

New onset of insomnia in hospitalized patients in general medical wards: incidence, causes, and resolution rate

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ABSTRACT

Background: Insomnia is common in hospitalized patients. However, no study has examined new onset of insomnia in patients without a prior history of insomnia.

Objectives: Incidence of new onset of insomnia in inpatients, associated factors and resolution rate after 2 weeks.

Method: This is a prospective observational study conducted at a community hospital. We used the Insomnia Severity Index questionnaire to screen for insomnia in all patients located in the general medical floors from day 3 to day 5 of their hospital stay. We excluded patients with a prior insomnia history.

Results: Out of the 205 patients who met the inclusion criteria, 75 patients (36%) reported insomnia. Severe insomnia was present in 3% of patients. Difficulty in maintaining sleep is the most common symptom. Frequent staff disruptions due to blood draws and vital signs checks were reported by 68% as the cause of insomnia, followed by illness associated causes (64%) and sleep disruption due to noise and or brightness (23%). Patients with insomnia had more awakenings due to noise, brightness, and staff interruptions than those without insomnia (1.35 times vs. 0.9 times, $p = 0.027$). Patients with respiratory symptoms, cardiac monitoring, oxygen use, private rooms, and no sedative use did not have a higher insomnia risk. Patients with insomnia had significant lower satisfaction scores than patients without insomnia (4.53 vs. 4.05, $p = 0.001$) but did not have a different length of stay (6.18 vs. 6.19, $p = 0.97$). In 31% of patients with insomnia who were able to be contacted two weeks after discharge, 75% of them had insomnia resolution.

Conclusion: New onset of insomnia occurred in 36% of hospitalized patients. Most common causes are staff disruption and disease symptoms. It was usually short-term and could decrease patients' satisfaction score.

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1. Introduction

Insomnia is a common condition and it has been proven to increase the risk of delirium, hypertension, hyperglycemia, and impaired daytime functioning [1–3]. Unfortunately, the hospital environment often disrupts the normal circadian rhythm leading to impaired quality of sleep [4,5]. The total number of hours of sleep in 24 hours may be normal, yet 50% of sleep occurs during the daytime in short bouts. This results in increased sleep onset latency, rapid eye movement latency, increased fraction of wakefulness, and stage 1 sleep [6].

Sleep impairment is increasingly being reported in inpatient settings, most notably in the intensive care unit (ICU). Nighttime awakening and difficulty in falling asleep were reported by 40% and 35% of ICU patients respectively [7]. These sleep disturbances could persist after patients are discharged from the ICU [8]. Sleep impairment in the general hospital ward is also a common finding. A study conducted in a tertiary care setting involving 1200 patients

hospitalized for infectious diseases found the incidence of unsound sleep to be 48%. Staff disruptions, pain, and anxiety were found as common reasons for impaired sleep [9].

Thirty percent of the general population report having chronic insomnia [10]. However, existing studies about insomnia in hospitalized patients were done on patients with both chronic and new-onset insomnia. Insomnia newly developed during a hospital stay in patients without a prior history of sleep problems has not been studied exclusively before. The aim of this study is to evaluate new-onset insomnia in hospitalized patients and to study its incidence, causes, impact on hospital stay, patient satisfaction score, and resolution rate.

2. Method

2.1. Study design

The study was conducted in full accordance with our institution and institutional review board regulations

with exemption of written informed consent granted. This is a prospective observational study conducted at a teaching community hospital from December of 2016 to March of 2017. All patients older than 18 years old in the general medical floor between day 3 and day 5 of their hospital stay were considered eligible for study.

Patients with severe cognitive impairment, severe speech/hearing disorders, those with a history of insomnia, and those who declined to participate were excluded. Cognitive impairment was decided by information obtained from the patient's health record and a bedside clinical assessment. History of insomnia was defined as difficulty sleeping or insomnia requiring the use of a medication more than three days a week in the last month.

2.2. Data collection

Eligible patients were interviewed using the 'Insomnia Severity Index' (ISI) questionnaire to diagnose and evaluate for insomnia. The ISI questionnaire includes seven questions about patients' perception of sleep-related symptoms and severity (Appendix 1). Each variable is given a score of 0–4 with the maximum possible score being 28. Anyone who scored above 7 was considered to have insomnia. The ISI has been validated to screen and assess the severity of insomnia in both general populations and inpatients [11,12]. Based on the ISI score, insomnia was categorized into clinically non-significant (ISI < 8), subclinical (ISI 8–14), clinical/moderately severe (ISI 15–22), and severe insomnia (ISI 23–28).

