Sleep education for healthcare providers: Addressing deficient sleep in Australia and New Zealand

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Abstract

Deficient sleep has been recognized as a current health crisis in Australia and New Zealand, contributing to the increased prevalence and severity of chronic diseases and mental health issues. However, all healthcare disciplines currently receive limited training in addressing deficient sleep, which is contributing to the current health crisis. This narrative review considers: 1) the prevalence and burden of deficient sleep in Australia and New Zealand; 2) the limited sleep education in healthcare training programs; 3) healthcare providers lack of knowledge and evidence-based clinical practice in sleep disorders; 4) sleep-focused education initiatives for healthcare providers; 5) an action agenda for improved sleep education for healthcare providers. Both domestic and international sleep initiatives are considered, as is the role of general practitioners (primary care physicians), pediatricians, psychologists, pharmacists and nurses. Three key themes emerge and guide action: 1) relevant training for students from all healthcare disciplines; 2) continuing professional development for practicing healthcare providers; and 3) translation of evidence-driven best practice into clinical practice. To achieve this sleep education agenda, the sleep community must form and strengthen partnerships across professional associations, public health agencies and education providers. By improving education and clinical practice in sleep, we will equip healthcare providers with the knowledge and skills needed to address deficient sleep in Australia and New Zealand.

Keywords

Sleep; education; sleep disorders; physician education; training; healthcare

Introduction

Sleep is essential for every aspect of health and wellbeing. Deficient sleep, which includes not getting enough sleep, irregularly timed sleep, poor quality sleep, and/or sleep disorders,[1] impacts all aspects of functioning, including physical, emotional and occupational. Yet healthcare providers receive minimal sleep education during their formal training. For the purposes of this review, sleep education refers to education and training in sleep and circadian science, sleep health and the clinical assessment and management of sleep disturbances and disorders. Due to the lack of sleep education, healthcare providers start their careers without the sufficient knowledge or skills required for diagnosing and treating sleep issues, despite the availability of evidence-based treatments for different types of sleep problems.[2-4] Furthermore, low levels of sleep education contributes to the widespread misinformation about sleep health, causing unrealistic expectations and inadvertent distress for those whose sleep is not 'perfect'.[5] This review focuses on five front-line health care providers (general practitioners/primary care providers, paediatricians, psychologists, pharmacists, and nurses) and will highlight: 1) the prevalence and burden of deficient sleep in Australia and New Zealand; 2) the limited sleep education in healthcare training programs; 3) healthcare providers lack of knowledge and evidence-based clinical practice in sleep disorders; 4) sleep-focused education initiatives for healthcare providers; and 5) an action agenda for improved sleep education for healthcare providers. This agenda will help establish a sleep education strategy for healthcare providers, to ensure they have the essential skills to assess, educate, treat or refer, patients experiencing deficient sleep.

1.0 The prevalence and burden of deficient sleep in Australia and New Zealand

Deficient sleep is common and problematic. Between 33 and 45% of Australian adults experience inadequate sleep duration or poor sleep health, with deficient sleep contributing to daytime impairment and increased risk for physical and mental health problems over time.[6-8] The Sleep Health Foundations' National Survey has reported a decline in sleep quantity for Australian adults over the past decade, from 7.4 hours to 7 hours.[6-8] Seven hours is the lower limit of sleep duration recommended by the American

Academy of Sleep Medicine and the National Sleep Foundation. Strikingly, 12% of Australian adults reported a sleep duration of less than 5.5 hours, and 8% reported sleep durations greater than 9 hours.[6] Excess and insufficient sleep duration are both a form of sleep disturbance, and there is a U-shaped relationship for negative health outcomes associated with both.[9,10] Furthermore, 20% of Australian adults reported symptoms of insomnia, and 8% reported a physician diagnosis of obstructive sleep apnea (OSA). In turn, the economy is negatively impacted, with a recent estimation of the costs of inadequate sleep in Australia totaling $AU 66.3 billion (~$US 45.2 billion) for a population of 25 million Australians.[7] This is a substantially higher cost than other Australian national health priority areas, such as asthma (annual costs approximate $AU 27.9 billion[11,12]). Despite the significant problem of deficient sleep in Australia, it does not receive the same level of Commonwealth government funding as other national health priority areas, resulting in limited research, practice and training incentives.

In New Zealand, deficient sleep is also highly prevalent, with subsequent effects on daytime functioning and mental health. Approximately one-quarter of New Zealand adults suffer from a chronic sleep problem.[13] Of patients seen in New Zealand general practice clinics, questionnaires revealed that 41% reported difficulty sleeping for at least one month, 19% reported taking medication to assist with sleeping, and 9% reported symptoms of OSA.[14] People with sleep difficulties also commonly reported problems with daytime functioning, as well as mental health issues such as depression and anxiety.[14]

Indigenous people in Australia and New Zealand are disproportionately affected by sleep difficulties. Aboriginal and Torres Strait Islander Australians are 1.8 times more likely to be diagnosed with OSA than non-indigenous Australians.[15] In New Zealand, sleep concerns are higher in Māori vs non-Māori adults for difficulties falling asleep (36.5% vs. 28.7%)[13], and symptoms of insomnia with excessive daytime sleepiness (19.1% vs. 8.9%).[16] Both Māori and non-Māori older adults (>79 years old) experience high rates of current sleep problems (26.3% vs. 31.7%) that contribute to mental health, physical health and personal

safety risks.[17] Addressing sleep health disparities for indigenous populations is critical to reduce general health inequalities.[13]

Deficient sleep is common, yet is often inadequately assessed or treated by healthcare providers. Only one-third of individuals have ever discussed their sleep with a healthcare provider,[18,19] and providers do not routinely assess for sleep.[19-23] Insomnia, in particular, is poorly identified in primary health care. Prevalence figures suggest that ~20% of Australians experience insomnia,[6] however general practitioners only reported insomnia in 1.54 encounters per 100 patients nationally.[24] The lack of proper primary care sleep assessment and treatment can have significant consequences on patients. For example, treating insomnia with benzodiazepines can increase the risk of falls and worsen health outcomes in elderly patients.[25] Improving sleep education will help reduce the health burden of deficient sleep by improving sleep assessment and treatment practices of Australian and New Zealand healthcare providers.

2.0 Limited sleep education for healthcare providers during university/post-graduate training programs

Despite the expansion of academic sleep programs over the past 30 years, basic sleep education has not filtered down into training programs for primary healthcare providers who service the majority of people affected by deficient sleep. A narrative review search was undertaken to identify relevant studies of sleep education provided to healthcare providers (Table 1). An extensive search of targeted database, including PubMed, PsychINFO, MEDLINE and Google Scholar was conducted. Search terms included: sleep (sleep, sleep disorders, sleep history, sleep medicine); education (medical education, physician education, medical school, curriculum, education, training); and healthcare provider (healthcare, doctor, physician, psychologist, nurse, nurse practitioner, pharmacist, dentist). Reference lists of identified papers were also searched. In addition, discussions with colleagues yielded some additional papers not identified through database searches. Results are presented in Table1. Several worldwide studies included Australia and New Zealand data, but only one study was conducted solely in Australia and New Zealand.[26] There were few consistent outcome

variables between studies, as such, studies cannot be compared directly, but contribute to an overall picture of the state of sleep education for healthcare professionals.

