

The Effect of a Sleep Education and Hypnotics Reduction Program on Hypnotics Prescription Rate for the Hospitalized Patients with Cancer at a General Hospital

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Objective: We aimed to investigate whether the sleep education and hypnotics reduction program (the i-sleep program), developed for all hospitalized patients and medical personnel, help reducing the hypnotics prescriptions rate among hospitalized cancer patients in a general hospital.

Methods: Patient data such as hypnotics prescribed at the time of admission and discharge during prior to (year of 2014) and after (year of 2015) initiation of the i-sleep program were collected and compared. Also, hypnotics prescription rate at the first day of each month of 2014 and 2015 were estimated and compared.

Results: All of 12,382 patients in 2014 and 12,313 patients in 2015 were admitted to the Department of Oncology of the hospital. In 2014, 782 (6.3%) of 12,382 inpatients were already taking hypnotics at the time of admission, and 594 (76.0%) of the 782 patients were still taking sleeping pills at the time of discharge. Following initiation of the i-sleep program (2015), 792 (6.4%) of 12,313 inpatients were already taking hypnotics at the time of admission, and 553 (69.8%) of the 792 inpatients were still taking them at the time of discharge (relative risk, 0.92; 95% confidence interval, 0.87–0.98). On the first day of each month of 2014, 7.3% to 12.6% (mean, 10.0%) of inpatients had prescriptions for hypnotics. Following initiation of the program, the rate of hypnotic prescription was significantly reduced (3.2–10.8%; mean, 8.0%; $p = 0.03$).

Conclusion: Our data showed that the i-sleep program may help to reduce the hypnotic prescription rate in hospitalized cancer patients.

KEY WORDS: Inpatients; Sleep; Neoplasms; Hypnotics and Sedatives.

INTRODUCTION

The hospitalized patients experience sleep disturbance due to noises, clinical procedures, illness or pain, reductions in physical activity, or medication side effects [1-4]. Furthermore, previous studies have reported that hospitalized patients use sleeping pills more frequently than the general population [5,6]. The insomnia prevalence is twice as high in patients with cancer than in the general population [7]. Indeed, sleep disturbance may occur at

the time of cancer diagnosis, during chemotherapy of radiation therapy, and may even persist for a long period of time in cancer survivors. Extended hospital stays also can trigger insomnia due to alarming noises, harsh lighting, and clinical procedures, or patients' reduced physical mobility.

To address this issue, we developed a sleep education and hypnotics reduction program for hospitalized patients (the i-sleep program) consisting of two parts: system/environment improvement and staff education/promotion [8]. The aim of this study was to investigate whether the program can help reducing the hypnotic prescription rate among hospitalized cancer patients.

METHODS

The study protocol was approved by the Institutional

Received: May 24, 2018 / **Revised:** June 20, 2018

Accepted: June 21, 2018

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Review Board of Asan Medical Center (No. 2014-0886). We used subset data of the previous study [9] which was done to explore sleeping pills prescription pattern of inpatients of Asan Medical Center in Seoul, South Korea. Especially, in this study we explored the sleeping prescription pattern of inpatients with cancer in the Department of Oncology.

The i-sleep program, been in place since January 1, 2015, is a sleep education and hypnotics reduction program for hospitalized patients. It consists of two parts [10]: system/environment improvement and staff education/promotion. For the system/environment improvement component, (a) a sleep-hygiene education leaflet was included in the inpatient guidebook; (b) a sleep-hygiene education video clip [10] was created and broadcast throughout the hospital; and (c) a quick response (QR) code linked to the education video clips was printed on the leaflet, which could be accessed by patients using their smartphones. For staff education/promotion, (a) nurses, residents, and medical personnel were educated regarding good sleep-hygiene for inpatients; and (b) education regarding how and when to prescribe sleeping pills for inpatients was provided to all residents and medical personnel.

To determine the number of patients in the Department of Oncology who had begun to take hypnotics during hospital stay, we estimated the proportion of all newly admitted patients in the Department of Oncology taking hypnotics both at the time of admission and discharge, excluding patients in pediatric care unit, during 2014 and 2015. We also estimated the proportion of patients taking hypnotics on the first day of each month. Zolpidem im-

mediate-release or controlled-release form, triazolam, benzodiazepines including clonazepam and bromazepam, and trazodone were considered hypnotics if they had been prescribed *hora somni* (HS). Data was provided by an honest broker following de-identification.

