

Trends in Sleep-Related Questions on Japanese National Medical Examinations, 2006-2020

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Abstract

Sleep is an essential element supporting human health. Sleep medicine is an emerging field, and awareness of it is increasing gradually. National medical examinations reflect the relative importance of topics covered. The examination of sleep-related questions on different national examinations may reveal how much knowledge of sleep and sleep disorders students in various fields of medicine are required to have. The aim of this study was to identify changes in sleep-related questions on national examinations for doctors, dentists, nurses, public health nurses, midwives, physical therapists and occupational therapists. Percentage of sleep-related questions on examinations were 1.49% for doctors, 0.27% for dentists, 2.39% for nurses, 1.67% for midwives, 1.18% for public health nurses, 1.40% for physical therapists, 2.00% for occupational therapists. On examinations for doctors and dentists, the number of sleep-related questions increased in 2012 and 2014, and decreased in 2019 and 2020. For nurses, midwives, and public health nurses, this number increased in 2014 and 2015. Insomnia related questions were the most frequent on examinations for doctors; questions about other sleep disorders, sleep testing, treatment, and patient education also appeared on these examinations. Questions on examinations for dentists were limited to sleep apnea syndrome and sleep-related bruxism. Examinations for nurses mainly included questions about insomnia complaints; those for midwives included questions about insomnia, as well children' sleep. Examinations for physical therapists and occupational therapists contained many sleep-related questions already 15 years ago, despite the lack of mention of sleep problems in the examination criteria. Our findings

indicate that sleep-related education varies among medical fields; thus, education about sleep problems may need to be adapted for the demands of each medical field.

Background

Sleep physiology has been of scientific interest since the beginning of the 1900s. In the mid-1900s, sleep-wake mechanisms and REM sleep were identified. Progress in basic sleep science, including the identification of sleep substances, has facilitated the diagnosis and treatment of sleep disorders (Jones BE, 2018).

Sleep occupies nearly one-third of human life, as an essential period of rest for the body and mind. Due to the variation and complexity in modern life, sleep problems are becoming a social issue, as they may lead to accidents and impaired work and study performance. The influence of disturbed sleep on society has attracted attention in various fields, such as sleep sociology and sleep economics, and intervention to ameliorate this problem is needed (Dinges DF, 2014).

Medical and healthcare providers' education in sleep medicine is important, as these professionals need to educate patients and provide quality care. The level and amount of sleep education vary among schools for medical and health care professionals; relevant content on national examinations for these professionals may give us an important clue about the level of interest in sleep medicine (Blunden SL, 2012).

The model core curriculum for doctors includes the following sleep-related topics; rest, mental health, sleep quality and insomnia [B-1-5)-(4)] and sleep apnea syndrome [D-6-4)-(6)-2] (Committee for Model Core Curriculum, 2016a). That for dentists includes causes,

diagnosis and treatment of sleep apnea syndrome [E-2-4)-(11)-6] and sleep disorders [E-6-1] (Committee for Model Core Curriculum, 2016b). The national examination criteria for nurses include the major topics “sleep”, “sleep apnea”, and “sleep disorders”; those for midwives include “sleep”, and those for public health nurses include “sleep apnea syndrome”(Nursing Department of MHLW, 2018). National examination criteria for occupational therapists and physical therapists include no sleep-related topic (Examination Department of MHLW, 2016). These curricula do not provide a clear indication of how sleep-related issues are included in national medical examinations.

Objectives

The aims of this study were to analyze the amount and content of sleep-related questions on different national medical examinations, and to elucidate how sleep-related problems are handled in various medical and healthcare fields.

Methods

Japanese national medical examinations for doctors, dentists, nurses, public health nurses, midwives, and occupational and physical therapists from the past 15 years (2006-2020) were downloaded from the Ministry of

Health, Labor and Welfare Website and included in the analysis. The authors reviewed all medical examination questions, and extracted those pertaining to sleep problems and sleep-related issues, as well as those whose response options contained sleep-related terms. The designation of an extracted question as sleep related was based on discussion and agreement among the authors. Sleep-related terms appearing in question and response text were also collected. The number of sleep-related questions per year and the frequency of appearance of sleep-related terms were determined for each type of medical examination.

