To sleep or not to sleep during hospitalisation
– a mixed-method study of patient reported sleep quality and the experience of sleeping poorly during hospitalisation

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ABSTRACT

Background: Complaints of sleep deprivation are a well-documented problem among hospitalised patients, and poor sleep quality is associated with a variety of negative health outcomes. Limited knowledge exists about patients’ experiences of sleep quality in general. Aim: To examine patient-reported sleep quality during hospitalisation, to identify predictors of poor sleep quality, and to explore patients’ experiences related to sleep. Methods: A QUAN-qual design that included a survey (N=257) and interviews (N=12). Sleep quality was investigated with the St. Mary’s Hospital Sleep Questionnaire, and interviews were analysed using content analysis. Data was collected between October 2014 and February 2015. Results: In general, inpatients reported a high sleep quality score in regard to the perceptions of sleep during the previous night, feelings of clear-headedness in the morning, and satisfaction with sleep. Decreased sleep duration, increased awakenings and time taken to fall asleep, lower age and gender (female) were essential predictors of poor sleep quality. Awakenings during the night were experienced as being carried away by thoughts or a decision to reschedule sleep to another time. Conclusion: Even when patients report that they have slept well, their sleep must be assessed systematically, and experiences of awakenings must be considered.

Keywords
Hospitalization, inpatient, nursing, sleep, sleep deprivation, surveys and questionnaires

Complaints of sleep disturbances are common among hospitalised patients (1–3), and normal sleep patterns are often disrupted. Inpatients, who need sleep to recover from illness, are particularly vulnerable to sleep deprivation due to their illness and environmental disturbances. Furthermore, persistent sleep problems are correlated with a greater use of health services (4).

Although the functions and mechanisms of sleep are not clearly understood, previous research supports the idea that sleep has a restorative function (5). Both physical and psychological well-being are affected by decreased sleep quality, and poor sleep is associated with a variety of health issues, such as changes in emotional state (6), declines in cognitive function (7,8) increases in pain (6), decreased immune functioning (9), increased risk of delirium (10), risk of falls among the elderly (11) and even increased mortality (12).

Most existing research on sleep quality among hospitalised patients is limited to intensive care unit (ICU) contexts (13–14) or to specific populations (e.g. obstetrics, geriatric, or neurology patients) (1,3,15–17). Patients have identified physical and psychological factors, such as bedside manner and feeling in control, that impact sleep during hospitalisation (18), and sleeping patterns may also be influenced by culture (19). Research has shown that nurses can experience the inability to promote good sleep at hospitals and a lack of knowledge of how to best deliver good care in relation to sleep (20). Nurses working at hospitals care for groups of patients. Therefore, they must have knowledge of overall sleep quality among hospitalised patients because patient sleep must be promoted regardless of the actual diagnosis.
We have limited knowledge about the patient’s perspective. However, if we combine data from quantitative measurements of sleep quality with data obtained from qualitative interviews, we can gain more detailed knowledge of patients’ experiences.

The aim of this study is to examine patient-reported sleep quality during hospitalisation, to identify predictors of poor sleep quality, and to explore patients’ experiences related to sleep.

METHODS

Design
A QUAN-qual design with a concurrent embedded strategy was employed (21), which meant that the major design was related to the quantitative part and the mixing of quantitative and qualitative data collection occurred concurrently. First, a prospective and exploratory descriptive study examined hospitalised patients’ experiences of sleep quality. Second, a minor qualitative study provided information to broaden our understanding. Data were collected concurrently between October 2014 and February 2015 at a medium-sized university hospital in the Capital Region of Denmark.

Sample/Participants
A one-stage systematic random sampling technique was used (22). Patients from all departments in the hospital, i.e. six medical wards (geriatric, rheumatology, dermatology, cardiology, pulmonary diseases and internal medicine) and one surgical ward (orthopaedic), were included. Hospitalised patients were screened for inclusion on Tuesdays (even weeks) and Thursdays (uneven weeks) each week over a five-month period. The inclusion criteria were as follows: 18 years of age or older, hospital admission no later than 3:00 pm on the previous day, the ability to understand Danish, and the capability to provide written consent. Data were collected by seven clinical nurse specialists.