Overall, the limited data on sleep education for healthcare providers has focused primarily on U.S.-based physician education.[27,28] In 1998, only 2.1 hours of sleep education was provided for medical students and 4.8 hours during residency/fellowship.[29] A more recent study of international medical schools found very little change, with an average of 3.1 hours for medical students in the U.S. and Canada.[30] In contrast, U.S. medical students receive 19 hours of nutrition education throughout medical school.[31]

Worldwide, sleep education in general medical curricula is similarly lacking, with the situation in New Zealand and Australia no exception. One international study that included Australian and New Zealand found that medical students only received an average of 2.5 hours of sleep education.[30] In 2013, The Royal Australian College of Physicians (RACP) acknowledged that a primary weakness of the current sleep medicine training in Australia and New Zealand was due to limited training posts that could provide comprehensive exposure to, and training in, sleep disorders; particularly non-respiratory sleep disorders.[32]

Sleep medicine coverage in medical textbooks is similarly deficient.[33] To date, there is still no standardized curriculum on sleep available in U.S. medical schools, despite the increased awareness of the role of sleep in health and disease.[34] Sleep education embedded within speciality disciplines, such as pediatrics and psychiatry, is similarly limited.[35,36] Notably, although most sleep programs are housed within neurology or pulmonary/critical care, these training programs include just over 5 hours of sleep education.[37,38] Together, the available research indicates a global paucity of sleep education and training for physicians.

Globally, information on sleep education within specific healthcare provider training programs is also scant. Although limited, international research across graduate clinical psychology,[39] nursing,[40] and dental programs[41] suggests low levels of sleep education similar to medical schools. Dental schools across Australia and New Zealand, however, reported an average of 4.8 hours of sleep education throughout an undergraduate dental

degree.[26] There is no data available on the amount of sleep education received by nursing or psychology students in Australia or New Zealand, however, it is likely similar to the low levels reported internationally.

The lack of sleep training across disciplines translates to a lack of sleep knowledge in healthcare students. Studies using sleep knowledge questionnaires (e.g., Assessing Sleep Knowledge in Medical Education [ASKME][42] and Dartmouth Sleep Knowledge and Attitude Survey[43]) consistently find limited sleep knowledge amongst nursing,[42,44] medical,[3,42,43,45-47] dental,[48] and pharmacy students.[49] This limited knowledge is directly related to the lack of standardised sleep education for all healthcare providers, and has significant implications for patient healthcare once the student has graduated.

Along with deficient patient-care related to sleep curriculum, healthcare providers are not taught the key skills to manage their own sleep health, particularly in high pressure and shift work environments, which can lead to burnout. For example, sleep deprived doctors[50] and nurses[51] make more medical errors, and are at an increased risk of car accidents on the drive home from work.[51] In addition, there is a high prevalence of insomnia and shift work disorder among healthcare shiftworkers.[52,53] Better sleep education may thus provide an opportunity to improve healthcare providers' sleep health and wellbeing, and reduce the risk of burnout.[54]

Table 1 *Sleep education provided across healthcare provider training programs*

Year	Authors	Country	Profession	Methods	Results	Barriers to sleep education
1980	Orr, Stahl, Dement, Reddington [27]	U.S.	Medical students	Formal inquiry sent to 116 medical schools • *N* = 91 • Response rate = 78%	• 46% of medical schools offered no formal education in sleep physiology or sleep disorders	• Not outlined
1993	Rosen, Rosekind, Rosevear, Cole, Dement [28]	U.S.	Medical students • Clinical clerkship • Pre-clinical programs	National survey mailed to the deans of 126 accredited medical schools (685 surveys sent). • *N*= 545 • Response rate (adjusted) = 82.6%	• Received < *M* = 2 hours teaching in sleep and sleep disorders on average • 29% (37/126) of schools provided no structured teaching training at all	• Unavailability of qualified faculty • Lack of curriculum time • Need for additional clinical and educational resources
1998	Rosen, Mahowald, Chesson, Doghramji, Goldberg, Moline, Millman, Zammit, Mark, Dement [29]	U.S.	Medical students and residents/ fellows	Two surveys: 1) A five-item postcard survey was mailed to American Sleep Disorders Association and Sleep Research Society members (3100 surveys sent)	• *M* = 2.1 hours of sleep education during medical school • *M* = 4.8 hours during residency/fellowship training	• Lack of time in medical curriculum • Better resources and teaching facilities for sleep required

Table 1. *Continued*

Year	Authors	Country	Profession	Methods	Results	Barriers to sleep education
				• *N* = 808 • Response rate = 26.1% 2) A 34-item survey was then sent to individuals involved in medical school teaching (508 surveys sent) • *N* = 158 • Response rate = 32.2%		
1998	Stores, Crawford [55]	U.K.	Medical students • Preclinical • Clinical courses	Questionnaire survey was sent to medical school organisers of preclinical and clinical courses • *N* = 179 • Response rate (adjusted) = 71%	• *Mdn* = 5 minutes of sleep education for undergraduate teaching • *Mdn* = 15 minutes of sleep education for pre-clinical teaching	• Lack of time in curriculum • Sleep not considered a core subject • Insufficient teaching expertise
2009	Meltzer, Phillips, Mindell [39]	U.S.	Graduate clinical psychology students	Email survey sent to 715 directors of clinical psychology training and internship directors • *N* = 212 completed	• Only 6% of programs (*n* = 12) offered formal didactic courses in sleep • Only 31% of programs offered any	• Not outlined

Table 1. *Continued*

Year	Authors	Country	Profession	Methods	Results	Barriers to sleep education
				• Response rate = 30%	training in the treatment of sleep disorders	
2011	Mindell, Bartle, Wahab, Ahn, Ramamurthy, Huong, Kohyama, Ruangdaraganon, Sekartini, Teng, Goh [30]	Worldwide (including Australia and NZ)	Medical students	Survey sent to the dean's office of 409 medical schools • *N* = 106 • Response rate = 25.9%	• *M* = 2.43 hours of formal sleep education was provided internationally during medical training programs • Australia had the highest amount of sleep education of all countries included (*M* = 6.15 hours) • New Zealand reported *M* = 2.75 hours of sleep education	• Insufficient time • Lack of qualified staff • Lack of resources • Low priority
2011	Simmons, Pullinger [41]	U.S.	Dental students • Pre-Doctoral	Survey sent to all 58 US dental schools • *N* = 49 • Response rate = 87.5%	• *M* = 3.92 hours (SD ± 3.39) of teaching time in sleep for the 37 schools that responded to this question (*M* = 2.96 across all schools)	• Not outlined
2012	Urquhart, Orme,	U.K.	Medical	Semi-structured questionnaire	• *Mdn* = 2.5 hours (Range 1 - 4.3	• Time constraints

Table 1. *Continued*

Year	Authors	Country	Profession	Methods	Results	Barriers to sleep education
	Suresh [56]		students	emailed to all undergraduate Deans (30) of UK medical schools • N = 17 • Response rate = 57%	hours) of sleep teaching for undergraduate medical programs	• Lack of qualified faculty
2013	Almohaya, Qrmli, Almagal, Alamri, Bahammam, Al-Enizi, Alanazi, Almeneessier, Sharif, BaHammam [45]	Saudi Arabia	Medical students	Two surveys: 1) Medical students were surveyed (sent to 480) on their sleep knowledge using the ASKME survey • *N* = 348 • Response rate = 72.5% 2) Organisers of medical courses (survey sent to 7 schools) • *N* = 5 • Response rate = 71%	• Only 4.6% of students correctly answered ≥ 60% of the ASKME questions • More than 80% of the study sample rated their sleep medicine knowledge as below average • *M* = 2.6 hours (range 0-8) of sleep medicine education advised by course organisers	• Low priority in curriculum • Time constraints