Results

Percentage of sleep-related questions on national medical examinations

Examinations for doctors dating to the study period contained 1.49% sleep-related questions, of which 11.1% were clinical case questions (Table 1). Examinations for dentists contained 0.27%, of which 33.3% were clinical case questions. In the field of nursing, examinations for nurses contained 2.39% sleep-related questions, those for public health nurses contained 1.18% questions, and examinations for midwives contained 1.67%. Examinations for physical therapists and occupational therapists contained 1.40% and 2.00% sleep-related questions, respectively.

Table 1. Percentage of sleep-related questions on national medical examinations

| Year | Doctors | Dentists | Nurses | Public Health Nurses | Midwives | Physical Therapists | Occupational Therapists |
|------------------|---------|----------|--------|----------------------|----------|---------------------|-------------------------|
| 2006 | 0.75 | 0 | 0.83 | 0 | 0.95 | 1.50 | 3.00 |
| 2007 | 1.20 | 0 | 1.25 | 0 | 0 | 2.50 | 2.50 |
| 2008 | 1.00 | 0 | 1.25 | 0 | 1.90 | 2.50 | 3.50 |
| 2009 | 0.40 | 0.27 | 3.33 | 1.90 | 0.95 | 4.00 | 2.00 |
| 2010 | 1.80 | 0 | 2.08 | 0 | 0.95 | 0.50 | 1.00 |
| 2011 | 1.40 | 0 | 1.67 | 0 | 0 | 1.50 | 0.50 |
| 2012 | 1.60 | 0 | 1.25 | 1.90 | 0 | 0.00 | 0.50 |
| 2013 | 1.80 | 0.27 | 1.67 | 0.91 | 1.82 | 0.50 | 1.50 |
| 2014 | 2.00 | 1.10 | 2.50 | 1.82 | 3.64 | 0.50 | 1.50 |
| 2015 | 2.80 | 0.82 | 4.17 | 1.82 | 0 | 1.50 | 1.50 |
| 2016 | 0.80 | 1.10 | 2.50 | 2.73 | 3.64 | 1.00 | 2.00 |
| 2017 | 2.20 | 0.27 | 3.33 | 0 | 4.55 | 1.00 | 2.50 |
| 2018 | 2.00 | 0.28 | 2.92 | 0.91 | 0.91 | 1.50 | 2.50 |
| 2019 | 1.25 | 0 | 4.58 | 3.64 | 3.64 | 1.50 | 3.00 |
| 2020 | 1.50 | 0 | 2.50 | 1.82 | 1.82 | 1.00 | 2.50 |
| Total (%) | 1.49 | 0.27 | 2.39 | 1.18 | 1.67 | 1.40 | 2.00 |

Trends in sleep-related questions on medical examinations

Trends in the numbers of sleep-related questions on examinations for doctors and dentists are shown in Figure 1 and 2, respectively. On examinations for doctors, the number of sleep-related questions was greatest in 2015 and least in 2009. Years with more than the mean number of sleep-related questions were 2012-2015, 2017, and 2018; the 2019 and 2020 examinations contained about one-third of the 2015 peak number of such questions. No sleep-related question appeared on dentists' examinations in 8 years (including 2019 and 2020), and one question on the examinations in 4 years. Three or four questions were on these examinations in 2014-2016.

Trends for nursing examinations are shown in Figures 3-5. Years in which the numbers of sleep-related questions on examinations were above the mean were 2009 and 2014-2019 for nurses and 2014, 2016, 2017, 2019, and 2020 for midwives. The 2019 examination for public health nurses contained the maximum of four sleep-related questions.