Data collection
Measurement instrument
Patient-reported sleep quality was assessed using the St. Mary’s Hospital Sleep Questionnaire (SMHSQ), which is a 14-item questionnaire that evaluates sleep behaviour over the previous 24 hours (23). The items do not sum to a composite score. The questionnaire underwent a forward and backward translation process (24). Experienced translators who were fluent in both languages translated the questionnaire from English into Danish and then performed a back translation. The research team conducted ten cognitive interviews with potential participants to evaluate the questionnaire’s comprehensibility and then met to decide the final wording based on consensus.

The SMHSQ includes subscales concerning sleep-related issues, including sleep latency, restlessness, night waking, and morning alertness. The nurse read the questions aloud and noted the patient’s answers. The questionnaire took approximately 10 minutes to complete. The scale solicits both Likert-type and fill-in-the-blank responses. Psychometric evaluation has shown that the SMHSQ is a reliable instrument, with a test/retest reliability corre-
lation (Kendall’s tau) varying from 0.70 to 0.96. Furthermore, each item displayed statistically significant reliability at p<0.0001 (23,25).

Exposure variables
The following data were used as exposure variables: sociodemographic factors (age, gender, occupational status and living situation), environmental circumstances during hospitalisation (private room or multi-bed room), circumstances surrounding hospitalisation (acute/planned hospitalisation, medical/surgical condition, days of hospitalisation before data collection), sleep characteristics (items from the SMHSQ describing patient-reported sleep characteristics related to the previous night’s sleep) and patient-reported use of sleep medication.

Interviews
Interviews were conducted to expand our understanding of patients’ experiences of sleep problems during hospitalisation. On randomly selected days, patients who had been admitted for more than five days were asked questions about the quality of their sleep during their stay. Those who felt as though they had predominantly slept badly were asked to complete an interview. The interviews lasted from 15 to 30 minutes, and a semi-structured interview guide was used. The interview guide contained two questions: ‘How well do you normally sleep?’ and ‘What is your experience of sleeping badly during your stay in the hospital?’

Ethical considerations
The study was approved by the Danish Data Protection Agency (j.nr.: 2012-58-0004). The Regional Ethical Committee evaluated the project and found that it did not require further ethical approval (H-6-2014-FSP-056).

Data analysis
Non-parametric tests were used, as a visual inspection of histograms showed that the data were not normally distributed. A Mann-Whitney test was used to compare the values of the continuous variables of two independent groups (unpaired observations), and a Kruskal-Wallis test was used when more than two independent groups were compared. A Spearman Rank test was used to test the associations between continuous variables. Multiple logistic regression analysis was performed to test for possible confounders and backward selection method was used. The results of the multiple logistic regression analysis are presented as odds ratios (ORs) with 95% confidence intervals (CIs). The results of the Mann-Whitney and Kruskal-Wallis tests are presented as medians, the associated interquartile ranges (IQRs) and p-values, and the results of the Spearman test are presented as Spearman’s rho. A p-value less than 0.05 was considered statistically significant. The statistical data analysis was conducted with SPSS 22.0.

Three items of the SMHSQ were considered outcome measurements of sleep quality because they assessed continuous areas: 1. How well did you sleep last night? (Scale from 1 to 6, 1=very badly, 6=very well), 2. How clear-headed did you feel upon waking this morning? (Scale from 1 to 6, 1=still very drowsy indeed, 6= very alert) and 3. How satisfied were
you with last night’s sleep? (Scale from 1 to 5, 1=very dissatisfied, 5=completely satisfied).

In logistic regression analysis the above three item were dichotomized into positive and negative categories, as done by other users of the scale (26), as follows: 1. How well did you sleep last night? Good sleep (1–4) versus Poor sleep (5–6), 2. How clear-headed did you feel upon waking this morning? Clear-headed (1–3) versus not clear-headed (4–6) and 3. How satisfied were you with last night’s sleep? Satisfied (1–3) versus unsatisfied (4–5). All exposure values were used as covariates.

Qualitative data were analysed using a conventional qualitative content analysis (27) with the aim of providing insights into the clinical practice context. Interviews were transcribed. Then, three of the authors performed the initial analysis through a systematic process of coding. The transcripts were read several times and discussed with a focus on differences in interpretations of the texts. The group then read the text again, met and discussed meaningful phrases. Units of meaning were then identified and condensed into themes.

Validity and rigour
During the data collection process, the research team met several times to discuss the quality of the data, how to interpret specific patient responses, and any ethical dilemmas that may have arisen while undertaking research with vulnerable patients. Advice was sought to ensure the use of appropriate statistical analysis. For the analysis of the interview data, we followed the process of discussing data until consensus was obtained because this method enhances the validity and trustworthiness of the study (27).

