ICS 2021 MELBOURNE ONLINE

14 - 17 October

Leading continence research and education, online

Abstracts #1-595
Live and On-Demand Programmes

International Continence Society
51st Annual Meeting

www.ics.org/2021

Helen O'Connell
Annual Meeting Chair

Christopher Maher
Annual Meeting Co-Chair

Anna Rosamilia
Annual Scientific Co-Chair

Vincent Tse
Annual Scientific Co-Chair

video-based voiding devices. This study aimed to evaluate the accuracy and reliability of a new smartphone-based acoustic voiding volume measurement application compared to conventional ultrasound bladder volume scanner.

STUDY DESIGN, MATERIALS AND METHODS

A total of 12 subjects from September 2020 to March 2021 were prospectively enrolled with informed consent to compare novel acoustic voiding volume measurement to conventional ultrasound bladder volume scanner. 2 subjects were excluded their measurement do not meet our standard of sound quality (i.e. voiding in environment with very loud fan noise, voiding to the wall, door slams). Finally, 10 patients with 50 voiding measurements were included for analysis. The value measured before urination by bladder scanner (A), the value measured after urination by bladder scanner (B), and the value of voided volume measured by smartphone-based acoustic voiding volume measurement mobile application (C) were compared between the 2 techniques. Reliability and accuracy of the voided volume results were compared using Pearson correlation coefficient, and student t-test, respectively.

RESULTS

10 healthy volunteers were included in the study. Median age was 53.5. Median values of uroflowmetry proflile are as follows: Qmax: 16.3mL/s, Voided volume: 256.8mL, and postvoid residual urine: 7.5mL. Voided volume between the 2 techniques revealed strong visual correlation ($r = 0.71$, $p = 0.02$). When compared to conventional uroflowmetry. When analyzed separately for each individual, each participant showed stronger correlation (range: 0.59-1.00).

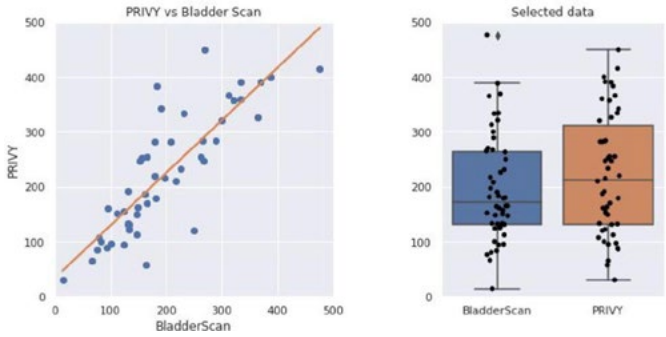
INTERPRETATION OF RESULTS

Authors evaluated to see how much the absolute value of the difference between A and B is consistent with C. In our previous study, we introduced a smartphone-based UFM device using acoustic analysis and reported a result comparable to that of contemporary office-based UFM. The current novel acoustic voided volume measurement mobile application can alleviate patients' mental burden to void well in the clinic and check real-time status of voiding whenever they hope. Our results showed a strong correlation between acoustic and standard bladder scanner regarding real voided volume.

CONCLUDING MESSAGE

The acoustic voiding volume measurement application can take over the role of traditional bladder scan resulted from our validation. Through comparison of bladder scan measurements before and after urination, it was confirmed that the urine volume measurement using the smartphone PRIVY application was accurate. PRIVY application can be a breakthrough that can lower the barriers to entry to health management of patients' urination. Further large-scale studies will further increase the credibility of our results.