Table 1. *Continued*

Year	Authors	Country	Profession	Methods	Results	Barriers to sleep education
2013	Mindell, Bartle, Ahn, Ramamurthy, Huong, Kohyama, Li, Ruangdaraganon, Sekartini, Teng [35]	Worldwide (including Australia and NZ)	Pediatric residency programs	Survey sent to 865 directors of pediatric residency programs • *N* = 152 • Response rate = 17.4%	• *M* = 4.4 hours (range 0 - 6.15 hours) of sleep education was delivered to pediatric residency programs • 23% of pediatrics programs worldwide offering no formal sleep training	• Lack of qualified staff • Insufficient time • Lower priority • Lack of resources • Lack of perceived relevance
2013	Avidan, Vaughn, Silber [38]	U.S.	Neurology	Online survey to 126 neurology residency training program directors • *N*= 58 • Response rate = 46%	• *M* = 5.2 hours (range 0 – 48) of didactic lectures of sleep • 81% listed a formal sleep rotation	Not outlined
2015	Talaat, AlRozzi, Kawas [48]	Middle East	Dental students	A cross sectional survey was administered to 51 undergraduate medical schools: • *N* = 39 • Response rate = 76%	• *M* = 1.2 hours of sleep education was reported by dental schools	Not outlined
2017	Khawaja, Dickmann, Hurwitz, Thuras, Feinstein,	U.S.	Psychiatry residents	Survey administered to 39 chief residents of psychiatry residency training programs	• 34% of psychiatry programs offer elective sleep medicine rotations • 89.5% of programs offered didactics	Not outlined

Table 1. *Continued*

Year	Authors	Country	Profession	Methods	Results	Barriers to sleep education
	Douglass, Lee [36]			• *N* = 39 • Survey response rate = 100%	in sleep medicine	
2017	Sullivan, Cao [37]	U.S.	Pulmonary and Critical Care Fellowships (PCC)	Online survey to 142 PCC program directors • *N* = 66 • Survey response = 46.5%	• 56% of programs offered at least 5 hours of sleep medicine didactics per year • 31.8% of programs reported ≥ 10 formal hours of sleep medicine didactics per year • 84% offering a formal sleep medicine elective	Not outlined
2019	Gellerstedt, Medin, Kumlin, Rydell Karlsson [40]	Sweden	Nursing	Quantitative data relating to sleep education provided was obtained from program and course syllabuses and intended learning outcomes. Four universities were approached. • *N* = 3 courses	• The word ‘sleep’ was not identified in any of the three nursing programs or course syllabuses. • The word ‘sleep’ was mentioned more in learning outcomes than in syllabuses • Only 38% of students reported	Not outlined

Table 1. *Continued*

Year	Authors	Country	Profession	Methods	Results	Barriers to sleep education
				• Response rate = 75% Qualitative data was also collected from student nurses about their *perceptions of sleep education* • *N* = 21	receiving a lecture about sleep • No students reported receiving education about the assessment of sleep	
2019	May, Romiszewski, Norris, Miller, Zeman [57]	U.K.	Medical students	Cross-sectional survey administered to 34 medical degree courses. • *N* = 25 • Response rate = 74%	• *Mdn* = 1.5 hours was devoted to sleep medicine	Not outlined

3. Healthcare providers lack knowledge and evidence-based practice in sleep

Since healthcare providers around the world receive limited sleep education, we examined the literature on healthcare providers' knowledge and evidence-based practices in sleep. Although not a comprehensive list of disciplines, this review focused on general practitioners (GPs)/primary care providers (PCPs), pediatricians, psychologists, pharmacists and nurses as these are the most common front line patient-care providers. This section outlines the state of knowledge and evidence-based practice in sleep across healthcare professionals around the world, with the limited Australian and New Zealand data incorporated where available.

3.1. General Practitioners/Primary Care Providers

The GP/PCP workforce has variable training, experience, and skills in sleep disorder assessment and management. It is estimated that up to 60% of primary care patients experience sleep disturbances, yet due to the limited training of GP/PCP's, many patients remain undiagnosed and undertreated.[4,58] Surveys of PCPs in the U.S. and GPs in Australia have found poor to fair sleep knowledge,[3,59,60] and indicate that these practitioners rarely enquire about sleep problems.[3,61] Primary healthcare professionals may therefore underappreciate the importance of identifying and treating sleep disturbances, perhaps due to a lack of knowledge or confidence in their ability to provide treatment recommendations if sleep problems are revealed.

Although insomnia is a common presenting complaint in primary care,[14,58] barriers to the management of insomnia in the general practice setting in Australia exist. These barriers include a lack of perceived expert support, insufficient time to manage insomnia during short consultations, limited knowledge about current evidence-based treatments for insomnia, and financial disincentives from the fee-for-service structure in Australia.[60,62] These barriers result in Australian GPs prescribing pharmacotherapy to 90% of patients presenting with insomnia.[24] Yet cognitive behavioral therapy for insomnia (CBT-I) is the first-line treatment recommended for insomnia, with pharmacotherapy use recommended only as a short-duration adjunct to CBT-I.[24,63] Data from a national GP activity monitoring database found

that only 20% of patients who presented with insomnia received non-pharmacological advice, and only 1% were referred to a psychologist, sleep clinic or counselling service for specialised management.[24] Similarly in the U.K., GP's rarely refer insomnia patients for CBT-I; with pharmacotherapy prescriptions common and issued in response to real or perceived patient pressure or as an empathetic action.[64] While in the U.S., insomnia in primary care is similarly mismanaged.[65] The lack of formal training or education in sleep along with time limitations for GP/PCP visits, likely inhibits providers from implementing current evidence-based guidelines for the management of sleep disorders.

3.2. Pediatrics

Over the past 25 years, studies around the world have shown little improvement in pediatricians' knowledge and practice of sleep.[66-69] In 1994, pediatricians' knowledge was highest for developmental aspects of sleep and sleep hygiene, and lowest for parasomnias and narcolepsy, with almost 50% of providers telling parents that children would "outgrow" sleep problems.[66] In 2001, only 26% of pediatricians reported routinely inquiring about snoring in a child with secondary enuresis, 29% never referred snoring patients to a sleep clinic, and 53% rarely or never ordered an overnight sleep study.[67] Child neuropsychiatrists and pediatricians in Italy reported limited knowledge about sleep and sleep disorders in 2004, often telling families the child would outgrow the sleep problem, recommending interventions that potentially exacerbated child sleep problems, and/or prescribing medications to treat childhood sleep problems despite evidence suggesting limited usefulness.[70]

By 2011, only 18% of practicing pediatricians in the U.S. reported receiving any formal training in sleep disorders, with only 19% answering more than half of eight sleep knowledge questions correctly.[68] Importantly, despite the American Academy of Pediatrics' 2002 recommendation that all children should be screened for snoring,[71] only 55% of providers regularly asked about children's snoring and only 42% regularly asked adolescent snoring. In both the U.S. and Australia, data suggest that parents rarely raise sleep issues

with their health care provider,[19,72] which highlights the necessity of provider training for the assessment of sleep issues in pediatrics.