RESULTS
Sample
Of the 492 possible patients, 257 (52%) were included. A total of 235 patients were excluded; 35 did not wish to participate and 200 were unable to give consent due to their physical or psychological state or because they had various medical examinations during data collection. Thus, of the 292 eligible patients, only 35 refused participation, resulting in a response rate of 88%. Patients who were excluded were significantly older than included patients (the median age of included patients was 76 years and the median age of excluded patients was 81 years ($p < 0.001$). No gender-based differences were found between the included and excluded patients ($p = 0.585$). The participants’ characteristics and descriptive data related to sleep are summarised in Table 1. In total, the sample’s median age was 76 years (IQR: 66–84), and 56% of the patients were female. The majority of the patients in the total sample were hospitalised due to acute illness (70%), and 75% of the patients were admitted to medical wards. On average, the SMHSQ was completed on the fifth day (IQR: 2–9) of hospitalisation.
Table 1 Demographic and descriptive variables

<table>
<thead>
<tr>
<th>Total sample n=257</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, median (IQR)†</td>
</tr>
<tr>
<td>Gender, female n (%)</td>
</tr>
<tr>
<td>Days of hospitalisation, median (IQR) ‡</td>
</tr>
<tr>
<td>Reason for admittance, n (%)‡</td>
</tr>
<tr>
<td>Patient type Medical, n (%)</td>
</tr>
<tr>
<td>Surgical, n (%)</td>
</tr>
<tr>
<td>Room, n (%)‡</td>
</tr>
<tr>
<td>Multi-bed room 168 (66%)</td>
</tr>
<tr>
<td>Employment/occupational status, n (%)§</td>
</tr>
<tr>
<td>Unemployed 13 (5%)</td>
</tr>
<tr>
<td>Senior citizen 197 (77%)</td>
</tr>
<tr>
<td>Living situation, n (%)‡</td>
</tr>
<tr>
<td>Cohabitant 126 (49%)</td>
</tr>
<tr>
<td>Sleeping medication last night, n (%)¶</td>
</tr>
</tbody>
</table>

† Unanswered, n = 7 ‡ Unanswered, n = 1 § Unanswered, n = 2 ¶ Unanswered, n = 4

Sleep quality
Sleep quality characteristics are shown in Table 2. On average, patients had three (IQR 2–5) awakenings during the previous night, estimated that they fell asleep after 20 minutes (IQR: 10-45) and slept for six hours (IQR: 4-7). Estimated daytime sleep on the previous day was five minutes (IQR: 0-112).

Table 2 Sleep quality characteristics

<table>
<thead>
<tr>
<th>Total sample (n=257)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many times did you wake up? †</td>
</tr>
<tr>
<td>How much sleep did you get last night? (Hrs:Mins) ‡</td>
</tr>
<tr>
<td>How much sleep did you get during the day – yesterday? (Hrs:Mins) §</td>
</tr>
<tr>
<td>How long did it take you to fall asleep last night? (Hrs:Mins) ¶</td>
</tr>
</tbody>
</table>

Values are presented as Median (IQR) [Min-Max]
† Unanswered, n = 10 ‡ Unanswered, n = 31 § Unanswered, n = 25 ¶ Unanswered, n = 45
Sleep quality in the total sample and associations between patient characteristics, clinical and environmental factors and the three sleep quality outcomes are shown in Table 3. Sleep quality scores for the total sample were as follows: How well did you sleep last night?: 5 (IQR: 4–5); How clear-headed did you feel upon waking this morning?: 3 (IQR: 2–5); and How satisfied were you with last night’s sleep?: 4 (3–4).

Table 3 Association between patient characteristics, clinical and environmental factors and sleep quality

