A 22-year-old male with autism presents for follow-up of his severe obstructive sleep apnea (apnea-hypopnea index 50/hour). He is currently on continuous positive airway pressure (CPAP) therapy at 8 cm H$_2$O. Patient admits that he does not wear the CPAP every night. According to his mother, he has poor sleep habits, frequently going to bed after midnight and getting up late in the morning, but she cannot give specific times. Patient does not complain of any daytime sleepiness but his mother states he dozes off periodically during the day. Patient is not presently employed or in school.

A compliance report is generated and a sample of the report is shown. Figure 1 shows the CPAP usage for the past 7 months. Figure 2 illustrates the night-to-night compliance over a 2-week period.

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In addition to poor compliance, the CPAP compliance report illustrates which of the following sleep-wake cycle patterns?

A. Nonentrained  
B. Sleep phase advance  
C. Sleep phase delay  
D. Irregular

Answer—See next page.
DISCUSSION

This case illustrates a unique use for the continuous positive airway pressure (CPAP) compliance report. The first page of the report generally provides the overall compliance, as it shows the number of nights used and the number of nights with use over 4 hours (the generally accepted minimal compliance; Figure 1).1,2 From this figure, it is clear that this patient has many periods of not using his CPAP at all; however, when he does wear it, it is often for ~4-5 hours. Figure 2 shows a section of the detailed night-to-night CPAP usage that is provided in many CPAP compliance reports; these detailed sections include the time at which the CPAP is started and ended each night. From this figure, it is clear that the patient frequently starts using his CPAP after 02:00, generally wearing it until 10:00 or later each day of use. This pattern is consistent with sleep phase delay.

Patients with circadian rhythm sleep disorder (CRSD) are unable to sleep at the expected or desired time.3 The diagnosis of a CRSD can be made from a careful history of the sleep-wake schedule and is usually confirmed with either a sleep diary or actigraphy monitoring for two weeks. In addition, the nadir of the core body temperature or the rise in melatonin (dim light melatonin onset, DLMO) can estimate the circadian phase. The diagnostic criteria for CRSD include the following: (1) persistent or recurrent pattern of sleep disturbances secondary to an alteration in the circadian timing system or misalignment between endogenous circadian rhythms and external factors that affect the timing or duration of sleep; (2) the sleep disturbance causes insomnia, excessive daytime sleepiness, or both; (3) the sleep disturbance causes social and functional impairment.3 The endogenous circadian rhythm sleep patterns are discussed here.

In delayed sleep phase type, the major sleep period is delayed 3-6 hours relative to the conventional sleep-wake time, and the patient reports sleep-onset insomnia or difficulty in awakening.3,4 In addition to sleep diary or actigraphy, a delay in the nadir of the core body temperature or DLMO confirms the delayed phase.3 When not required to maintain the conventional sleep-wake cycle and allowed to sleep as desired, sleep is of normal architecture and duration.3,4 The prevalence in the general population is between 0.13%-3.1%; it is >7% in adolescents.5

Delayed sleep phase disorder (DSPD) has been associated with mental disturbances, schizoid and avoidant personality types.3 Furthermore, 10% of persons with chronic insomnia may have DSPD.6 Possible mechanisms include long endogenous circadian period, hypersensitivity to evening light, reduced sensitivity to morning light, and genetic mutations in the circadian genes (hPer3 and Clock genes).7 Treatment options include bright light (short-wavelength in the blue range) exposure in the morning, evening melatonin, or hypnotics.4,5,7,8 However, it is not clear that treatment is indicated in this patient, as he does not work or attend school and has no complaint regarding his sleep schedule.

In the advanced sleep phase disorder (ASPD), sleep onset and wake times occur earlier than the desired clock time.3,4 ASPD is more common in middle-aged and older patients, with a prevalence of 1% in middle-aged adults.4

In the free-running or nonentrained type, there is a daily delay in the sleep onset and wake time that may resemble a normal subject living in isolation without time cues; the daily delay is determined by the individual’s circadian clock periodicity.4 The individual’s sleep schedule drifts in and out of phase with conventional sleep time. Thus, when in phase with conventional sleep time, this syndrome is not recognized. However, when sleep is out of phase, this syndrome may be confused with DSPD or ASPD. This disorder is rare, being most often observed in patients with total blindness and with personality disorders.3,4

In irregular sleep-wake rhythm, the total sleep time is divided into three or more short sleep bouts that are irregular and unpredictable; however, the total sleep time within 24 hours is normal for age.3,4 This sleep-wake pattern resembles that of normal infants. The disorder is rare and is observed in individuals with congenital, developmental, or degenerative brain disease.3,4

Sleep problems in autistic spectrum disorder include insomnia, frequent awakenings, circadian rhythm disorders, sleep-wake transition disorders, and sleep related breathing disorders. The prevalence of sleep related problems range from 44% to 83%.5,9,10 Disturbed sleep has been linked to impaired learning and memory, increased aggression, and irritability.10

REFERENCES