

## A NEW CONCEPT OF ELECTRONIC VOIDING DIARY: REDUCING THE BURDEN OF NOT ONLY PATIENTS BUT ALSO MEDICAL PRACTITIONERS ON VOIDING DIARY

### Hypothesis / aims of study

Voiding diary (VD) is a key diagnostic tool for voiding dysfunction. However, this is a great burden for both the patient and the doctor, because the patient should record all micturitions several days and the doctor must analyze the many records in the outpatient clinic as soon as possible.

We developed a new device, which allowed the patient to carry a small, portable device and conveniently record the micturition by touching the screen (Fig. 1A). In addition, when the patient brings the device to the doctor and connects to the computer, they can automatically see the analyzed data related to micturition immediately.

In this study, we performed a prospective study to estimate and compare the subjective burden felt by patients when they were asked to complete electronic and paper frequency volume charts. We also observed what advantages of using this device doctors have over paper VD.

### Study design, materials and methods

A total of 205 men and women (mean 59.7 years old, 17-84), with lower urinary tract symptoms suggestive benign prostatic hyperplasia or overactive bladder, were enrolled from two hospitals in South Korea between October 2016 and February 2017. They were randomly assigned to complete an electronic VD (Lee Diary, Mcube Technology, Seoul, Korea) (n=77) or paper VD (n=85) for consecutive 3 days. At first visit, patients were instructed how to put the time and volume of fluid intake or micturition into the device or paper. At second visit, the device or paper was received back. The device was connected to computer via USB cable and various results analysed from the above data were displayed on the computer screen (Fig. 1B, 2). The data on the paper VD was put into the excel datasheet by medical practitioner and analysed it and produced the results sheet. The time taken to analyse the device or paper data was measured. And all the participants were asked answer the questionnaires with 7 questions about burden. The chi-square test was used to compare the burden between electronic and paper VD.

### Results

Twelve patients were excluded during the study due to lost follow-up, and 30 patients were excluded from the analysis as incomplete record, a total of 163 results were used in the study analysis.

**Burden on the patients.** Paper VD group experienced higher levels of burden than electronic VD group ( $p<0.002$ ), and higher burden during daytime ( $p<0.002$ ) and night time ( $p<0.01$ ) than electronic group. The portability of electronic VD was better than those of paper VD ( $p<0.0001$ ). The strange thing is that the electronic VD group felt that they have missed to record more data than the paper VD group ( $p<0.0001$ ), although there was no difference in real data ( $p>0.05$ ). This is probably because the data on the paper can be seen again, but electronic VD group cannot see the data recorded on the touch screen again.

**Burden on the medical practitioner.** It took about 10-15 minutes for a medical practitioner to insert and analyse data from a paper VD into a computer, but in the case of an electronic VD, we could immediately see the results of various types of analysis as soon as the computer was connected. This is not statistical comparative data, but it is considered a considerable advantage.

### Interpretation of results

The use of this electronic VD reduces the burden of not only the patient but also the medical practitioner, comparing to that of the paper VD.

### Concluding message

Until recently, research on VD has been tailored largely to the accuracy or burden of patient's writing a VD, or the accuracy of data interpretation by medical practitioner without considering the interpretation speed. Due to the uncertainty of micturition patterns, statistical observation is needed, especially as the observation period becomes longer. It is almost impossible to observe the characteristics of micturition from a statistical point of view, for a short period of time when clinicians meet patients at the outpatient clinic. From this new perspective, we believe that our electronic VD machine will have advantages over other VD machines.



**Fig. 1.** Electronic Voiding Diary (VD). A. Image of electronic VD, (size: 64(W) x 95(H) x 15.5(D) mm). This has 2.4 inch touch screen to record the data related to micturition. B. If electronic VD is connected to computer via USB cable, various style of analysed results are automatically displayed on the computer screen.