<table>
<thead>
<tr>
<th>Exposure variables</th>
<th>How well did you sleep last night? (0–6)</th>
<th>How clear-headed did you feel upon waking this morning? (0–6)</th>
<th>How satisfied were you with last night’s sleep? (0–5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-value</td>
<td>P-value</td>
<td>P-value</td>
</tr>
<tr>
<td>Total sample, md (IQR)</td>
<td>5.0 (4.0–5.0)</td>
<td>-</td>
<td>4.0 (3.0–4.0)</td>
</tr>
<tr>
<td>Age, Spearman’s rho</td>
<td></td>
<td>0.27 &lt;0.001†</td>
<td>0.14</td>
</tr>
<tr>
<td>Gender Women, md (IQR)</td>
<td>5.0 (4.0–5.0)</td>
<td>0.450‡</td>
<td>3.0 (2.0–4.0)</td>
</tr>
<tr>
<td></td>
<td>Men, md (IQR)</td>
<td>5.0 (4.0–4.0)</td>
<td>4.0 (3.0–5.0)</td>
</tr>
<tr>
<td>Reason for admittance</td>
<td>Acute hospitalisation, md (IQR)</td>
<td>5.0 (4.5–5.0)</td>
<td>3.0 (2.0–5.0)</td>
</tr>
<tr>
<td></td>
<td>Planned hospitalisation, md (IQR)</td>
<td>5.0 (3.0–5.0)</td>
<td>4.0 (3.0–5.0)</td>
</tr>
<tr>
<td>Patient type Medical, md (IQR)</td>
<td>5.0 (4.0–5.0)</td>
<td>0.152‡</td>
<td>3.0 (2.0–5.0)</td>
</tr>
<tr>
<td></td>
<td>Surgical, md (IQR)</td>
<td>5.0 (4.0–6.0)</td>
<td>4.0 (3.0–5.0)</td>
</tr>
<tr>
<td>Room Private room, md (IQR)</td>
<td>5.0 (3.0–5.0)</td>
<td>0.715‡</td>
<td>3.0 (3.0–5.0)</td>
</tr>
<tr>
<td></td>
<td>Multi-bed room, md (IQR)</td>
<td>5.0 (4.0–5.0)</td>
<td>4.0 (3.0–4.0)</td>
</tr>
<tr>
<td>Occupational status</td>
<td>Occupation, md (IQR)</td>
<td>4.0 (2.0–5.0)</td>
<td>3.0 (2.0–4.0)</td>
</tr>
<tr>
<td></td>
<td>Unemployed, md (IQR)</td>
<td>4.0 (1.5–5.0)</td>
<td>3.0 (1.5–4.0)</td>
</tr>
<tr>
<td></td>
<td>Senior citizen, md (IQR)</td>
<td>5.0 (4.0–5.0)</td>
<td>4.0 (2.0–5.0)</td>
</tr>
<tr>
<td>Living situation Living alone, md (IQR)</td>
<td>5.0 (4.0–5.0)</td>
<td>0.041‡</td>
<td>4.0 (2.0–5.0)</td>
</tr>
<tr>
<td></td>
<td>Cohabitant, md (IQR)</td>
<td>4.0 (3.0–5.0)</td>
<td>3.0 (2.0–4.8)</td>
</tr>
<tr>
<td>Sleeping medication Yes, md (IQR)</td>
<td>5.0 (4.0–5.0)</td>
<td>0.613‡</td>
<td>3.5 (2.0–4.3)</td>
</tr>
<tr>
<td></td>
<td>No, md (IQR)</td>
<td>5.0 (4.0–5.0)</td>
<td>4.0 (2.0–5.0)</td>
</tr>
<tr>
<td>Days of hospitalisation, Spearman’s rho</td>
<td>–0.06</td>
<td>0.381†</td>
<td>0.305†</td>
</tr>
<tr>
<td>Daytime sleep (yesterday), Spearman’s rho</td>
<td>0.03</td>
<td>0.696†</td>
<td>0.10</td>
</tr>
<tr>
<td>Time to fall asleep, last night, Spearman’s rho</td>
<td>–0.38</td>
<td>&lt;0.001†</td>
<td>–0.343</td>
</tr>
<tr>
<td>Number of awakenings, last night, Spearman’s rho</td>
<td>–0.61</td>
<td>&lt;0.001†</td>
<td>&lt;0.001†</td>
</tr>
<tr>
<td>Sleep duration last night, Spearman’s rho</td>
<td>0.59</td>
<td>&lt;0.001†</td>
<td>0.37</td>
</tr>
</tbody>
</table>