We also collected data on various factors that may contribute to sleep disturbances, such as the type of room, respiratory symptoms on admission, use of oxygen, use of sleeping aids, and medications with

sedation properties. Causes of sleep disturbances reported by patients were grouped into six major categories: staff interruptions for blood draw/vital signs checks, noise/brightness, unfamiliarity with the new environment, disease symptoms, anxiety/stress, and medication side effects. Patients rated their level of satisfaction on overall hospital care on a scale of 1–5. We collected other demographic information and length of stay from electronic health records.

Those who were diagnosed to have 'new-onset insomnia' were contacted by phone two weeks post discharge and the ISI questionnaire was repeated to check for resolution of insomnia. Data were entered and stored in REDCap (Research Electronic Data Capture), a secure web-based software that provides solution and workflow methodology for research studies.

2.3. Statistical analysis

The statistical analysis was performed using SPSS version 15 for Windows. We used an independent *t*-test to evaluate continuous variables, a Chi-squared test for dichotomous outcomes, and measured odd risk ratio for risk factors with $P < 0.05$ considered to be statistically significant.

3. Results

Three hundred and eighty-five patients were eligible to be interviewed, out of which, 57 patients had cognitive limitations, hearing impairment, or refused to be interviewed and could not be interviewed. One hundred and eighteen patients had a history of insomnia and were excluded. The remaining 205 patients were included in the study and provided with the ISI questionnaire. Figure 1 shows our patient flow in the study.

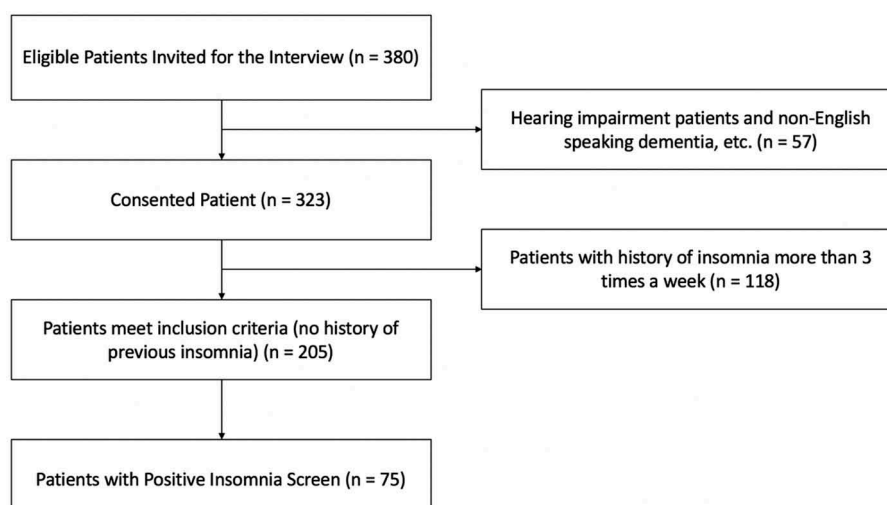


Figure 1. Patient flow in the study

Table 1. Clinical characteristics of patients with and without insomnia.

		Insomnia <i>n</i> = 75	No insomnia <i>n</i> = 130	<i>p</i> value
Gender	Female	46 (61%)	60 (46%)	0.036*
	Male	29 (39%)	70 (54%)	
Oxygen requirement	Yes	37 (49%)	68 (52%)	0.68
	No	38 (51%)	62 (48%)	
Cardiac monitoring	Yes	47 (63%)	80 (62%)	0.87
	No	28 (37%)	50 (38%)	
Sleep aid	Yes	11 (15%)	22 (17%)	0.71
	No	63 (85%)	108 (83%)	
Sedative medication	Yes	51 (68%)	74 (57%)	0.12
	No	24 (32%)	56 (43%)	
Length of stay		6.19 ± 3.41	6.18 ± 3.16	0.97
Age		65 ± 14.7	61 ± 15	0.08

Notes: Insomnia was defined as Insomnia Severity Index above 7.
* Statistically significant as *p* value is less than 0.05.