FIGURE 1



Comparison of measured voided volume between conventional bladder scan and PRIVY mobile application

REFERENCES

1. Lee YJ, Kim MM, Song SH, Lee S. A Novel Mobile Acoustic Uroflowmetry: Comparison With Contemporary Uroflowmetry. Int Neurourol J. 2021;10.5213/inj.2040250.125. doi:10.5213/inj.2040250.125
2. Urodynamic testing. In: Abrams Paul, Cardozo L, Wagg A, Wein A, editors. Incontinence. 6th ed. Bristol (UK): International Continence Society; 2017. p. 604.
3. Shokoueinejad M, Alkashgari R, Mosli HA, Alothmany N, Levin JM, Webster JG. Video Voiding Device for Diagnosing Lower Urinary Tract Dysfunction in Men. J Med Biol Eng. 2017;37(4):474-483. doi:10.1007/s40846-017-0283-8

Funding This work was supported by the Korea Medical Device Development Fund grant funded by the Korea government (theMinistry of Science and ICT, the Ministry of Trade, Industry and Energy, theMinistry of Health & Welfare, the Ministry of Food and Drug Safety)(9991006814, KMDF_PR_20200901_0141) **Clinical Trial** Yes **Public Registry** No **RCT** No **Subjects** Human **Ethics Committee** Seoul National University Bundang Hospital **Helsinki** Yes **Informed Consent** Yes

150 www.ics.org/2021/abstract/150

INNOVATIVE EHEALTH BEDWETTING SOLUTION FOR CHILDREN

Matthijsse D[1], Yoneyama M[2], Imazawa K[2], Hu A[3], Chen T[3], Cheng C[4], Summerville M[5], Meyer S[5], Tutelaers M[1], van Zanten J[1], Swinckels P[1], Hu A[4], Pop V[1]
1. LifeSense Group, Eindhoven, The Netherlands, 2. LifeSense Group Japan, Tokyo, Japan, 3. IOHS, Taipei,Taiwan, 4. Megabona International, Taipei,Taiwan, 5. BioLife Healthcare, Sydney, Australia

HYPOTHESIS / AIMS OF STUDY

This study is based on 2,421 children's data, aged between 6-12 and suffering from bedwetting issues. Persistent bedwetting (functional nocturnal enuresis) often becomes a problem once a child has reached 6 years of age and continues to wet the bed at least twice a week over three con-

secutive months. This common problem affects 12% of all 6-12-year-olds and can be both frustrating and embarrassing to children and parents [1]. Bedwetting is about twice as common in boys than girls [1]. Root causes that can lead to nocturnal enuresis include stress, genotype, hormonal imbalances or a large nightly urine production prompted by delayed cognitive and physical development. Being able to recognize the feeling of a full bladder is a learnt skill for children to become aware of. For some children this milestone can take longer than customary guidelines, causing them to involuntarily urinate in bed whilst asleep at night [1].

One solution to tackle functional nocturnal enuresis is a bedwetting alarm. This product helps train the child's brain to recognize the body signals when the bladder is full and stay dry at night [2]. Based on this concept we developed an innovative non-invasive eHealth bedwetting alarm called Oopsie Heroes, including a tiny bedwetting sensor and simple mobile device application. The Oopsie Heroes bedwetting sensor is different because it makes use of a safe, child-friendly and frequency-based sound emission signal (instead of harmful Bluetooth or other radio wireless signals) to communicate with the Oopsie Heroes application which functions as the alarm module. The Oopsie Heroes bedwetting sensor is very small, thin (25x35x5mm) and comfortable. It does not require any special underwear and can be easily attached to all underwear or pyjama trousers using a sticker.

The aim of this study is to demonstrate the effectiveness of using the Oopsie Heroes Bedwetting Alarm system to record data about bedwetting. It is based on data collected through an anonymous database that helps record events such as when the alarm gently wakes a child up after a bedwetting event occurs at night.

The hypothesis of this study is that the Oopsie Heroes bedwetting alarm can record accurate user data about bedwetting. These insights may help provide a better understanding of the bedwetting issues and eventually cure children from bedwetting sooner.

STUDY DESIGN, MATERIALS AND METHODS

Data from 2,421 children, aged between 6-12 (M=8,3, SD=1,9) and suffering from bedwetting issues was included. The children's parents noted the child's age and gender in the Oopsie Heroes device application. In this study, data of bedwetting events that took place between 06:00AM and 5:59PM was excluded as the intended use of the system is at night-time.