† Spearman’s test, ‡ Mann–Whitney U test, § Kruskal-Wallis test, ¶ Unanswered, n = 2
Increases in age, time taken to fall asleep, and number of awakenings and decreases in duration of sleep during the night were associated with impaired sleep quality in regard to all three outcome items (Table 3). Additionally, living situation was associated with the item How well did you sleep last night?, with cohabitants experiencing poorer sleep quality than patients living alone ($p = 0.041$). Women had poorer sleep quality than men in relation to how clear-headed they felt in the mornings ($p = 0.014$). Likewise, patients admitted to medical wards felt less clear-headed in the mornings compared with patients in surgical wards ($p = 0.028$). Occupational status was associated with sleep quality, and an additional test (Mann-Whitney) showed that senior citizens had significantly better sleep quality than patients who were employed or in school in terms of all three sleep quality items (How well did you sleep last night? ($p < 0.001$), How clear-headed did you feel upon waking this morning? ($p = 0.004$), How satisfied were you with last night’s sleep? ($p < 0.001$)). Similarly, senior citizens reported better sleep quality than unemployed patients but only for the outcome measure How well did you sleep last night? ($p = 0.019$). Neither whether patients slept in private or multi-bed rooms or patients’ reports of the use of sleep medication was associated with sleep quality.

**Predictors of poor sleep quality**

Predictors of poor sleep quality are shown in Table 4. Occupational status was not included in the multiple logistic regression model because the association between occupational status and sleep quality was expected to be due to differences in age between the groups. The Mann-Whitney test confirmed that the group “senior citizens” was significantly older than the “occupation/education” ($p < 0.001$) and “unemployed” ($p < 0.001$) groups.

The results of the multiple logistic regression analysis after backward selection (Table 4) showed that increased age, gender (female), increases in time to fall asleep and number of awakenings and decrease in sleep duration predicted poor sleep quality. The strongest predictor of poor sleep quality was gender (women) OR = 2.16 (CI: 1.11 – 4.19) but only in relation to feelings of tiredness in the morning. Number of awakenings during the night was the only exposure variable which was associated with an increased risk of poor sleep quality in terms of all three outcome items, as it was associated with a greater risk of experiencing poor sleep OR = 1.79 (CI: 1.41 – 2.27), being tired in the morning OR = 1.61 (CI: 1.34 – 1.94) and, in general, being unsatisfied with the previous night’s sleep OR = 1.54 (CI: 1.26 – 1.88).
Table 4 Predictors of poor sleep quality. Results of multiple logistic regression analysis after backward selection

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Dependent variables</th>
<th>OR 95% CI for OR</th>
<th>P-value</th>
<th>OR 95% CI for OR</th>
<th>P-value</th>
<th>OR 95% CI for OR</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor sleep vs good sleep (How well did you sleep last night? 5–6 vs 1–4)</td>
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<tr>
<td></td>
<td>Not clear-headed vs clear-headed (How clear-headed did you feel upon waking this morning? 4–6 vs 1–3)</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Unsatisfied vs satisfied (How satisfied were you with last night’s sleep? 4–5 vs 1–3)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Age (per 10 years)</td>
<td>0.61 0.46–0.81 0.0001</td>
<td>0.76 0.61–0.98 0.032</td>
<td>0.31 0.15–0.64 0.003</td>
<td>0.60 0.45–0.70 &lt;0.001</td>
<td>0.45 0.26–0.78 &lt;0.001</td>
<td>0.29 0.14–0.62 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Gender (reference = male)</td>
<td>– – –</td>
<td>2.16 1.11–4.19 0.022</td>
<td>– – –</td>
<td>– – –</td>
<td>– – –</td>
<td>– – –</td>
<td></td>
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<tr>
<td>Department (reference = medical)</td>
<td>– – –</td>
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<td>– – –</td>
<td></td>
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<tr>
<td>Living situation (reference = living alone)</td>
<td>– – –</td>
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<td>– – –</td>
<td>– – –</td>
<td>– – –</td>
<td>– – –</td>
<td></td>
</tr>
<tr>
<td>Time to fall asleep, last night (per hour)</td>
<td>1.64 1.07–2.51 0.024</td>
<td>1.72 1.18–2.50 0.005</td>
<td>– – –</td>
<td>– – –</td>
<td>– – –</td>
<td>– – –</td>
<td></td>
</tr>
<tr>
<td>Number of awakenings, last night</td>
<td>1.79 1.41–2.27 &lt;0.001</td>
<td>1.61 1.34–1.94 &lt;0.001</td>
<td>1.54 1.26–1.88 &lt;0.001</td>
<td>1.53 1.24–1.90 &lt;0.001</td>
<td>1.55 1.25–1.91 &lt;0.001</td>
<td>1.57 1.27–1.93 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Sleep duration, last night (per hour)</td>
<td>0.77 0.60–0.98 0.037</td>
<td>– – –</td>
<td>– – –</td>
<td>0.60 0.45–0.70 &lt;0.001</td>
<td>– – –</td>
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<td></td>
</tr>
<tr>
<td>Daytime sleep (yesterday) (per hour)</td>
<td>– – –</td>
<td>– – –</td>
<td>– – –</td>
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</table>

Interviews with patients

Interviews were conducted with twelve patients who experienced poor sleep during hospitalisation. As the descriptive study highlighted that awakening during sleep was significant, special attention was paid to patients’ experiences of awakening.