Canadian pediatric healthcare providers similarly reported low levels of sleep disorder literacy. In 2017, only 3% of providers reported receiving any formal training in pediatric sleep, with almost 1/3 of providers reporting delivering incorrect advice for behavioural sleep problems that could actually worsen sleep problems.[69] A recent Canadian review also demonstrates that sleep training for pediatric healthcare providers is limited and highly variable.[73] Together, these studies clearly show the need for more sleep education to improve sleep knowledge and skills of pediatric healthcare professionals.

3.3. Psychologists

There is no available research in Australia or New Zealand about the sleep knowledge and skills of psychologists in clinical practice. However, data form the U.K. suggests that limited sleep knowledge is an issue amongst practicing counselling psychologists.[74] Despite 95% of clients reporting some form of sleep disturbance, psychologists reported significant gaps in their knowledge about sleep, with some using evidence-based treatments while others delivered advice and interventions to clients based on media representations and “lay beliefs” about sleep.[74] Such inconsistent sleep knowledge amongst counselling psychologists in the U.K. is likely to be similar in other specialties of psychology (e.g., clinical psychology, organizational psychology, etc.) and around the world; however, there is little research in this area.[75]

3.4 Pharmacists

Pharmacists also require improved sleep knowledge and clinical skills. In 2007, an Australian study aimed to map the knowledge of undergraduate pharmacy students, pharmacists providing sleep health services (namely CPAP device provision for OSA) and those not providing sleep health services.[49] The survey highlighted that practicing pharmacists, whether they were providing sleep services or not, had similar low scores (~50%), suggesting a lack of specialised sleep knowledge. In a study where a simulated patient with acute insomnia was presented to 100 pharmacies in Sydney, Australia, 42% of

pharmacists provided non-pharmacological advice and 96% supplied a product; of those, 31% of the products were herbal supplements for which evidence is insufficient.[76] As pharmacists may often be the front-line healthcare provider for patients with insomnia or other sleep issues, increased sleep knowledge and training for pharmacists is also essential.

3.5 Nurses

A lack of sleep expertise is an issue for nurses. One of the most overlooked aspects of nursing and shift work is enabling individuals to understand and give sleep care to themselves' and then to support their patients. Fatigue and stress levels in nurses are generally high and the transition from being a student to managing sleep in the first three years post-graduation is associated with a pronounced short-term decline in sleep quality.[77] Managing patients sleep in high stress environments, such working in critical care on night shifts, is an additional problem. A Canadian study showed that critical care nurses had limited sleep knowledge and ability to change the critical care environment to improve patients sleep.[78] Additionally, studies in Norway,[79] Australia[80], and around the world[81] highlighted that despite intensive care nurses having an overall general awareness of the importance of sleep and positive attitudes towards helping to promote patient sleep, a lack of knowledge, as well as the pressures of caring for critically ill patients, limited their ability to deliver evidence-based sleep-promoting interventions.

Although two-thirds of U.S.-based pediatric advanced practice nurses regularly screened for sleep problems in infants/toddlers, only one-third regularly screened for sleep problems in school-aged children or adolescents.[82] Further, less than 13% of nurse practitioners felt confident in evaluating or managing pediatric sleep disorders, including OSA, restless legs syndrome, circadian rhythm sleep-wake disorder, parasomnias or narcolepsy. Taken together, nurses working across different age groups and settings report limited sleep expertise.

4.0 Sleep Initiatives for Healthcare Providers in Australia and New Zealand

Education initiatives developed to improve the sleep knowledge and skills of Australian and New Zealand healthcare providers are outlined in Table 2. Sleep initiative up-

take and outcome data are presented where available. While there may be more sleep education initiatives across Australia and New Zealand than those tabulated, there is a lack of published research and advertised training programs. Several crucial international sleep initiatives for healthcare providers and students are also discussed

4.1 General practitioners /Primary Care Physicians

GP/PCP research has recently focused on providing brief, accessible interventions for insomnia (e.g., sleep restriction therapy)[83,84] and increased screening and treatment of OSA.[85,86] For insomnia, the focus on brief interventions ensues from time constraints (e.g., 15 minute consultations for GPs), financial constraints (e.g., incentives to see a greater number of patients in Australia, patient co-payments for GP consultations in New Zealand), high patient-to-GP ratios, costs to the healthcare system, and the lack of priority for treating insomnia in general practice.[60,62,87]

GP/PCP management is essential to increase the number of patients assessed and treated for OSA. Importantly, in Australia OSA management in primary care has been found comparable to specialist sleep centre management.[86] The establishment of a community-based service for common sleep disorders in New Zealand has provided increased access to sleep disorder assessment and management with shorter wait times for patients.[85]

Training resources such as 'On the Spot Management Guides' and online learning modules have also been developed to educate GPs about sleep in Australia and New Zealand; however, a comprehensive training programme is still lacking for all GPs and practice nurses interested in up-skilling in the evaluation and treatment of deficient sleep.

4.2 Pediatricians

There are no accreditation guidelines for the delivery of tertiary education in sleep health for pediatric healthcare providers, so individual pediatric training programs have implemented their own sleep education and resources (Table 2). For example, Flinders University (South Australia) has advocated for the federal government to identify and implement national, best-practice healthcare provider training in pediatric sleep, and to extend this training to secondary school teachers.[88] In addition, the Royal Children's Hospital

Melbourne, Murdoch Children's Research Institute, and Sensible Sleep Solutions have created professional development workshops and online training courses for healthcare professionals in pediatric sleep.

To date, there is no clear consensus of what constitutes best-practice resources for treating pediatric sleep disorders in Australia and New Zealand.[88] However, a recently completed, large translational trial in Australia examined the efficacy and cost-effectiveness of training pediatricians and child psychologists in a brief behavioral sleep intervention for children with attention-deficit/hyperactivity disorder [89] This cost-effective, 3.5 hour training program was successfully delivered to pediatricians and psychologists, and resulted in notable improvements in patient sleep for up to 3 months.[90]

4.3 Psychologists

Psychologists are extensively trained in the management of mental health conditions and health behaviour change, and are therefore well placed to deliver sleep interventions. Medicare-subsidised psychological assistance is available in Australia under the "Better Access" Medicare Initiative. This program entitles eligible patients up to 10 rebated psychology sessions per calendar year for people with a diagnosed (ICD-10) mental illness, which includes sleep disturbances.[91] Yet, there are no data available on the skill level of psychologists in Australia to address and manage sleep problems. An online practice certificate in sleep psychology has been developed to up-skill psychologists in the assessment and management of sleep disorders; however, greater uptake is required (Table 2). The Australasian Sleep Association (ASA) has established a Behavioural Management of Sleep Disorders Education (BMSD) Sub-Committee to increase healthcare provider training in behavioural management approaches for sleep disorders, with an emphasis on training psychologists.