The sensor was attached to the underwear or pyjama trousers of the child (user) using a double-sided adhesive sticker. The application was activated, and the mobile device placed in the room where the child slept. In case of a bedwetting event, the Oopsie Heroes bedwetting sensor detected urine in the underwear using a sensitive impedance measurement and emitted a pulsating frequency sound which the application on the mobile device detected. As a result of a bedwetting event, the mobile emitted within less then 5 seconds an interval alarm sound that woke up the child. The mobile alarm sound could be for example a pre-recorded parents voice which has been proven to be the fastest and most effective way to wake the child up during his night-time sleep [3].

Alongside, for the analysis of the app's "night-mode activation" and "sensor activation" (bedwetting) events detailed data of night-mode activation and bedwetting events times and dates from 16.6% (n=403) of the users was collected over a period of maximum three months from the date the user installed the Oopsie Heroes application. The data collection period depended upon how soon the child woke up dry for a consecutive period of two weeks. Data about the age, demographics and bedwetting events time and date were automatically collected by the application. Data was automatically uploaded to our database and stored anonymously.

RESULTS

The average age of the 2,421 users was 8,3 years (SD=1,9). The division in gender was 62% boys (n=1492) and 38% girls (n=929). See figure 1.

The average time the users (n=403) activated the night mode of the application was 9:54 PM (SD=2:42 hours) and the average time of the sensor activation events was 11:18 PM (SD=3:18 hours). See figure 2.

INTERPRETATION OF RESULTS

The global data indicates that the average age at which users try a bedwetting alarm is approximately 8 years old, and there is an almost equal divide amongst of 6, 7 and 8-year-olds using the bedwetting alarm system Oopsie Heroes. The gender division of (62% boys, 38% girls) correlates with research indicating a 2/3 vs. 1/3 division between boys and girls [1]. However, at an older age the division gap becomes smaller.

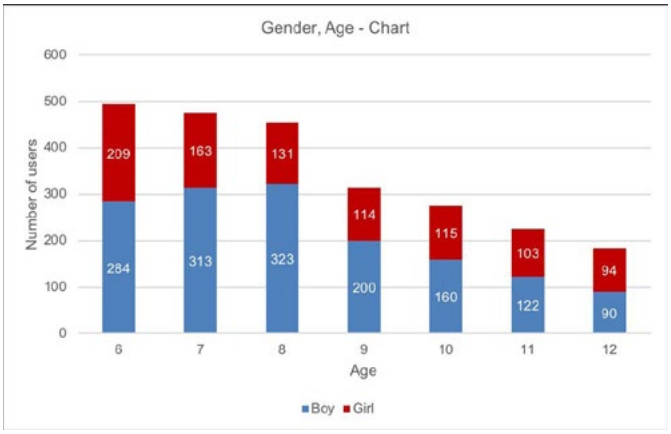
According to the data collected the average bedtime (night-mode activation) for 6-12-year-olds is 9:54 PM. The data also indicates that the sensor is activated (when a bedwetting event occurs) at 11:18 PM, approximately one and a half hours after the night mode of the application has been activated. Additionally, the data indicates that during the bedwetting training period the child wets the bed on average once every 4 nights. However, we should also take into account that after the sensor has been activated and the application has responded to wake the child up, the night-mode could have been activated for a second time for the remaining of the night and thus the bedwetting frequency could be higher than once every 4 nights.

Alongside, based on collected user feedback we see that after using the Oopsie Heroes application and device children's bedwetting frequency events plummet. From this we conclude that children using a bedwetting alarm can learn to control their bladder at night. This is in keeping with the current research [2].