Two main themes emerged: “Carried away by thoughts” and “Rescheduling sleep to another time”. Some participants experienced awakenings during the night for many different reasons, such as pain, noise from other patients, overly high or low room temperature, nurses talking to or taking care of other patients, or sounds from various items of medical equipment. The main difference was found in how patients experienced or tackled these awakenings.

Some patients were “carried away by thoughts”. When they woke up, their minds began working. Worries about the future or about how to regain health or prevent illness were recurring issues that the patients were unable to stop thinking about. One patient said, “I get irritated when I wake up because I start to think, and the problem just keeps on growing. It is because of the darkness I think and because no one interrupts my thoughts”. The feeling of being unable to control their thoughts and, thereby, their sleep might also influence their mood and energy levels the following day. One patient stated, “I become quiet, I keep to myself and feel very tired”, while some patients reported, “I almost hate having to go to bed”.

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For others, awakenings were not experienced as particularly troublesome. They «Rescheduled sleep to another time». One patient said, «I ask for a cup of tea and read five pages of my book», others listened to music or got out of bed and walked around. Some patients asked for sleeping medication or painkillers, while others simply accepted the situation and slept during the day instead of at night. One patient made the following statement: «I am not doing anything in here, so I might as well just sleep when I can».

Discussion
The aim of this study was to examine patient-reported sleep quality, predictors of poor sleep quality and patients' experiences of poor sleep. The relatively large number of patients excluded was expected because the population, as a whole, was fragile.

This study found that inpatients generally reported relatively good sleep quality scores. This result differs from the findings of other studies, which generally found poor sleep quality among hospitalised patients (17,28–29). However, comparisons with other studies must be conducted with caution because of the use of different instruments to measure sleep quality. In our study, sleep quality was measured by items referring to the patients' subjective experiences. The relatively good sleep quality score found may have been influenced by patients' expectations that impaired sleep quality should be expected while hospitalised. Other scholars have suggested that among older adults, sleep disturbance does not necessarily result in complaints of bad sleep because it is expected (30). In this study, the finding that patients “reschedule sleep to another time” might contribute to this explanation, indicating that patients adjusted by sleeping during the daytime. However, we found that inpatients correspondingly had lower sleep quality in relation to how clear-headed they felt in the morning; of note, the 25th percentile reported a score of 2 (= still moderately drowsy) (Table 3). This supports the above mentioned assumption that self-rated sleep quality, measured in terms of experience and satisfaction with the previous night's sleep, might generally be affected by expectations and acceptance of impaired sleep quality.

The total sample's self-reported sleep duration of 6 hours (median) is somewhat similar to the 5.5 hours (mean) among hospitalised patients (50+ years) described in the study conducted by Adachi et al. (15) Other studies have reported a sleep duration, which was measured with objective instruments, of 3.75 hours (mean) (29) and 4.6 hours (mean) (1) among patients with medical conditions. Lauderdale et al. (31) found that self-reported sleep duration is overestimated compared with objectively measured sleep duration (actigraphs and polysomnography), which might explain the longer sleep duration in our study population.

However, we found that the 25th percentile for sleep duration during the night was 4 hours, which is less than the 7 hours recommended by the American Academy of Sleep Medicine and Sleep Research Society (32). Recent research has shown that sleep duration of < 7 hours among healthy adults is associated with poor health and the presence of diseases, compared with sleep duration of 7–8 hours (32). Furthermore, studies have shown that sleep duration of less than 6 hours is associated with increased pain symptoms (32). In summary, 25% of the enrolled patients slept less than the recommended amount, which may have affected their overall condition, potentially including an increased experience of pain.
This study investigated the association between clinical, environmental and demographic factors and sleep quality. It found that increased age was significantly associated with decreased risk of poor sleep quality (experiencing poor sleep (OR = 0.62) and of not feeling clear-headed (OR = 0.77). This is interesting because increased age has previously been found to be related to a greater prevalence of sleep disturbance (33). Of note, however, the results of the Spearman Rank test showed a weak correlation between age and the three sleep quality items, with a Spearman's rho in the range of 0.14–0.27. The age distribution of the population in our study was narrow (IQR = 66 – 84), which may be taken into account in the assessment of age as a predictor of poor sleep quality. In several clinical studies, no association between age and sleep quality was found (17,28–29).