To estimate the changes in the hypnotics prescription rates, we calculated relative risk (RR) using the number of the inpatients who continued to take sleeping pills (*a*), number of inpatients who discontinued to take sleeping pills (*b*) until discharge from the hospital among inpatients who were already taking sleeping pills at the time of admission at 2015 (exposure), the number inpatients who continued to take sleeping pills (*c*) and number of inpatients who discontinued to take sleeping pills (*d*) until discharge from the hospital among inpatients who were already taking sleeping pills at the time of admission at of 2014 (control). The RR was calculated as $\{a/(a+b)\} / \{c/(c+d)\}$. The Student's *t* test was also done to analyze the difference in the hypnotics prescription rate per day of 2014 and 2015.

RESULTS

Prior to initiation of the i-sleep program (2014), 12,382 patients were admitted to the Department of Oncology of the hospital. Among them in the year of 2014, 782 (5.81%) of 12,382 patients were already taking hypnotics at the time of admission, while 1,062 (8.58%) patients had been prescribed hypnotics at the time of discharge (Table 1). A total of 594 (76.0%) of the 782 patients who had already been taking sleeping pills upon admission were still taking sleeping pills at the time of discharge.

Table 1. Patients in the Department of Oncology prescribed sleeping pills

	Inpatients taking hypnotics			
	Before implementation (2014)		After implementation (2015)	
	At time of admission	At time of discharge	At time of admission	At time of discharge
Total	782 (5.8)	1,062 (8.6)	792 (6.4)	1,011 (8.2)
One tablet				
Zolpidem IR or CR	565 (72.3)	807 (76.0)	575 (72.6)	776 (76.8)
Triazolam	24 (3.1)	25 (2.4)	23 (2.9)	23 (2.3)
Clonazepam or bromazepam	64 (8.2)	87 (8.2)	94 (11.9)	100 (9.9)
Trazodone	32 (4.1)	32 (3.0)	5 (0.6)	8 (0.8)
Two tablets	83 (10.6)	95 (8.9)	64 (8.1)	71 (7.0)
More than three tablets	14 (1.8)	16 (1.5)	31 (3.9)	33 (3.3)

IR, immediate-release; CR, controlled-release.

Following initiation of the i-sleep program (2015), 12,313 patients were admitted to the Department of Oncology, 792 (6.4%) of 12,313 patients were already taking hypnotics at the time of admission, and 1,011 (8.2%) had been prescribed hypnotics at the time of discharge. In 2015, 553 (69.8%) of the 792 inpatients who were already taking hypnotics at the time of admission were still taking them at the time of discharge. A significant decrease in the hypnotic prescription rate was observed from 2014 to 2015 following initiation of the i-sleep program (RR, 0.92; 95% confidence interval [CI], 0.87–0.98). Among all inpatients who were not taking sleeping pills upon admission (11,600 in 2014 and 11,521 in 2015), 468 (4.0%) and 458 (4.0%) were newly prescribed hypnotics during hospital stay during 2014 and 2015 (RR, 0.99; 95% CI, 0.87–1.12), respectively.

On the first day of each month of 2014, 7.3% to 12.6% (mean, 10.0%) of inpatients had prescriptions for hypnotics (Fig. 1A). Following initiation of the program, the rate of hypnotic prescription was significantly reduced ($p = 0.03$): On the first day of each month of 2015, hypnotics had been prescribed to 3.2% to 10.8% (mean, 8.0%) of inpatients (Fig. 2B). There was no significant difference in the number of tablets taken by each patient between 2014 (one tablet, 80.3%; two tablets, 15.4%; and three or more tablets, 4.3%) and 2015 (one tablet, 80.1%; two tablets, 12.0%; and three or more tablets: 4.1%).

DISCUSSION

A significant reduction in the proportion of inpatients

who continued sleeping pills until the time of discharge was observed, and the sleeping pills prescription rate per day had significantly decreased following initiation of the i-sleep program. Numerous sleep programs have been developed for use with inpatients [11–13]. To ensure appropriate education regarding sleep hygiene, sleep specialist provided guidance on how to prescribe sleeping pills and help inpatients reduce or stop taking their pills to doctors and nurses. Including the education to medical personnel is the main difference between our program and previous sleep education programs.