Table 2. Insomnia severity.

Insomnia severity	Number of patients
Clinically non-significant insomnia (ISI<8)	130 (64%)
Subclinical (ISI 8–14)	54 (26%)
Clinical or moderately severe (ISI 15–21)	14 (6.7%)
Severe (ISI 22–28)	7 (3.38%)
Total	205

Table 1 shows the demographic and clinical characteristics of our patient population. Female patients reported insomnia more often than males, but the differences in age and length of stay were not statistically significant. Based on the ISI scale, 75 (36%) reported insomnia. Most patients with insomnia had only mild or subclinical insomnia (Table 2).

In patients with insomnia, average score for each component in the ISI scale was as follows: 2.06 for difficulty falling asleep, 2.22 for maintaining asleep, 1.44 for waking up early, 2.78 for satisfaction, 1.24 for noticeability, 1.53 for worries, 1.8 for interference with daytime functioning. On average, patients with insomnia had maximum difficulty with the ‘maintaining their sleep’ component.

Common diagnoses were grouped into seven categories. Incidences of insomnia in different disease conditions are as follows: 40% in chronic obstructive pulmonary disease exacerbation patients, 37% in congestive heart failure exacerbation patients, 52% in pneumonia patients, 32% in patients with soft tissue infections, 43% in all types of patients with musculoskeletal disorders, 8% in patients with stroke/transient ischemic attacks, and 52% in all types of patients with gastrointestinal disorders.

Patients with a new onset of insomnia (NOI) reported that their sleep disturbances were predominantly caused by staff interruptions for blood draw and vital signs checks (66%), followed by symptoms or illness related causes (62%), and noise/brightness (22%). Table 3 demonstrates groups of causes reported by patients with insomnia.

Patients with NOI had more awakenings due to hospital factors (noise, brightness, and staff interruptions) than those without insomnia (1.35 times vs. 0.9

Table 3. Frequency of awakenings based on the nature of interruptions.

	Number of patients	Average number of awakenings per night (in patients who reported)
Staff interruption	51 (68%)	1.83
Sickness	48 (64%)	2.3
Noise, brightness	17 (22.67%)	1.68
Stress, anxiety	9 (12%)	2
Medication side effect	5 (7%)	2.3
New environment	5 (6.67%)	2.2

times, *p* = 0.027) which was statistically significant. Patients with respiratory symptoms, cardiac monitoring, oxygen use, private rooms, no sleep aid use, and no medications with sedation properties did not report insomnia more than patients without those factors (OR:1.17 [95% CI 0.66–2.09], 0.99 [0.53–1.83], 0.96 [0.54–1.68], 1.17 [0.63–2.17], 0.85 [0.39–1.88], 0.62 [0.34–1.12] respectively).

Patients with insomnia had lower satisfaction scores than those without (4.53 vs. 4.05, *p* = 0.001), which was statistically significant, but there was no difference in the length of stay (6.18 vs. 6.19, *p* = 0.97).

The ISI questionnaire was administered to patients post discharge on the phone. Thirty-one percent of patients with insomnia were able to be contacted. Ninety percent of them have a decreased ISI score. The mean ISI score of patients with insomnia after discharge was 5.2 which was significantly lower than the mean ISI of 12.3 before discharge (*p* < 0.05). Seventy-five percent of patients had insomnia resolution (ISI<8).

4. Discussion

To the best of our knowledge, this study is the first study to examine new-onset insomnia in hospitalized patients without a prior history of insomnia. The incidence of new-onset insomnia in hospitalized patients was found to be 36% in our study. However, clinical insomnia and severe insomnia

were found only in 10% of all patients. The incidence of new-onset clinically significant insomnia in our study was lower than that in previous studies (38%–57%) [12,13]. We attribute it to the fact that other studies have included patients with chronic insomnia. Patients with NOI in our study also experienced most difficulty in the ‘maintaining their sleep’ component than falling asleep or waking up early.