Trends for physical therapists and occupational therapist examinations are shown in Figures 6-7. The percentage of sleep-related questions peaked in 2009 for physical therapists. The percentage of sleep-related questions was above the mean in 2006-2008 and 2017-2020 for occupational therapists. This percentage peaked before 2008 and in recent years.

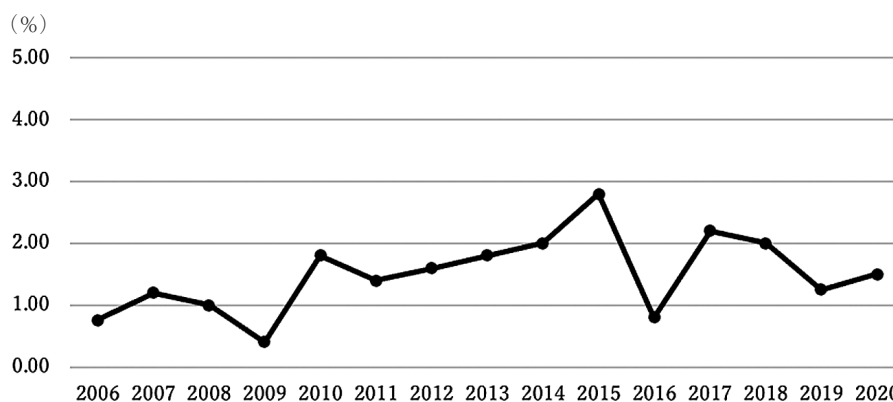


Figure 1. Trends in percentage of sleep-related questions on examinations for doctors

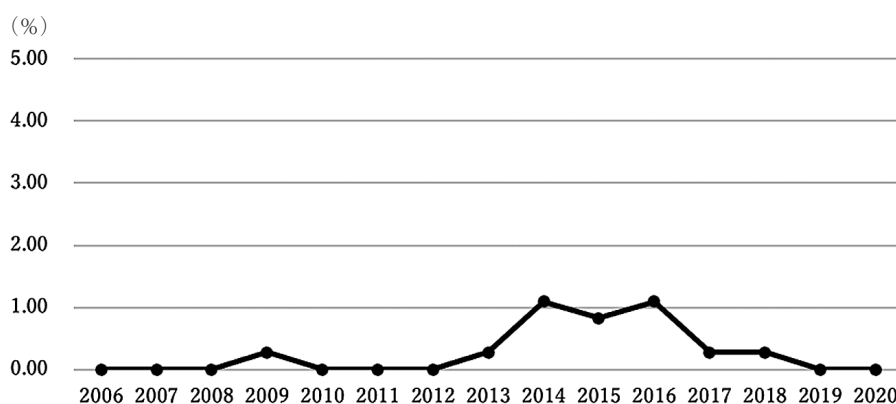


Figure 2. Trends in percentage of sleep-related questions on examinations for dentists

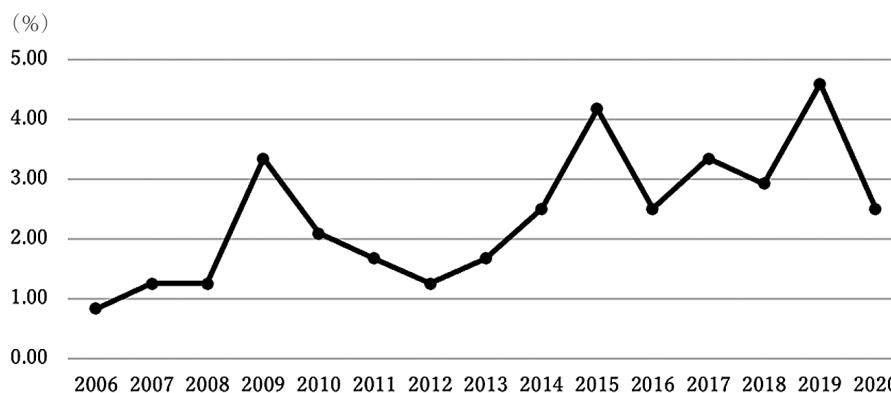


Figure 3. Trends in percentage of sleep-related questions on examinations for nurses

