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...
Hypnotics Reduction for Inpatients with Cancer

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 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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