CONCLUDING MESSAGE

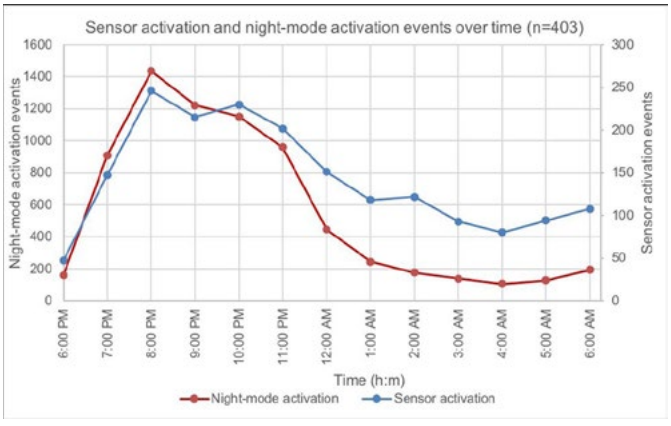
The Oopsie Heroes bedwetting alarm demonstrates it is an effective system to 1. Discreetly collect bedwetting event data 2. Provide an overview of events to parents/carers 3. Help children wake up on time after a bedwetting event takes place. This system can especially be of value to healthcare professionals and parents interested in understanding their patients/child's bedwetting pattern.

FIGURE 1



Gender per age group.

FIGURE 2



Night-mode activation and sensor activation events over time.

REFERENCES

1. Doleys, D. M. (1977). Behavioral treatments for nocturnal enuresis in children: a review of the recent literature. Psychological Bulletin, 84(1), 30.
2. Baker, H. (2001). Practical solutions to help parents deal with childhood bedwetting. Professional nurse (London, England), 17(2), 133-136.
3. Smith, G. A., Chounthirath, T., & Splaingard, M. (2019). Effectiveness of a Voice Smoke Alarm Using the Child's Name for Sleeping Children: A Randomized Trial. The Journal of Pediatrics, 205, 250–256.e1. https://doi.org/10.1016/j.jpeds.2018.09.027.

Funding Nil **Clinical Trial** No **Subjects** Human **Ethics Committee** The **Ethics Committee** of Medical Corporation LifeSense Group The Netherlands **Helsinki** Yes **Informed Consent** Yes

151

www.ics.org/2021/abstract/151

EHEALTH INNOVATIVE DIAGNOSTICS AND THERAPEUTICAL SOLUTION FOR FEMALE PELVIC FLOOR AND STRESS CONTINENCE

Gervasoni F[1], Ricci V[1], Boni A[2], Andreoli A[1], Yokoi Y[3], Sekiguchi Y[3], Nakamura R[3], Sasaoka A[3], Fassina C[4], Mingardo V[4], Trevisan T[4], Yoneyama M[5], Ogura D[6], Summerville M[7], Meyer S[7], Wu F[8], Durai P[8], van Zanten J[9], Tutelaers M[9], Matthijsse D[9], Swinckels P[9], Ho Yee T[8], Pop V[9]
1. Unit of Rehabilitation, Luigi Sacco Hospital, ASST Fatebenefratelli Sacco, Milan, Italy, 2. Perugia University Hospital, Interdivisional Urologic clinic: Perugia-Terni, Umbria, Italy, 3. Women's Clinic LUNA Next Stage, Kanagawa, Japan, 4. I.A.C.E.R., Martellago, Venice, Italy, 5. LifeSense Group Japan, Tokyo, Japan, 6. CBC Co., Ltd, Tokyo, Japan, 7. BioLife, Sydney, Australia, 8. National University Health System, Department of Urology, Singapore, 9. LifeSense Group, The Netherlands

HYPOTHESIS / AIMS OF STUDY

This abstract provides an overview result of pilot studies performed on 115 women aged 25-70 years old suffering from urinary stress incontinence. The average age of participants being 39.09 years old, and the average weight 77.15kg. During these pilot studies, we used Carin: an innovative non-invasive eHealth solution composed of the Carin sensor and the Carin Pelvic Floor Trainer application. We focused on measurement data collected during an 8-week training period. During the Carin pilot studies, 72% of women fully recovered, and 28% saw over 50% improvement. Based on data collected from 65.2% of the participants (n=75), we hypothesize that the positive results of stress incontinence symptoms are directly correlated to the pelvic floor training frequency women implemented into their daily life, as recommended by Carin.

Urinary Incontinence (UI) implies the inability to retain urine, creating a bothersome condition experienced by women. Influenced by age and condition its prevalence ranges from 8.5% and 38% (1,2,3). The majority of these women experienced stress UI. Intitially their condition was treated using a