Clinical Use of Actigraphy

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SUMMARY: Actigraphy is defined as the unattended monitoring of patients using a portable device to record movement over an extended period of time (1). The raw data is reviewed and algorithms are used to analyze the recorded data. Actigraphy, in conjunction with sleep logs, can be used to infer sleep/wake patterns based on periods of activity versus inactivity (2). Most modern actigraphs combine an accelerometer to detect body movements with some form of digital memory and an interface to store and retrieve data. The amount of memory in the device and the sampling rate used determines the amount of time that can be recorded. Generally, movement is sampled multiple times per second, and data is grouped into 1-minute epochs (2). Some actigraphs also may record additional parameters, such as light exposure, or core body temperature. Actigraphy is used as a diagnostic tool to aid in clinical evaluation, particularly in populations or conditions where polysomnography is not practical, and as a measure of treatment outcomes.

KEY DEFINITIONS

Actigraph is a device used to measure and record human motion over a period of time.

Sleep facility any sleep center whether it is hospital based or independent.

Sleep technologist refers to a trainee, technician or technologist for the purpose of this document. Note that the technologist designation usually refers to those who have passed the American Board of Sleep Medicine (ABSM) examination and are identified by the Registered Sleep Technologist (RST) credential or the Board of Registered Polysomnographic Technologists (BRPT) examination, and are identified by the Registered Polysomnographic Technologist (RPSGT) credential or National Board of Respiratory Care examination and are identified by the Sleep Disorders Specialist (SDS) credential.

1.0 SCOPE

This technical guideline will address actigraphy studies that are set up and scored by a sleep technologist, but are conducted as unattended recordings outside of a sleep facility.

1.1 Indications for Actigraphy

The 2007 AASM practice parameters indicate that actigraphy is a useful tool in the clinical evaluation of certain sleep disorders.

Actigraphy is indicated to assist in the clinical evaluation of suspected advanced sleep phase syndrome (ASPS), delayed sleep phase syndrome (DSPS), shift work sleep disorder, and other circadian rhythm disorders (1). Actigraphy also may be used to estimate total sleep time in patients undergoing portable monitoring for suspected obstructive sleep apnea syndrome. Actigraphy also can be used to evaluate circadian rhythm patterns and sleep disturbances in patients with insomnia or hypersomnia.

Actigraphy is useful in evaluating response to treatment in patients with circadian rhythm disorders and insomnia. Adjunct uses of actigraphy include evaluation and treatment of special populations such as the elderly or infants and children, particularly those with chronic medical conditions (1).

2.0 RECORDING TECHNIQUES

2.1 Actigraph Placement

The actigraph is generally worn on the wrist, like a watch; however, superiority has not been demonstrated for this particular placement, over any other location (2). For infants, actigraphs are sometimes placed on the legs. If the actigraph contains a light sensor, it is important for the patient to be aware that the device should not be covered by their sleeves. For patients who are sensitive to the plastic bands on most actigraphs, these may be replaced with cloth or Velcro® bands (3).

2.2 Recording

For any circadian assessment, it is recommended that the actigraph be worn for a minimum of 3 days in order to obtain a comprehensive view of the patient's sleep/wake pattern. Longer studies, up to several weeks, are preferable, and allow for bad data or anomalies to be discarded. Most actigraphs are equipped with an event marker button that the patient can push to mark lights out, when they get out of bed, etc. It is also recommended that the patient keep a sleep/wake log or sleep diary, and note whenever the actigraph is removed (3). Some actigraphs are waterproof to allow the patient to bathe without removing the device, but there may be instances, such as during athletic activities, when the device must be removed for a period of time. Any period of time during which the actigraph device is removed should be documented by the patient in an accompanying sleep/wake log or diary.

2.3 Interpretation

While there are established standards of use for actigraphy, there are no set standards for interpretation. Generally, study data is downloaded from the actigraph, with a USB cable or memory card reader, to a computer equipped with analysis software. Various algorithms are used by the interpreting software to distinguish wake from sleep. Most actigraphy analysis software has published validation studies that demonstrate the accuracy of their algorithm. The data is edited by the technologist with the aid of the patient's sleep/wake log or diary. Epochs may be manually changed to wake if the log indicates a time that the patient is clearly awake, but may have removed the device. Time intervals should be scored as missing data if there is no

information in the patient's sleep/wake log or diary when the actigraph is removed (3).

3.0 DOCUMENTATION

3.1 Patient Identification

In compliance with the Health Insurance Portability and Accountability Act of 1996 (HIPAA), the actigraph data and all reports should clearly be labeled on each page with a minimum of two identifiers, such as the patient's full name, date of birth or medical record number, and the date of the study. Any additional information, such as identification numbers required for retrieval, also can be included. Likewise, all long-term storage media should be adequately labeled.

3.2 Patient History

The patient's chart should contain sufficient history to document the reason for the study, i.e., any significant existing medical conditions, current medications and dosages, or special therapy (i.e., supplemental oxygen). A complete history and physical along with a sleep history/questionnaire should be obtained. The technologist should discuss any key items in the questionnaire with the patient and clarify any incomplete or missing information.

REFERENCES

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