliative care and only one for haemato-oncology.¹⁴ As with any retrospective and single centre study, the results of this investigation may have been influenced by confounding factors. As this was a database study, we were unable to adjust for potentially confounding factors such as age, sex, performance status, type of cancer, or patient reported outcomes. On the other hand, the findings of this study might have been even more compelling if an even more vulnerable subgroup of patients (for example, reduced performance state, severe symptoms) had been evaluated.

Comparison with other studies

Most studies report that on normal acute inpatient wards, significantly more patients die on weekends and public holidays than on regular working days. For example, one study reported significantly higher death rates at weekends than on working days for all patients treated in 72 German medical centres.¹⁵ In particular, the weekend effect for emergency admissions accounts for a 20% increased risk of death in the hospital.¹⁶ Other investigations of critically ill patients confirmed this result. Kostis et al reported a significantly higher 30 day mortality of patients with myocardial infarction in those who were admitted at weekends.¹⁷ Saposnik et al reported similar findings for patients with a cerebral insult.¹⁸ The only study in an oncology setting is the study of Bejanyan et al,¹⁴ who examined a subgroup of patients with acute myeloid leukaemia and reported a significant delay in the placement of triple lumen catheters. The authors used this as a surrogate measure for the quality of care for these patients.

None of the previous studies was able to provide exact explanations for the phenomenon of increased mortality on weekends and public holidays, but different reasons are discussed. For example, Bell et al argue that on weekends and public holidays the number of the medical and non-medical employees present in hospitals is clearly lower than on normal working days.³ Alspach et al assume that a reduction in the continuity of medical care and delayed reporting of diagnostic or therapeutic test results occur during weekends and public holidays.¹⁹ Other authors point out that doctors who are on call on weekends and public holidays are rather inexperienced compared with those working on regular working days, which may result in a reduced quality of invasive procedures and a temporal delay of therapeutic decisions.^{17 20}

Meaning of study

Although most of the studies discussed above evaluated admissions on weekends and public holidays in acute care settings, the potential reasons for a weekend effect theoretically also apply to inpatient palliative care. However, we did not expect equal findings. Of course, many symptoms such as pain or dyspnoea require speedily interventions (for example, opioid or benzodiazepine titration), and paracentesis or thoracentesis can also be indicated for some palliative care emergencies. On our palliative care unit, however, patients are usually admitted on weekdays. After admission, punctures are usually performed in an anticipatory manner on working days. Therefore, invasive procedures are rarely necessary as a medical emergency on weekends and public holidays in our patient population.

On the other hand, other explanations for our finding remain speculative. For example, some nursing team members think that the reduction or even absence of some routine elements of care (for example, grand rounds, routine laboratory and radiological testing) during weekends and public holidays had a great influence on this result. They argue that the atmosphere on the ward is typically more quiet and "laid back" on weekends and public holidays. They suppose that such a decrease in auditory, physical, or emotional distractions may in fact "allow" severely ill patients to die. Another assumption is that with a possibly greater presence of family visitors on weekends, patients may be more prepared to die with loved ones around them. Also, the proportion of very sick patients may be greater at weekends because others have been discharged home. Although it has been argued that psychological factors can influence the time of death,²¹ the reasons for the weekend effect in the palliative care setting remain unclear. We believe that the

slightly reduced number of staff on weekends and public holidays is not responsible for the higher mortality. We also believe that “working attitude” is not different on weekends and public holidays. However, this is unproved. To identify risk factors and the exact reasons for our findings, a prospective study assessing demographic and clinical data together with a parallel examination of healthcare providers’ perceptions would have been necessary.

Conclusion

Palliative care inpatients were at a higher risk of dying on weekends and public holidays than on normal working days. In the absence of a prospective study, the exact reasons for this correlation are unclear.

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Ethical approval: Not needed.

Transparency: The lead author (the manuscript's guarantor) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Data sharing: The statistical codes and full dataset are available from the corresponding author.

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What is already known on this topic

The increase in inpatient hospital mortality on weekends and public holidays is known as the weekend effect

Most authors assume that the reduced availability of emergency procedures and senior staff contributes to these findings

What this study adds

This is the first paper examining a possible weekend effect in a palliative care setting

Patients in the inpatient palliative care ward were at higher risk of dying on weekends and public holidays

The exact reason for this correlation remains unclear

Tables

Table 1| Number of days, deaths, and patients in palliative care unit by day type

Day type	No of days	No of deaths	Person days*	Mortality rate (95% CI) per 1000 person days
Working days	3001	877	35 692	24.6 (23.0 to 26.3)
Weekends and public holidays	1382	448	15 460	29.0 (26.4 to 31.8)
Total	4383	1325	51 152	25.9 (24.5 to 27.3)

*Cumulative number of patients in palliative care unit.

Table 2| Room occupancy by day type

Day type	Patients in palliative care unit				P value*
	<10	10-15	>15	Total	
No (%) working days	725 (24.2)	2045 (68.1)	231 (7.7)	3001	<0.001
No (%) weekends and public holidays	441 (31.9)	877 (63.5)	64 (4.6)	1382	
Total No (%)	1166 (26.6)	2922 (66.7)	295 (6.7)	4383	

* χ^2 test.