In New Zealand, there is a dearth of sleep education and training for psychologists. Members of the ASA and New Zealand Sleep Health Foundation are currently in discussions with universities to provide appropriate professional development opportunities for psychologists in sleep. Additionally, researchers from Massey University recently completed

a study investigating perceptions, skills, and knowledge of sleep-related difficulties and treatment approaches in a cancer psychosocial workforce and found that self-reported feelings of confidence, skills or qualifications in sleep assessment and treatment were low.[92]

International research also shows promising trends for increasing sleep education for psychologists to improve their knowledge and skills. A roll-out of CBT-I training to non-sleep specialist mental health providers in the U.S. Veterans Health Administration has demonstrated excellent results.[93] Of 598 mental health providers who had completed the CBT-I training in 2016, 92% met CBT-I competency post-training, with associated reductions of insomnia severity in veterans treated by these trained providers.

4.4 Pharmacists

Community pharmacists are one of the most accessible healthcare providers, and as such, they deal with many sleep complaints. Australian pharmacists have been at the forefront of trialling various health service models including screening for sleep disorders,[94] audits of pharmacy housed OSA services,[95,96] and behavioural treatment for insomnia[97] (Table 2). Globally, Australian community pharmacists have been lauded as the first to recognise the need for a sleep health-related service provision, and participate in academic and commercially driven research to address sleep health in the community.[98]

4.5 Nurses

There is a definitive need to have nurses trained in sleep assessment and management, particularly for people in rural and remote areas of Australia and New Zealand who have limited access to health resources. Research supports nurse-led management for OSA in Australia[99] and New Zealand,[85] along with the clinical effectiveness of nurse-delivered CBT-I groups and other behavioural interventions for insomnia.[100,101] In regional New South Wales, a recent pilot RCT of insomnia treatment delivered by nurses in general practice (in combination with interventions for cardiovascular disease and diabetes), demonstrated encouraging results.[102] The supportive, team-based approach of the GPs and nurses in the practice setting was key to the program's success. Further, as a result of practice nurses' enthusiasm and commitment, program delivery was able to continue even

after the research study was completed. This contrasts with other studies, where it has been reported that program dissemination stops once research is completed, typically due to funding constraints.[100]

4.6 Students

Several international sleep education initiatives targeting healthcare students are noteworthy. A self-paced, online sleep education module, delivered to medical students at John Hopkins University, led to significant increases in sleep knowledge compared to an online 'sham' education control condition.[46] Similarly, an online sleep psychology course for graduate students in the U.S. improved knowledge about sleep, enhanced awareness of the import of sleep within the curriculum, and resulted in more confidence in treating/referring relevant patients, compared to a matched control group.[103] Doctoral level nursing students also showed increased knowledge of sleep disorders and sleep health promotion strategies after participating in a sleep training session.[104] Combined with Australian research for pharmacy students,[49,105] these studies show that sleep training for medical, psychology, pharmacy and nursing students increases sleep knowledge, which may translate to better clinical practice for healthcare providers post-graduation, although long-term follow-up studies are required.

Several graduate degrees have been established to train healthcare providers in sleep. In Australia, three sleep-focused degrees are available at The University of Western Australia (Graduate Certificate in Adult Sleep Science, Graduate Diploma in Sleep Science, and Graduate Diploma in Dental Sleep Science), with 168 students graduating from these programs since 2010 (personal communication, Peter Eastwood). Additionally, the University of Sydney offers both short courses and graduate degrees in sleep for both medicine (e.g., Master of Medicine (Sleep Medicine)) and science graduates (e.g., Graduate Diploma in Science in Medicine (Sleep Medicine). Internationally, the Sleep and Circadian Neuroscience Institute (SCNi) at the University of Oxford in the U.K. offers an online Post-Graduate Diploma and Master of Science in Sleep Medicine. In addition, the Society of Behavioral Sleep Medicine (SBSM) in the U.S. offers accreditation to graduate, internship

and post-doctoral university programs providing extensive training in behavioural sleep medicine, along with a professional certification for behavioral sleep medicine healthcare providers. However, despite the availability of these training and accreditation programs, accessibility may be limited due to financial and time barriers of healthcare providers.

Table 2. Sleep education initiatives and research for healthcare providers across Australia and New Zealand

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
General Practitioners (Primary Care Physicians)	Effectiveness of a GP-delivered, modified version of sleep restriction	Research • Falloon, Elley, Fernando, Lee, Arroll [83]	Compared a GP-delivered simplified sleep restriction therapy intervention (*N* = 46) to sleep hygiene(*N* = 51)	Six months after the intervention the SSR protocol significantly improved: • Insomnia symptoms (Insomnia Severity Index; ISI; *p*=0.001); • Sleep quality (Pittsburgh Sleep Quality Index; PSQI; *p*<0.001), • Sleep efficiency measured by actigraphy (*p*=0.006) • Fatigue (p=0.04). SSR produced higher rates of defined treatment response compared to control (67%	Information from this research has been incorporated into the Auckland Region Health Pathways insomnia pathway. Health Pathways is a web-based information portal supporting primary care clinicians at 'point of care' to plan patient care through primary, community and secondary health care systems. The SSR model has also been incorporated into Best Practice Advocacy

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
				versus 41%).	Centre (BPAC) insomnia management publications.
	The Goodfellow Unit training resources on sleep	University/Professional Body • Goodfellow Unit at The University of Auckland	• Development of eLearning modules, webinar and podcasts relating to sleep, including insomnia, sleep-disordered breathing, sleep and pain. The content also emphasises links to the Australasian Sleep Association resources.	Online content available at: https://www.goodfellowunit.org/	To increase access to free sleep-related content for general practice and primary health care
	Primary Care vs Specialist Sleep Center Management of Obstructive Sleep Apnea and Daytime Sleepiness	Research • Chai-Coetzer, Antic, Rowland, Reed, Esterman, Catcheside,	• This study compared primary care vs. specialist sleep centre assessment and management of OSA	Epworth Sleepiness Scale (ESS) scores significantly improved from baseline to 6-months post treatment in both primary care and specialist	To continue increasing access to OSA assessment and management in primary care practice in Australia

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
	and Quality of Life: A Randomized Trial.	Eckermann, Vowles, Williams, Dunn, McEvoy [86]	with regards to clinical efficacy and costs • Randomised controlled non-inferiority trial design: ○ 155 patients with OSA ○ 81 primary care practices around Australia	sleep centre groups • The mean change in ESS scores for primary care vs specialist sleep centre (5.8 vs 5.4: adjusted difference, −0.13; lower bound of 1-sided 95% CI, −1.5; *P* = .43) indicated that primary care management of OSA was non-inferior to specialist sleep centre management of OSA	
	Development and outcomes of a primary care-based sleep assessment service in Canterbury, New Zealand.	Research and community • Epton, Kelly, Shand, Powell, Jones, McGeoch, Hlavac [85]	A community sleep assessment service was established in Canterbury, New Zealand	Assessment numbers of sleep disorder patients have increased as a result of the community centre implementation (~400 in 2007 vs. 1400 in 2015)	The community sleep service aims to continue its growth, with 1597 sleep assessments occurring in 2018 (Michael Epton, personal

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
			• General practitioners and practice nurses were trained to use a standardised sleep assessment tool and overnight oximetry to assess sleep disorders	Shorter sleep assessment and treatment wait times have been recorded (especially for severe OSA)	communication)
	GP Education sub-committee of Australasian Sleep Association	Professional Body • Australasian Sleep Association	• This committee is focused on increasing training regarding the management of sleep disorders in the general practice setting. • Committee members are involved in development of resources designed to	Development of “on-the-spot management” guides for GPs about sleep disturbances. Resources available at: https://www.sleep.org.au Uptake or usage of these resources or their impact has not been tested Creation of online learning modules by the ASA in conjunction Royal Australian	The committee will continue their advocacy work, collaborating with a professional bodies to promote training and education in sleep for GP’s