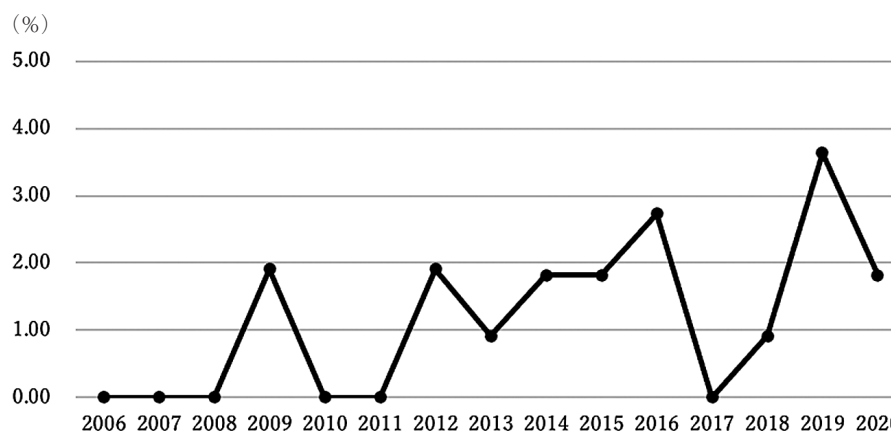


Figure 4. Trends in percentage of sleep-related questions on examinations for public health nurses

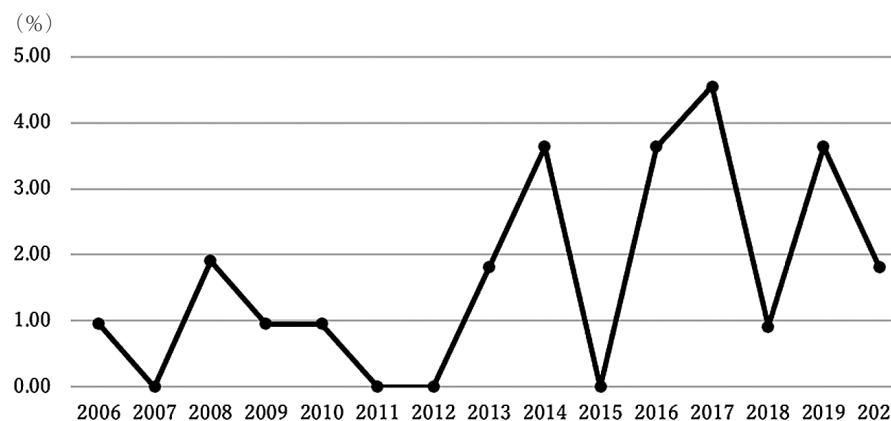


Figure 5. Trends in percentage of sleep-related questions on examinations for midwives

Sleep-related terms appearing on national medical examinations

In total, the examinations contained 646 sleep-related terms (Table 2). These terms appeared most frequently on examinations for doctors (254 terms), followed by those for nurses ($n = 167$), occupational therapists ($n = 92$), physical therapists ($n = 47$), midwives ($n = 38$), dentists ($n = 30$), and public health nurses ($n = 26$).

The terms appearing most frequently on doctors'

examinations were related to insomnia. The examinations also contained terms related to sleep disorders. The most frequently appearing term related to sleep testing was "polysomnography". Terms related to sleep-disorder treatment devices included "continuous positive airway pressure" and "oral appliance", and related to medications.