Etiologies of NOI were noticed to be similar to the findings in previous studies [9,12,14]. Patients with NOI in our study reported more sleep disruption due to staff interruptions, noise/brightness, and symptoms or illness related causes when compared to other studies. This could be for multiple reasons such as difference in hospital settings or a lower ability of patients without a prior insomnia history to cope with new stressors. The most common causes of patients’ sleep disruptions were frequent blood draws and vital signs checks, followed by their illness, and noise/brightness. This was consistent with a prior study done in patients hospitalized for infectious ailments in which staff interruption was found to be the most common cause of unsound sleep [9]. This also explains our result that patients with insomnia reported most difficulty with the ‘maintaining their sleep’ component of the ISI questionnaire.

In our study, we found that sharing rooms, oxygen use, cardiac monitoring, and respiratory symptoms, were not statistically different among the two groups. Sleep aid medication usage, which can cause adverse outcomes and falls [15], did not decrease the insomnia risk. Use of medications with sedation side effects was also not associated with insomnia.

Our study also showed that newly developed insomnia was significantly associated with lower satisfaction scores on the overall hospital care. However, the total length of stay was not different, which was consistent with previous studies [14].

Insomnia acquired during a hospital stay was found to resolve quickly after discharge. Ninety percent of the patients reported improvement in their insomnia within two weeks after discharge. This quick resolution shows that hospital-related insomnia belongs to the category short-term insomnia or adjustment insomnia. Short-term insomnia is defined as insomnia that resolves when the stressor is removed or when the individual adapts to the stressor [16]. Short-term insomnia has also been called adjustment insomnia, acute insomnia, stress-related insomnia, or transient insomnia [16].

This brief report sheds light on a high incidence of insomnia occurring in the first few days of patients’ hospital stay in patients without a prior history of insomnia. Our findings of sleep disruption due to staff interruptions, noise/brightness, and disease symptoms as the most common causes, suggests several possible interventions to improve the sleep of

patients. These include informing patients about the time of routine vital checks or medication administrations, less frequent vital signs checks for stable patients, and more attention to symptomatic management such as pain, nausea, vomiting, and coughing etc. Installation of noise sensors would be a good idea to curb excess noise in wards. Central lights may be avoided after a certain time of the day.

The limitations of our study include the small study population and limited follow-up as we were able to contact only 31% of the patients with new-onset insomnia. Other limitations include reliance on patient recall of their sleep symptoms without an objective measurement. Our brief report results might not have been generalizable for all hospitalized patients. For future research on insomnia in hospitalized patients, we suggest a prospective study, randomizing patients to two groups: one with standard room brightness, noise, interruptions for blood draws, and another where some intervention to decrease excessive light, noise, and interruptions for procedures is instituted.

5. Conclusion

In this brief report, 36% of patients without a history of insomnia developed insomnia in the first few days of their hospital stay. Patients with insomnia tend to be awakened more by the hospital environment (noise, brightness, and procedures) than patients without insomnia. Other factors such as cardiac monitoring, oxygen, breathlessness symptoms, and room type did not increase the risk of insomnia. Self-reported insomnia significantly decreased patients’ satisfaction score. However, it did not affect their length of stay and most of the patients with insomnia reported resolution of insomnia within two weeks after discharge.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix 1. Insomnia Severity Index questionnaire

1. Insomnia problems

Insomnia problem	None	Mild	Moderate	Severe	Very severe
Falling asleep	0	1	2	3	4
Staying asleep	0	1	2	3	4
Waking up too early	0	1	2	3	4

2. How satisfied are you with the current sleep pattern?

Very satisfied	Satisfied	Moderately satisfied	Dissatisfied	Very dissatisfied
0	1	2	3	4

3. How noticeable to others do you think your sleep problem is in terms of impairing the quality of your life?

Not at all	A little	Somewhat	Much	Very much noticeable
0	1	2	3	4

4. How worried/distressed are you about your current sleep problem?

Not at all worried	A little	Somewhat	Much	Very much worried
0	1	2	3	4

5. To what extent do you consider your sleep problem to interfere with your daily functioning (eg, daytime fatigue, mood, ability to function at work/daily, concentration, memory, mood) currently?

Not at all interfering	A little	Somewhat	Much	Very much worried
0	1	2	3	4

Scoring and interpretation:

- 0–7: no clinically significant insomnia,
- 8–14: subthreshold insomnia
- 15–21: clinical insomnia (moderate severity)
- 22–28: clinical insomnia (severe)