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## CLINICAL REVIEW

## Questionnaires that screen for multiple sleep disorders

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## SUMMARY

The goal of this review was to identify, describe, and evaluate the existing multiple sleep disorders screening questionnaires for their comprehensiveness, brevity, and psychometric quality. A systematic review was conducted using Medline/PubMed, cumulative index to nursing & allied health literature, health and psychosocial instruments and the “grey literature”. Search terms were “sleep disorders, screening, questionnaires, and psychometrics”. The scope of the search was limited to English language articles for adult age groups from 1989 through 2015. Of the  $n = 2812$  articles identified, most were assessment or treatment guideline reviews, topical reviews, and/or empirical articles. Seven of the articles described multiple sleep disorders screening instruments. Of the identified instruments, two questionnaires (the Holland sleep Disorders questionnaire and sleep-50) were evaluated as comprehensive and one questionnaire (the global sleep assessment questionnaire [GSAQ]) was judged to be both comprehensive and efficient. The GSAQ was found to cover four of the six core intrinsic disorders, sleep insufficiency, and daytime sequela with 11 questions. Accordingly, the GSAQ is the most suitable for application as a general sleep disorders screener. Additional work is required to validate this instrument in the context of primary care. Finally, the future development of multiple sleep disorders screening questionnaires should not only cover all six intrinsic sleep disorders but also acquire some basic demographic information (age, sex, body mass index, presence/absence of bed partner, work status and shift) and some limited data regarding sleep sufficiency and the daytime consequences of sleep disturbance.

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## Introduction

Over the course of the last two decades, it has become increasingly clear that undiagnosed and untreated sleep disorders increase the individual's risk for new onset medical and psychiatric illness [1–4]. This, in combination with the high prevalence of sleep disorders in the population (more than 40% by some estimates [2]) underscores the need for the increased assessment of sleep disorders at the primary care level. While an increased exposure to sleep medicine during clinical training (both pre-professionally and as part of continuing professional education) would be an ideal way to address this issue, such curricular changes would be difficult to implement and take years, if not decades, to affect clinical practice. With increasing awareness of a need to know patients' sleep disorder status, primary care providers may remain uncertain as to

how to make differential assessments without a sleep medicine consult or at least a general screening tool.

In some ways this scenario parallels that which occurred with depression in the late 1990s and early 2000s. At that time, primary care had been sensitized to the need for assessment and treatment or referral for depression but lacked the tools required to accomplish this end. While several instruments existed to quantify depression severity (e.g., the 30-item inventory for depressive symptomatology – IDS [5,6], the 21-item Beck depression inventory – BDI [7,8], the 24-item Hamilton rating scale for depression – HRSD-24 [9], and the 30-item geriatric depression scale – GDS-30 [10]), none were suitable for primary care practice given their length and focus on severity. This problem was remedied with the development of a nine-item screener, patient health questionnaire [11] (PHQ-9). This instrument was both brief and allowed non-specialists to make a diagnostic assessment. This scenario suggests that the need to assess for sleep disorders within primary care might be remedied in a similar way: a brief screening tool could be used to assess for the incidence of sleep disorders.

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**List of abbreviations**

AASM	American Academy of Sleep Medicine	ISDI	Iowa sleep disturbances inventory
ASPS	advanced sleep phase syndrome	IRLS	international restless legs scale
AUC	area under the curve	ISI	insomnia severity index
ASQ	Auckland sleep questionnaire	MeSH	medical subject headings
CINAHL	cumulative index to nursing & allied health literature	n/a	not applicable or not available
BDI	Beck depression inventory	NAR	narcolepsy
BMI	body mass index	NCSDR	National Center on Sleep Disorders Research
COSMIN	consensus-based standards for the selection of health measurement instruments	NINDS	National Institute of Neurological Disorders and Stroke
CRSD	circadian rhythm sleep wake disorders	NSF	National Sleep Foundation
DSM	diagnostic and statistical manual of mental disorders	OSA	obstructive sleep apnea
DSPS	delayed sleep phase syndrome	PAR	parasomnias
ESS	Epworth sleepiness scale	PDF	portable document format
GSAQ	global sleep health assessment questionnaire	PHQ	patient health questionnaire
GDS	geriatric depression scale	PSQI	Pittsburgh sleep quality index
HaPI	health and psychosocial instruments	pt	patient
HRSD	Hamilton rating scale for depression	RLS	restless legs syndrome
HSDQ	Holland sleep disorders questionnaire insomnia	ROC	receiver operator characteristic curve
ICSD	international classification of sleep disorders	SBSM	Society of Behavioral Sleep Medicine
IDS	inventory for depressive symptomatology	SD	sleep disorders
INS	insomnia	SDQ	sleep disorders questionnaire
		SQAW	sleep questionnaire and assessment of wakefulness
		SSC	sleep symptom checklist
		STOP	snore, tired, observed, pressure