The terms that appeared most frequently on examinations for dentists were "sleep apnea syndrome"

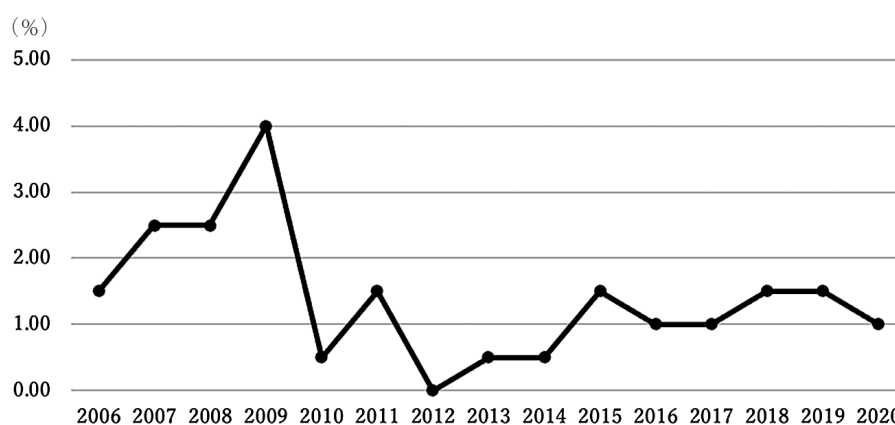


Figure 6. Trends in percentage of sleep-related questions on examinations for physical therapists

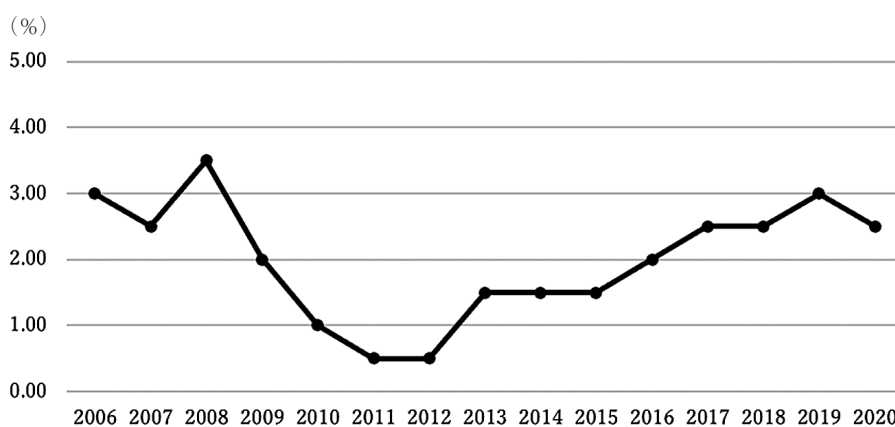


Figure 7. Trends in percentage of sleep-related questions on examinations for occupational therapists

and “sleep bruxism”.

Those that appeared most frequently on examinations for nurses referred to insomnia-related patient complaints. Terms related to sleep conditions, such as “sleep state” and “sleep time”, also appeared on the examinations for nurses, as did sleep terms used in clinical practice, such as “difficulty falling asleep”, “nocturnal arousals”, “early morning awakenings”, “unrefreshed sleep”, and terms related to sleep intervention and treatment. The examinations for public health nurses contained general sleep terms, such as “not sleeping well” and “sleeping”; the only medical term appearing on these examinations was “hypnotics”. Terms appearing on examinations for midwives referred to inability to sleep. Words related to sleep duration also appeared on these examinations, as did terms such as “newborn sleep” and “baby sleep”.

The terms appearing most frequently on examinations

for physical therapists and occupational therapists were sleep disorders. Terms related to sleep disorders that appeared on these examinations were similar to those on the examinations for doctors.