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
			reduce the burden of seeking relevant, reliable and evidence-based information about sleep disturbances • The subcommittee also works to facilitate GP education through presentations at major conferences across Australia and New Zealand	College of General Physicians (RACGP). The online training is hosted on RACGP website (GP Learning https://gplearning.racgp.org.au) There are learning modules on OSA, insomnia, paediatric sleep (1 hour each, accredited Continuing Medical Education (CME)) There were approximately 600 completions in 2018.	
Pediatricians	Extensive training of provisional and registered psychologists in the assessment and treatment of pediatric sleep disorders	University • Flinders University in South Australia[88]	Training provided through Master of Psychology degrees as well as delivery of professional training workshops	Since 2007 the University has provided 32 training workshops around Australia to more than 1,100 health professionals in assessing and managing pediatric sleep	Flinders University have advocated for the federal government to identify and implement national, best-practice healthcare provider training in

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
				disorders	pediatric sleep, and to extend this training to secondary school teachers.
	Impact of a behavioral intervention, delivered by pediatricians or psychologists, on sleep problems in children with ADHD: a cluster-randomized, translational trial	Research • Hiscock, Mulraney, Heussler, Rinehart, Schuster, Grobler, Gold, Bohingamu Mudiyanselage, Hayes, Sciberras [90]	• This Australian trial randomly allocated half of the pediatric healthcare providers to receive sleep intervention training. The control condition was usual care. • Participating child psychologists (N = 40, with 27 receiving participants) were provided with 3.5 hours of training.	• The proportion of children with moderate to severe sleep problems was lower in the intervention group compared to usual care at 3 months (28.0% vs 55.4; p < .001) and 6 months (35.8% vs 60.1%; p < .001) • Children in the intervention group had improvements across multiple Children's Sleep Habits Questionnaire subscales	Investigating whether outcomes could be improved if the sleep intervention was tailored to the specific needs of children with ADHD and autism Investigating whether results improve if clinicians are provided with more supervision by experienced sleep professionals Understanding how best to enhance family uptake of the full intervention.

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions

			• 361 children participated in the study
			  ○ *N* = 183 in the intervention group
			  ○ *N = 178* in usual care group
				• No benefits of the intervention were observed in other domains	

	An international survey of sleep interventions delivered by pediatric professionals consulted for autism	Research • Personal communication: Karyn France and Laurie Mclay from The University of Canterbury	• An international survey of sleep interventions delivered by pediatric professionals consulted for autism has recently been conducted by the University of	• Preliminary results indicate little pattern/consistency of sleep interventions delivered by pediatric professionals consulted for autism	This research may highlight the need for further sleep training in pediatric professionals working with patients with autism

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
			Canterbury		
	Creation of online programs and professional development workshops for infant and child sleep	Research/education • Murdoch Childrens Research Institute • Sensible Sleep Solutions • Royal Childrens Hospital Melbourne	• An 1-hour online 'Infant Sleep eLearning Program' was developed by Murdoch Children's Research Institute • Professor Sarah Blunden from Sensible Sleep Solutions created the Gentle Methods of Sleep Settling (GeMSS) sleep intervention-training system • Face-to-face and online professional development workshops at the	• The Infant Sleep eLearning Program o https://mcri.learnupon.com/store/35721-infant-sleep-elearning-program?tab=1 o Healthcare providers who completing/passing the Infant Sleep eLearning Program, receive an Infant Sleep Certificate • The Gentle Methods of Sleep Settling (GeMSS) sleep intervention-training system o https://sensiblesleep.com/course/blunden-	To continue delivering high quality education on infant and child sleep to healthcare providers

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
			Royal Childrens Hospital Melbourne provides education for healthcare professionals in children's sleep and safe sleep practices	responsive-gemss-method/ • The Royal Childrens Hospital Melbourne runs face-to-face professional development workshops understanding children's sleep from birth to five years is run several times a year • Affordable online training in understanding sleep and safe sleep practices in early childhood education and care has been created https://www.rch.org.au/cch/training-dev/Understanding_sleep_and_safe_sleep_practic	

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
				es_in_early_childhood_education_and_care/ No current data was available to the authors regarding program uptake for these pediatric sleep training resources	
Psychologists	Medicare “Better Access” Initiative	Government • Australian Government	• The Medicare “Better Access” Initiative entitles patients with an ICD-10 diagnosis of a mental illness (of which sleep disturbance is included) to 10 rebated psychology sessions per calendar year	No current data on the number of Australians accessing the scheme to treat sleep disorders	Better Access Initiative is currently under review, and submissions have been made to encourage government to support providers to make psychology referrals for sleep disorder treatment
	Development of the Australian Psychological	Professional body • Collaboration between	A four-module practice certificate was	• 121 healthcare providers in Australia	The APS Practice Certificate in Sleep

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
	Society (APS) Practice Certificate in Sleep Psychology	the APS and Australasian Sleep Association	developed with modules covering basics about sleep, insomnia, circadian rhythm disorders, and CPAP adherence • The Practice Certificate provides continuing professional development (CPD) points to psychologists	(predominantly psychologists) completed all four modules that form the practice certificate between 2013 to 2018 (personal communication, APS Institute and Hailey Meaklim)	Psychology is currently under review to increase engagement with psychologists in clinical practice
	Investigating a pilot sleep psychology training program delivered to Master of Psychology students in Australia	Research • Meaklim, Junge, Rehm, Monfries, Kennedy, Bucks, Meltzer, Jackson [106]	• A 6-hour sleep psychology workshop was developed by a group of psychologists with	• Initial pilot study with *N* = 11 students completing a Master of Clinical Psychology program at RMIT University. • Students' significantly	A larger trial of the sleep psychology workshop training is underway at other universities around Australia

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
			expertise in sleep and clinical psychology.	improved their sleep psychology knowledge over the course of the workshop (*p* = .009), with scores on a custom designed sleep psychology knowledge quiz increasing from 59% to 74% post-workshop	
	Behavioral Management of Sleep Disorders (BMSD) sub-committee of Australasian Sleep Association educational initiatives	Professional Body • Australasian Sleep Association	The BMSD is currently driving initiatives to increase healthcare provider training in behavioural management approaches for sleep disorders, with an emphasis on training psychologists	• These initiatives include sub-committee members attending psychology conferences in Australia to deliver presentations on sleep and circadian rhythm disorder management – e.g., APS Congress 2018, APS Clinical Conference 2019	Advocacy work will continue

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
				• Submission written to the Productivity Commission into Mental Health advising on the importance of treatment sleep disorders[107]	
	Perceptions, skills, and knowledge of sleep-related difficulties and their treatment in a cancer psychosocial workforce	Research • Sweeney, Wu [92]	• An online survey was conducted within a New Zealand-based psychosocial cancer support service (*N* = 31), enquiring about workers perceptions, skills and knowledge of sleep-related difficulties, assessment and management practices	• Participants reported *M* ≤ 4 hours of sleep education (Range 2-30 hours) • 68% of respondents reported feeling competent to screen for sleep difficulties • Self-reported feelings of confidence, skills or qualifications in sleep assessment and treatment were low (≤50%) • There was limited use of standardised sleep-	Future work will hopefully lead to the development and provision of sleep resources for both patients and workforce