This prospect, however, is complicated by the need to assess not one illness, but several which encompass the core sleep disorders (or classes of disorders) including insomnia, sleep disordered breathing, circadian rhythm disorders, restless legs syndrome/periodic leg movements of sleep, parasomnias and narcolepsy.

At present, there are a variety of single condition measures available (e.g., the insomnia severity index – ISI [12], the Berlin questionnaire for sleep apnea [13], the STOP (snore, tired, observed, pressure) questionnaire for sleep apnea [14], the International restless legs syndrome rating scale – IRLS [15], and Epworth sleepiness scale – ESS [16]). These instruments, however, were created for use by specialists to assess the severity of specific disorders and are not practical to use in combination for screening. The only well-known, and well-studied, global instrument presently in use is the Pittsburgh sleep quality index (PSQI) [17]. This instrument, while the first of its kind and useful for the quantification of global sleep disturbance severity, was not intended to be used as a stand-alone screening tool by non-sleep professionals. Thus, what is needed is a “one page” instrument that can be completed by patients and provide the primary care clinician with an easy way to discern 1) which presenting complaints map onto specific sleep disorders and 2) whether the sleep complaints are of a severity and/or frequency to warrant treatment and/or referral. The present review was undertaken to identify what instruments are presently available to assess multiple sleep disorders, and which do so in a manner that is suitable for use in primary care.

**Methods**

This analysis first identified candidate questionnaires by reviewing the literature and then appraised questionnaires for potential usefulness in primary care.

*Literature review*

A review of the literature was conducted using databases (Medline/PubMed, CINAHL – cumulative index to nursing & allied health

literature, and HaPI – health and psychosocial instruments) and “grey literature” (information presented in academic, government, foundation, and industry reports). The database search terms were: a) sleep disorder AND diagnosis, b) sleep disorder AND psychometric\*, c) sleep disorder AND questionnaire, d) sleep disorder AND screen\*, and (e) sleep disorder AND validation (where \* indicates a wildcard to allow for multiple word endings). The search was restricted to English language articles for all adult age groups (ages 18+) from 1989 through 2015. Grey literature was searched for “sleep questionnaire” with both Google and Google Scholar. Additional sources for grey literature were the National Guideline Clearinghouse (search term “sleep disorder”) [18], Centers for Disease Control and Prevention National Health and Nutrition Examination Survey website (question items related to sleep) [19], and the American Academy of Sleep Medicine website (search term “sleep disorder”) [20]. Date of last search for grey literature was March 25, 2015.

Articles/questionnaires with studies that met the following criteria were included for subsequent feature assessment and appraisal – the screening instrument: 1) was based on self-report, 2) assessed at least three sleep disorders, and 3) was evaluated psychometrically. Articles were excluded if the studies focused primarily on specific diseases, if they were reviews or practice guideline papers, or if they described structured interview procedures. Reference lists from included database articles were also scanned. Following review of this search strategy with a health sciences librarian, MeSH (medical subject headings) terms “sleep disorders”, “sleep disorders, intrinsic”, “sleep disorders, circadian rhythm”, and “dyssomnias” were also searched using PubMed (advanced search builder). The resulting list of candidate questionnaires proposed for feature assessment was then reviewed by two experts in the field of sleep medicine to identify possibly-missed questionnaires.

*Quality appraisal*

Questionnaires were assessed for their practicality and psychometric soundness. Practicality was assessed in terms of

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