Discussion

Sleep management is an essential part of the care provided by medical professionals, including medicine, nursing, and occupational therapy (Morgan, 2003). Sleep-related questions appeared on the national examinations for medical professionals in different manners, according to specialty, as examined in this study. In most specialties, these differences reflect the curricula designed for the specialties (Nursing Department of MHLW, 2018). However, examinations for physical therapists and occupational therapists contained many sleep-related

Table 2. Sleep-related terms on national medical examinations

| | Medical Doctors | Dental Doctors | Nurse | Public Health Nurses | Midwives | Physical Therapist | Occu- pational Therapist |
|--|--------------------|-------------------|------------|----------------------------|-----------|-----------------------|--------------------------------|
| Total | 254 | 30 | 167 | 26 | 38 | 47 | 92 |
| Sleep disorders (disease) | 37 | 11 | 8 | 0 | 0 | 24 | 32 |
| Sleep disorders (in general) | 3 | 1 | 1 | | | | 8 |
| Insomnia (disorder) | 3 | | | | | | |
| Sleep apnea syndrome | 5 | 7 | 3 | | | 5 | 2 |
| Narcolepsy | 3 | | 1 | | | 4 | 7 |
| Circadian rhythm sleep-wake disorders | 5 | | 1 | | | 2 | 2 |
| Sleepwalking | 1 | | 2 | | | 3 | 3 |
| Sleep terrors | 5 | | | | | 1 | 2 |
| Sleep related eating disorder | 1 | | | | | 1 | 1 |
| REM sleep behavior disorder | 6 | | | | | 5 | 5 |
| Nightmare disorder | 1 | | | | | | |
| Restless legs syndrome | 4 | | | | | 3 | 2 |
| Bruxism | | 3 | | | | | |
| Sleep symptoms / complaints | 105 | 2 | 86 | 15 | 14 | 1 | 29 |
| Insomnia (in general as a symptom) | 20 | | 9 | 3 | | | 8 |
| Sleeping well | 3 | | 7 | 2 | | | |
| Not sleeping well / inability to sleep | 11 | | 20 | 6 | 11 | | 3 |
| Difficulty falling asleep | 6 | | 13 | | | | 1 |
| Nocturnal arousals / awakenings | 2 | | 6 | | | | 1 |
| Early morning awakenings / wake up too early | 2 | | 6 | | | 1 | 3 |
| Unrefreshed sleep / light sleep | 4 | | 4 | | 2 | | 1 |
| Nocturnal behavior / movement | 11 | | | | | | |
| Nightmare | 1 | | | | | | |
| Nocturnal delirium | 2 | | | | | | 2 |
| Nocturnal attack | 1 | | | | | | |
| Long sleep duration | 2 | | 1 | | | | 1 |
| Short sleep duration / insufficient sleep | 2 | | 2 | 2 | | | 1 |
| Disturbed sleep rhythm | 1 | 1 | 2 | | | | |
| Daytime sleepiness | 13 | | 7 | 1 | 1 | | 1 |
| Dozing | 7 | | 3 | 1 | | | |
| Daytime fatigue | | | 1 | | | | |
| Dreaming | | | 1 | | | | |
| Sleep apnea / breathlessness | 5 | | | | | | |
| Snoring | 4 | 1 | 3 | | | | |
| Cataplexy | | | | | | | 1 |
| Sleep paralysis | | | | | | | 1 |
| Restlessness of the legs | 5 | | | | | | 1 |
| Sleep anxiety / impatience | 1 | | 1 | | | | |
| Hyperarousal | | | | | | | 3 |
| Increased muscle tone | | | | | | | 1 |
| Nocturnal sweating | 1 | | | | | | |
| Palpitation | 1 | | | | | | |
| Sleep related terms | 23 | 12 | 43 | 8 | 19 | 19 | 26 |
| Sleep (in general) / physiological sleep | 3 | 1 | 2 | 2 | 2 | | 2 |
| Wake (in general) | 2 | 2 | | | 1 | 2 | |
| Wakefulness | | | | | | 7 | 4 |
| Sleep state / sleep cycle | | 3 | 2 | 1 | 1 | 1 | 5 |
| Sleep desire | | | 1 | | | | 1 |
| REM sleep | 3 | 1 | 7 | | 3 | 1 | 2 |
| Non-REM sleep | | | 2 | | 2 | | |
| Slow wave sleep / deep sleep | | 1 | | | 1 | | |
| Sleep duration | 1 | | 5 | 3 | 3 | | 3 |
| Sleep in adult | | | 1 | | | | |
| Sleep in newborn / baby / children | 2 | | 5 | | 4 | | |
| Sleep in elderly | 2 | | | | | | |
| Sleep position | | 1 | | | | | |
| Sleep diary | 1 | | | | | | |
| Nap | 1 | | 1 | | | | |
| Bedtime / sleep onset / going to bed | 2 | 1 | 10 | 1 | | 4 | 3 |
| During sleep / sleeping | 4 | 1 | 3 | 1 | 1 | 2 | 1 |
| Waketime | | 1 | 1 | | | 1 | 1 |
| Dream | | | | | | 1 | 3 |
| Hot drink before bedtime - bedtime routine | | | 1 | | | | |
| Melatonin | 1 | | 1 | | | | 1 |
| Circadian / sleep-wake rhythms / sleep cycle | 1 | | 2 | | 1 | | |