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
				assessment measures by this workforce • The most common sleep-related interventions used were sleep hygiene (85%) and relaxation (75%) were the, whereas CBT-I (recommended first line treatment for insomnia) was less common (30%).	
Pharmacists	Development of specialised lectures on insomnia, sleep apnea, sleep pharmacology, and workshops that cover competencies of using devices like CPAP for pharmacy students	University • Tze-Min Ang, Saini, Wong [49]	A survey using two validated sleep knowledge and attitudes instruments (Dartmouth and ASKME survey) showed limited sleep knowledge amongst undergraduate pharmacy students (as well as practicing	Positive feedback from students about the usefulness of the specialized sleep lectures was received.	Specialised sleep lectures retained in current BPharm curriculum

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
			pharmacists). This needs analysis led to the development of specialised sleep lectures developed for undergraduate pharmacy students at The University of Sydney		
	Development of a comprehensive chronobiology workshop for final year undergraduate pharmacy students	Research and University • University of Sydney • Kaur, Phillips, Wong, Saini [105]	• A comprehensive workshop on chronotherapy was developed for final year undergraduate pharmacy students • This workshop included building an understanding of how sleep and circadian factors can influence	Evaluation of this workshop indicated that scores were significantly higher for total awareness about and attitudes towards chronotherapy, post-workshop	To continue delivering chronotherapy education to undergraduate pharmacy students

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
			drug pharmacokinetics and pharmacodynamics		
	Development of specialised training accredited for practicing pharmacists (providing CPD).	Research • Fuller, Wong, Krass, Grunstein, Saini [108] • Fuller, Wong, Grunstein, Krass, Patel, Saini [94] • Tran, Fuller, Wong, Krass, Grunstein, Saini [109]	1.5-day training workshop covering various sleep disorders and sleep pharmacology was prepared for pharmacists participating in the sleep disorders screening project • The training comprised lectures, case studies and skills workshops and was planned with careful attention to pedagogical principles	Mean scores on the Dartmouth Sleep Knowledge survey scores were significantly higher at (13 ± 3.5 vs. 15 ± 2.5) post-training, with 86% scoring greater than 12, compared to with 68% scoring above 12 before the intervention (p = 0.04) Trained pharmacists screened 325 patients and the diagnostic yield from the screening project was approximately 7%, which is	

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
			• 21 pharmacists and two pharmacy graduates completed the sleep health workshops	comparable to other screening projects in Australian community pharmacy (e.g., for diabetes)	
	Pharmacists provided a modified brief behavioural treatment training program to insomnia patients	Research • Fuller, Wong, Hoyos, Krass, Saini [97]	• A cluster-randomized trial • Participants were recruited through 23 community pharmacies. • Using validated instruments, 325 (RAO=152, RA+=173) participants were screened for OSA, insomnia, and RLS	• 12 pharmacists who participated provided the brief behavioural therapy training service to 42 insomnia patients • Participants reported a significant improvement to Insomnia Severity Index scores in their patients from pre- to post-intervention	Unknown
	Development of Practice Guidelines for Sleep	Professional Body/ Research	• 199 pharmacies around Australia were	• 110 responded and the mean number of criteria	After this project, a stakeholder panel was

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
	Apnea Services in Pharmacy	• Australasian Sleep Association and Pharmaceutical Society of Australia • Hanes, Wong, Saini [96] • Hanes, Wong, Saini [95]	invited to review their pharmacy sleep apnea services according to a criterion devised by the Australasian Sleep Association and Pharmaceutical Society of Australia	met of 23 (total score) for pharmacies was 15.7 ± 3.4 (15.7/23 = 68.3%; score range 2-22).	convened with a purpose of developing consensus-based guidelines for sleep apnea service provision in pharmacies. Following this, the ASA and Pharmaceutical Society of Australia have developed a specialised course for community pharmacists providing sleep apnea services.
Nurses	CBT-I administered by practice nurses in rural NSW	Research • Galgut, Wong, Lobsey, Hall, Collier, Pearson, Rutherford, Bartlett [102]	Practice nurses were trained to deliver an individual 4-session intervention to patients within a general practice setting, consisting of psycho-educational information about sleep,	• Patients ISI scores were reduced on average by 6.9 points (from moderate insomnia >15) after the nurse-led CBT-I intervention. The wait list group showed no improvement, but after later	Program delivery has been able to continue even after the research study was completed.

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
			healthy sleep practices, cognitive challenging strategies and information about mood	completing the 4-session CBT-I intervention, the wait listed group showed similar improvements.	
	A Randomized Controlled Trial of Nurse-led Care for Symptomatic Moderate–Severe Obstructive Sleep Apnea	Research • Antic, Buchan, Esterman, Hensley, Naughton, Rowland, Williamson, Windler, Eckermann, McEvoy [99]	This randomized controlled trial investigated whether a nurse-led model of care for the treatment of obstructive sleep apnea could produce non-inferior health outcomes to physician-led care195 participants met criteria and were randomized to 2 models of care: one nurse led and the other sleep physician led	The change in Epworth Sleepiness Scores (ESS; primary outcome measure) was similar between both nurse-led and physician led OSA management • 4.02 vs. 4.15; difference, −0.13; 95% confidence interval: −1.52, 1.25 • No difference in CPAP adherence between groups at 3 months post-intervention	
	ASA Sleep Nursing	Professional Body	• This project aimed to	Survey finalised – awaiting	The responses will be

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
	Workforce Survey 2019	• Nursing Education Subcommittee of the Australasian Sleep Association	understand how nursing practice is currently being conducted for patients with sleep disorders or sleep problems. • The survey was sent to ASA members and members asked to circulate the survey to other nurses outside of the ASA	results	used to profile the sleep nursing workforce in Australia and New Zealand.
	ASA Nursing Education Sub-Committee	Professional Body • Australasian Sleep Association	This committee is focused on increasing training for the management of sleep disorders in nursing practice	The subcommittee has made a submission to the Australian Government for 'Educating The Nurse Of The Future' review – An independent review of Nursing to highlight the need for targeted sleep education in all curriculum	Advocacy work for nurse education in sleep will continue

Table 2. *Continued*

Profession	Initiative	Type	Initiative details	Outcomes	Future directions
				(undergraduate to post graduate, research leading to PhD and post-doctoral) for nurses	

Note: ASA = Australasian Sleep Assocation; OSA = Obstructive Sleep Apnea; CPAP = Continuous Positive Airway Pressure. This is not an exhaustive list of sleep initiatives for health professionals across Australia and New Zealand, due to the lack of published research and advertised training programs

5.0 Sleep Education Action Agenda for Healthcare Providers in Australia and New Zealand

Almost 40 years ago, the first study on sleep education for healthcare providers concluded that efforts to educate the medical community about sleep needed to be intensified.[27] Unfortunately, this remains true today. Despite a range of attempts across numerous healthcare disciplines to broaden education and professional development to include sleep education, these efforts are yet to be translated into lasting educational reforms due to a lack of follow-up, funding, or other priorities within schools/departments. Given the recognition of deficient sleep as a public health crisis, sleep specialists across disciplines need to drive the sleep education agenda forward, build on previous work promoting sleep education across disciplines, and create lasting sleep education reforms for all healthcare providers. In addition, we can look to other fields, like nutrition, which have successfully integrated specialty training into the medical curriculum and provided guidelines around nutrition education in the medical curricula.