Previous studies have consistently reported that the prevalence of insomnia remains pervasive even in long-term survivors of cancer [14]. Since sleep disturbance may affect the survival rate among cancer patients [15], it is important to treat the problem appropriately. According to cognitive-behavioral theory, insomnia can be maintained or exacerbated by dysfunctional beliefs, thoughts and excessive worries regarding insomnia, or maladaptive behaviors such as frequent napping, spending excessive time in bed, or engaging in activities that interfere with sleep [16]. Patients with cancer can easily feel fatigued and lack physical stamina as a side effect of the cancer treatments or due to the symptoms of the cancer itself, thereby aggravating insomnia [17]. In addition, patients diagnosed with cancer are likely to experience anxiety regarding the adverse effects of insomnia on their immunity or cancer, which may lead them to behave in ways that are maladaptive for sleep [18,19]. However, the cognitive-behavioral approach cannot be applied to patients experiencing poor physical function, even though they

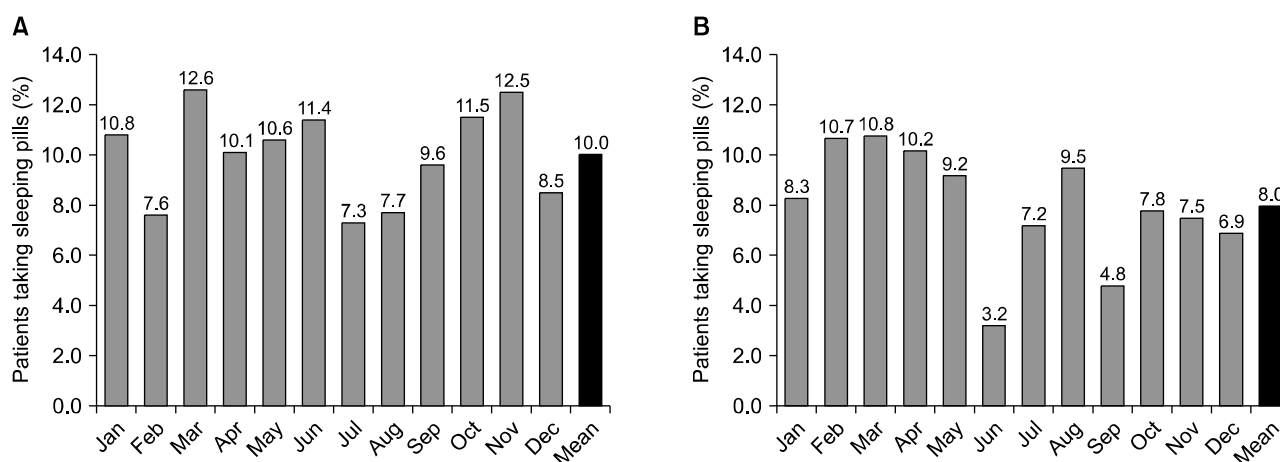


Fig. 1. The hypnotics prescription rates on the first day of each month in 2014 (A) and 2015 (B).

may also be experiencing sleep disturbance. For survivors of cancer who continue to experience insomnia symptoms as well as maladaptive sleep behaviors, access to adequate education regarding sleep before or at the time of hypnotic prescription may improve the prognosis of insomnia.

Patients with cancer who experience sleep disorders are at risk for reduced quality of life as well as poor physical and psychological functioning. Therefore, physicians must become more proactive in identifying and treating sleep problems in patients with cancer. Previous studies have focused on the effects of various insomnia treatments in patients with cancer; however, no studies to date have reported the impact of educating hospitalized patients regarding healthy ways to cope with insomnia. The sleep education and hypnotics reduction program discussed in the present study is advantageous in that it can be delivered to patients using effective and efficient audiovisual resources at the time of hospitalization, when patients are most prone to acquire sleep problems cost-effectively. Our program also emphasizes efforts to educate medical personnel including physicians, nurses, and interns regarding proper management of insomnia in an inpatient setting. Our findings support the notion that prevention is key in reducing the inappropriate or prolonged use of sleeping pills [20], which can be achieved by educating hospitalized patients and medical personnel regarding the management of sleep problems they are likely to encounter.

The present study possesses some limitations of note. First, it was unclear whether the implementation of the i-sleep program directly reduced the hypnotics prescription rate. Especially, hypnotics prescription patterns and rates can vary according to individual characteristics. It is possible that the results could have been obtained by chance, or different characteristics of the cohort. Further long-term studies are required to confirm the true effects. In addition, we cannot determine precisely whether hypnotics were prescribed for insomnia symptoms or other symptoms such as anxiety (benzodiazepines) or pain (trazodone), even though these medications were initially regarded as hypnotics when they were prescribed as HS. Despite these limitations, we observed that the i-sleep program may help to reduce the rate of hypnotic prescription in hospitalized patients with cancer.

■ Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

■ Author Contributions

Conceptualization: Seockhoon Chung, Soyoung Youn. Data acquisition: Seockhoon Chung, Suyeon Lee, Changnam Kim. Formal analysis: Seockhoon Chung, Soyoung Youn. Funding: Seockhoon Chung. Supervision: Seockhoon Chung. Writing—original draft: Soyoung Youn. Writing—review & editing: Seockhoon Chung, Suyeon Lee, Changnam Kim.

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