| | | | | | | | |
|--|-----------|----------|-----------|----------|----------|----------|----------|
| Sleep testings | 27 | 4 | 3 | 0 | 0 | 0 | 0 |
| Polysomnography | 8 | 1 | | | | | |
| Electroencephalogram (EEG) | 4 | | | | | | |
| Electromyogram (EMG) | 2 | | | | | | |
| Electrocardiogram (ECG) / heart rate | 1 | | 1 | | | | |
| Eye movement | 1 | | | | | | |
| Sleep stage | | 1 | | | | | |
| REM sleep | 2 | | | | | | |
| Non-REM sleep | 1 | | | | | | |
| Slow wave sleep | 2 | | 2 | | | | |
| Arousal index | | 1 | | | | | |
| Apnea hypopnea index | 3 | 1 | | | | | |
| Oxygen saturation | 2 | | | | | | |
| Blood pressure | 1 | | | | | | |
| Treatment | 9 | 1 | 0 | 0 | 0 | 0 | 0 |
| Continuous positive airway pressure (CPAP) | 8 | 1 | | | | | |
| Oral appliance | 1 | | | | | | |
| Medication | 19 | 0 | 13 | 1 | 3 | 3 | 5 |
| Hypnotics (in general) | 11 | | 13 | 1 | 3 | 1 | 4 |
| Anxiolytic | 2 | | | | | | |
| Benzodiazepines | 2 | | | | | 1 | 1 |
| Phenobarbital | | | | | | 1 | |
| Pramipexole | 1 | | | | | | |
| Clonazepam | 1 | | | | | | |
| Diazepam | 1 | | | | | | |
| Dopamine blocker | 1 | | | | | | |
| Care / Guidance for sleep hygiene | 34 | 0 | 14 | 2 | 1 | 0 | 0 |
| Promote sleep | | | 3 | | | | |
| Improve sleep | | | | 1 | | | |
| Body position | | | 1 | | | | |
| Sleep knowledge | | | | 1 | | | |
| Sleep assessment | | | | | 1 | | |
| Sleep education / instruction (in general) | 1 | | | | | | |
| Proper use of hypnotics | 3 | | | | | | |
| Keep necessary sleep duration | 1 | | 2 | | | | |
| Take breakfast | 1 | | | | | | |
| Get sunlight in the morning | 2 | | 2 | | | | |
| Taking bath before bedtime | | | 1 | | | | |
| Early to bed and early to rise | 2 | | | | | | |
| Go to bed at proper time | 5 | | | | | | |
| Wake up at proper time | 1 | | | | | | |
| Control of nap duration | 2 | | | | | | |
| Leave bed when unable to fall asleep | 1 | | 1 | | | | |
| Get out of bed in the morning | | | 2 | | | | |
| Avoid sleeping out of bed | 1 | | | | | | |
| Alcohol | 4 | | 1 | | | | |
| Coffee | 1 | | | | | | |
| Smoking | 1 | | | | | | |
| Reduce body weight | 2 | | | | | | |
| Read a book in the bed | 1 | | | | | | |
| Watch television | 1 | | | | | | |
| Avoid catch-up sleep | 1 | | 1 | | | | |
| Sleep position | 1 | | | | | | |
| Refreshed in the day with good sleep | 1 | | | | | | |
| Control of bedroom environment | 1 | | | | | | |
| Sleep environments | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

questions already 15 years ago, despite the lack of mention of sleep problems in the examination criteria.