Three key priorities have emerged from this review to achieve the goal of having healthcare providers who are knowledgeable about and comfortable with evaluating and treating deficient sleep in patients across the lifespan:

1. Education and training in sleep for healthcare students
2. Continuing professional development opportunities in sleep for practicing healthcare providers
3. Translation of evidence-based practice in sleep into clinical practice

These priorities are consistent with the recent Australian Parliamentary Inquiry into Sleep Health Awareness,[110] which made key recommendations to address the sleep education challenge for healthcare providers: (1) assessing current levels of knowledge in sleep health for GPs, nurses and psychologists; and (2) developing effective training mechanisms to improve the knowledge and skills of primary healthcare providers in assessing and managing sleep health problems.[110] We endorse these recommendations, but we also need an increased, coordinated and collaborative effort by education,

healthcare, public health and sleep professional associations, as well as the Australian and New Zealand governments, to implement sleep education into all healthcare providers training. Table 3 lists specific recommendations for the three priority areas identified. In addition, we require a ‘Sleep Education for Healthcare Providers Task-Force’ to be established by the ASA, Australian and New Zealand governments or public health agencies in order to oversee and drive long-lasting sleep education reforms. The Australian Parliamentary Inquiry into Sleep Health Awareness has created an excellent platform for sleep education reform to finally happen in Australia. This platform will hopefully extend to sleep education reforms in New Zealand, and potentially worldwide. The time for increased sleep education for all healthcare providers is now.

Table 3. Sleep education action agenda: What we need to bring about sleep education reform and the required parties involved

Priority Needs Area	What is needed
1. Sleep education for all healthcare students	• Funding for scoping research, the development and rollout of sleep education in university level healthcare provider training programs • Evaluation of the current level and quality of sleep education delivered to students during university level healthcare provider training programs • Assessment of the current level of knowledge and skills of student healthcare practitioners in sleep health and the assessment and management of sleep disorders • Identification of the core competencies and the amount of training in sleep and circadian science (e.g. recommendation of 2-4 hours of sleep education per year, totalling up to 16 hours over a medical degree[54]) required by different healthcare students. This will also involve collaboration with university education section to investigate what level and amount of sleep education will be feasible to integrate into existing curriculum • Development of a brief, standard, discipline-specific curriculum for sleep and circadian science for university healthcare provider training programs. The training program will need to be self-sufficient – i.e. after the roll out it can be delivered by university staff who may not necessarily be sleep experts. • Training in indigenous specific sleep and circadian science information, being sensitive and respectful to both cultural and contextual factors associated with Indigenous health and wellbeing • Implementation of sleep curriculum into university healthcare training programs. This may involve

Priority Needs Area	What is needed
	changing accreditation standards for healthcare training programs to include sleep related curriculum and competencies. It will also require collaboration between education, healthcare and sleep professional associations. • Examination of other fields, like nutrition, which have created competency based frameworks for nutrition education in medical curricula in Australia[111] and received a 2-year Australian government national teaching award project funding by the Office for Learning and Teaching (2013-2015) to integrate nutrition education into entry level medical programs in Australia[112] • Access to a national network of expert sleep clinicians and researchers to provide guest lectures, support university staff with curriculum and potentially take students for placements within a sleep setting • Assessment and evaluation of the ongoing efficacy and effectiveness of the implementation sleep training programs
2. Provide continuing professional development opportunities in sleep to all practicing healthcare professionals	• Funding to provide continuing professional development opportunities in sleep to healthcare providers. Additional funding will be required to establish (and pay) a network of sleep experts who can engage in supervision, provide feedback and improve training program outcomes of healthcare providers in sleep • Assessment the current knowledge, skills and practice of healthcare providers (e.g. GPs, psychologists, pharmacists, nurses and dentists) in sleep health and the evidence-based assessment and management of sleep disorders

Priority Needs Area	What is needed
	• Development and validation of psychometrically sound tools to assess sleep knowledge and skills in different healthcare disciplines: Currently there are limited validated surveys to assess sleep knowledge and skills in different healthcare provider (the medical profession is the exception) • Accessible and affordable opportunities for continuing professional development in sleep for practicing healthcare professionals. This may be done by workshops, online training etc. • Trained healthcare providers with expertise in sleep will be required to regularly deliver training programs and provide ongoing supervision around the country. • Professional supervision to healthcare providers by sleep experts and follow-up to solidify sleep skills after training programs. This is required to assist with skills development, consolidation and practice implementation. A range of supervision models may need to be implemented, e.g. group supervision, online supervision, web-based chat sessions, client session recording and review by sleep expert (if client consents) etc.
3. Improve the translation of evidence-based practice into clinical practice	• Support for healthcare providers to solidify evidence-based sleep assessment and management skills with ongoing supervision and professional development to ensure current evidenced-based practice skills in sleep are implemented and supported • Competency-based assessments (e.g. Objective Structured Clinical Interviews) to assess skills of healthcare students and providers • Improved dissemination of clinical sleep research and treatments to healthcare providers

Priority Needs Area	What is needed
	• Development of standardised sleep, sleep disorder and circadian science training materials and resources, such as webinar training videos, workshops, online materials Centralised access (such as through the ASA website) • Access to the public to online modes of sleep treatment. This will reduce the burden on sleep professionals and also increase dissemination (e.g. access to government funded online CBT-I programs, such as ‘This Way Up’)

Conclusion

Deficient sleep is highly prevalent in Australia and New Zealand and places a significant burden on the economy due to reduced health and wellbeing and lost productivity. Healthcare providers are not currently equipped to address the increasing need for sleep expertise, with a critical gap in their training in sleep. If left unaddressed, there will be a significant cost to health, quality of life and productivity at the individual and public levels. Sleep education must be improved for all healthcare students and currently registered/practicing healthcare providers.

Sleep education reforms need to encompass a wide range of sleep topics, including the impact of deficient sleep on health and wellbeing, sleep assessment, and evidence-based sleep treatments. Education about what is 'normal sleep' is also needed to reduce some of the misinformation commonly presented by healthcare practitioners and the media. Sleep education reforms will require partnerships between professional associations, public health agencies and universities. While some inter-agency and inter-professional collaborations exist, they can be nurtured towards forging larger or formalized collaborative partnerships; sharing resources, ideas and training opportunities; and promoting the development of expertise in effective sleep health education. Changes to health professional training programs must be reviewed to evaluate impact, such that resources can be targeted optimally.

The goal of all healthcare providers is to improve the health and well-being of their patients. Without sufficient knowledge and clinical skills in sleep, patients across the lifespan may suffer with sleep issues going undiagnosed, untreated, undertreated or mistreated. Improving sleep education for all healthcare providers will have positive flow-on effects for the physical and mental health of patients. Thus, this paper is a call to action for the Australian, New Zealand, and international sleep communities, along with government, professional and educational associations, to establish a national strategy to ensure that every healthcare provider has the essential skills to assess, educate, treat, and/or refer, patients experiencing deficient sleep.

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