The Ambulatory Phonation Monitor (APM), Model 3200, is a portable device worn by a client in order to extract important parameters of vocal behavior over an entire day of normal activities. Developed collaboratively by KayPENTAX, Sensimetrics Corporation, and clinicians at Massachusetts General Hospital, APM is based on years of research and addresses the important issue of how individuals use their voices throughout the day. APM can also help clients with carryover of therapy goals outside the clinical environment via the use of real-time vibrotactile feedback. 

How APM collects phonatory data

APM is worn in a waistpack by clients as they go about their normal daily routine. The transducer is a small accelerometer (contact microphone) which is adhered to the base of the client’s neck (just above the sternal notch); it can be hidden by the collar of a shirt or blouse. A cable runs from the accelerometer to the hardware module in the waistpack. The accelerometer senses the vibrations of the skin on the neck that are associated with phonation.

In the clinic, the APM system is calibrated by the clinician prior to data collection. The client then leaves the clinic and pursues his daily activities. After wearing APM over a defined period, the unit is returned to the clinic and data is downloaded to a PC for analysis using APM software.

Data analysis includes both graphic and numeric displays of total phonation time, average fundamental frequency (Hz), and amplitude (dB SPL) values. A primary graphic-based display is a “Phonation Profile” that shows phonation times and amplitude levels across a selectable time span ranging from the entire day to various sub-intervals. Not only are values for phonation time and SPL reported, but the graphs also indicate when, during the data collection period, the vocalizations occurred. Additional graphical displays (e.g., histograms) reveal important characteristics of the client’s phonatory behavior over many hours. It should be noted that APM only collects extracted voice parameters, not actual speech samples. Clients need not be concerned with the confidentiality of their conversations during the day.
How APM works as a vibrotactile feedback device

APM has an additional mode of operation as a feedback device for clients outside the clinic. This is accomplished by means of a vibrotactile unit (about the size of a pager) connected to the APM and worn on the client’s belt or placed in a pocket.

The clinician, using APM software, customizes the unit for each client to elicit a vibrotactile sensation when a particular threshold, such as an amplitude value, is exceeded. It is believed that such real-time vibrotactile feedback during routine daily activity will help the client more quickly learn how to modify vocal behavior and achieve desired vocal function, as defined by the clinician.

Summary

APM is an important addition to the instrumentation tools available to clinicians and researchers interested in voice because it provides objective data on the vocal behavior of clients outside the clinic during normal daily activity. This information has previously been provided by clients themselves in qualitative self-reports which were highly subjective and prone to be unreliable. With actual data, clinicians can more effectively manage their patients presenting with vocal disorders. The information provided by APM may also be of interest to a wide variety of researchers interested in the speech patterns of different clients and occupational groups.

In addition to the important objective data the APM provides, the vibrotactile component is a potentially powerful feedback tool to help remind patients, in real time, of abusive vocal behaviors. This feature of APM may enhance therapy carryover and potentially expedite the rehabilitation process of clients with vocal problems.

APM Features

- Portable lightweight device that is worn during normal daily activity
- Tracks important vocal parameters for an entire day
- Accurate measures of when, how long, how loud, and at what pitch a person vocalizes throughout data collection
- Vibrotactile real-time feedback attachment to assist client self-monitoring of selected voice parameters and to facilitate learning of new vocal behaviors
- Quantitative results and graphs to summarize phonatory behavior and compliance with biofeedback parameters
- Developed collaboratively by engineers, speech researchers, and clinicians at leading facilities

PC requirements

- Pentium IV or higher
- Windows 2000/XP operating system

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