The model core curricula and national examination criteria for medical professionals indicate that national examinations should contain questions on sleep-related issues. We found that different percentages of sleep-related questions were included in national medical examinations for various fields. This percentage of such questions increased over the past 15 years in some medical fields, but showed no clear trend in others, suggesting that national model core curricula and examination criteria do not affect consistent percentage of sleep-related questions. Year-to-year changes in the percentage of sleep-related questions may reflect the number of professionals for each year involved in question-posing who have some interest in sleep-related issues. Whether the observed percentages are sufficient is difficult to judge, as increasing numbers of issues need to be covered on the national medical examinations.

The National Health Promotion Movement in the 21st Century (Health Japan 21), established by the Ministry of Health, Labor and Welfare, emphasizes the importance of sleep habits and sleep disorders, with reference to “promoting physical and mental health by rest” (Health Japan 21 Committee, 2000). Medical professionals are in positions to educate patients and recommend that they get sufficient sleep to meet this goal. Although many questions need to be included in the national examinations, sleep is a basic function supporting health. More attention to sleep among medical professionals would benefit patient management.

Conclusion

The number of sleep-related questions on national medical examinations tended to increase over the past 15 years, but varied among medical fields and years. This study showed that clinically important sleep-related topics were covered on all examinations for all medical specialists. Further enhancement of sleep education in medical schools is expected.

References

Blunden SL, Chapman J, Rigney GA (2012) “Are sleep education programs successful? The case for improved and consistent research efforts” *Sleep Med Rev*;16(4):355-370
 Committee for Model Core Curriculum (2016a) “Model

core curriculum for medical education, 2016 Update edition” Ministry of Education, https://www.mext.go.jp/component/b_menu/shingi/toushin/_icsFiles/afieldfile/2017/06/28/1383961_01.pdf (2020.10.15, Japanese)

Committee for Model Core Curriculum (2016b) “Model core curriculum for dental education, 2016 Update edition” Ministry of Education, https://www.mext.go.jp/component/b_menu/shingi/toushin/_icsFiles/afieldfile/2017/12/26/1383961_02_3.pdf (2020.10.15, Japanese)

Dinges DF (2014) “The growth of sleep science and the role of SLEEP” *Sleep*;37(1):7-8.

Examination Department of MHLW (2016) “Physical therapist and occupational therapist national examination criteria, 2016 Version” Ministry of Health, Labor and Welfare, <https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000058636.html> (2020.10.15, Japanese)

Health Japan 21 Committee (2000) “National health promotion movement in the 21st century” Ministry of Health, Labor and Welfare, <https://www.mhlw.go.jp/file/06-Seisakujouhou-10900000-Kenkoukyoku/0000047221.pdf> (2020.10.15, Japanese)

Jones BE (2018) “The mysteries of sleep and waking unveiled by Michel Jouvet.” *Sleep Med* 49:14-19

Ministry of Health, Labor and Welfare website, <https://www.mhlw.go.jp/index.html> (2020.10.15, Japanese)

Morgan K (2003) “Sleep Management in Nursing Practice” Tokyo : Brain Publishing (Japanese)

Nursing Department of MHLW (2018) “Public health nurse, midwife and nurse national examination criteria, 2018 Version” Ministry of Health, Labor and Welfare, <https://www.mhlw.go.jp/file/04-Houdouhappyou-10803000-Iseikyoku-Ijika/0000158962.pdf> (2020.10.15, Japanese)