In our study, being female was associated with lower sleep quality in relation to a decreased feeling of clear-headedness, which is in line with the findings of other studies. Dogan et al. (28) found a lower sleep quality score among hospitalised women compared with men. Missildine et al. (29) found a nonsignificant trend towards lower sleep quality in women despite the fact that, when objectively measured, they had significantly longer sleep durations and fewer waking episodes at night than men.

In the current study, environmental factors such as room type were not associated with sleep quality. This result is in contrast to the findings of Yilmaz et al. (17), who found that sleep in single rooms was associated with better sleep quality among surgical patients, and Missildine et al. (29), who found a nonsignificant trend towards better sleep quality in single rooms. In particular, noise is described as a major factor in sleep disturbance and sleep deprivation among hospitalised patients (34), which explains the expectation that sleep in single rooms predicts better sleep quality. More research is needed to clarify this association. Furthermore, obstacles to sleeping well might also include psychological issues, such as anxiety, worries or family problems, as was found in a study of nursing home residents (35), or lifestyle non-regularity and lack of engagement in normal daily activities (36). In this study, this situation was found among patients who experienced being “carried away by thoughts”.

We found that sleep characteristics such as sleep duration, the time required to fall asleep and awakenings were important predictors of poor sleep quality. These finding are supported by Missildine et al. (29), who found a moderately positive correlation between sleep quality and the duration of night-time sleep and duration of awakening episodes. After potential confounders were adjusted in multiple logistic regression analysis, the results using backward selection showed that awakenings during the night was the only exposure variable that predicted poor sleep quality in regard to all three outcome items: experience of sleeping badly, feeling of not being clear-headed and being unsatisfied in general with the previous night’s sleep. This may be one of several reasons why we did not find that environmental factors such as room type (e.g. private or semi-private room) were associated with sleep quality. We would otherwise expect that sleep in a private room would be positively associated with sleep quality due to the lack of disturbance from other patients. Previous studies have found that staff disruption, due to treatment and care intervention, is one of the major causes of disruption of patients’ sleep quality (17).

This study has some limitations. Sleep quality and sleep characteristics are entirely based on self-reported data and might be over- or underestimated due to recall bias. How-
ever, we have attempted to minimise this bias by using a questionnaire containing items about the previous night's sleep. Half of the eligible patients were excluded, and these patients might have experienced the poorest sleep due to their illness and overall health condition. The questionnaires were completed by the clinical nurse specialists, who read the questions aloud and then noted the patient’s answers. This method may have influenced the responses, which might have differed if the patients completed the questionnaires independently; however, because a high proportion of the included patients were elderly and frail, we considered this method as necessary. Furthermore, it might be possible that including only one hospital have influenced the results related to environmental factors.

**CLINICAL IMPLICATIONS AND CONCLUSION**

In general, the patients experienced good sleep quality during hospitalisation. Age, gender (female) and sleep characteristics such as brief sleep duration, awakenings and the time required to fall asleep were predictors of poor sleep quality. However, awakenings during the night, in particular, predicted poor sleep quality, as measured in terms of both overall satisfaction with the previous night's sleep and the feeling of being rested.

This study shows that interventions targeted at supporting and promoting the sleep quality of hospital inpatients could include professional reflections on the necessity of interrupting patients’ sleep during routine treatment and care tasks. A number of nursing interventions may be proposed to promote better sleep among patients, but more research is needed to confirm the current results (37).

This study offers knowledge about patients' experiences related to sleep during hospitalisation regardless of diagnosis. Therefore, it is a valuable contribution to healthcare professionals’ endeavours to promote good sleep – especially given that patients are typically admitted to wards containing patients with different diagnoses.

Research has found that healthcare professionals often assess patients’ sleep through informal approaches and do not use standardised tools (38). This study suggests that merely asking “Did you sleep well?” is not sufficient. A more systematic approach is required, and when patients experience poor sleep quality, health professionals should communicate with patients about their thoughts about being awake. Other scholars have also given this recommendation for practice (39).

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