

risk factors of incontinence and continence management strategies in Taiwan. It is not clear if residents receive proper assistance in toileting and selection of diapers are not clear. The aim of this study was to investigate the prevalence and continence care strategies among elderly population living in the long-term care institution.

### STUDY DESIGN, MATERIALS AND METHODS

A cross-sectional survey was done and 810 subjects were recruited from long-term care institutions in Eastern Taiwan, Stratified cluster sampling to ensure representativeness of the target population. Incontinence status and continence care strategies were investigated by trained research assistants. Clinical data were derived from a retrospective clinic medical record review and checklists including mobility, incontinence status, and continence care products use, toileting assistance, and daily fluid intakes were used to recorded the current continence care status.

### RESULTS

Average age of the sample was 81.46yrs, 52.9% were female, average lengths of stay in the institution were 3 years, numbers of comorbidity 3.82, and average number of daily medication 11.48 tablets. Prevalence of urinary incontinence(UI) was 40%, and 7.8% for fecal incontinence and 29% with double incontinence. Elderly needed wheelchair assistance was up to 63.6%. Total dependence which classified by Barthel index less than 40 was up to 384 (47.4%), average CDR Clinical Dementia Rating is 2.65, 243 people had severe cognitive disabilities (30.4%) by measurement of MMSE Mini-Mental State Examination .

The odd ratio between UI and related disease are stated as follow: chronic diseases as pressure sores was 10.11 ( $p=.03$ ), brain vascular disease was 4.18 ( $p=.00$ ), urinary infection 8.19 ( $p=.00$ ), dementia 5.74 ( $p=.00$ ). The odd ratio between UI and lower extremity activity were analyzed and the results revealed that unable to stand or hip lifting had significantly higher risks of wearing diapers, (OR 29.86,  $p < .0001$ ) . In addition, unable to stand but able to lift hip for 30 seconds still obtain a higher risk on diaper use( OR 6.77,  $p < .001$ ). The odd ratio between UI and degree of cognitive impairment by MMSE found that severe, moderate and mild cognitive impairment was 8.94, 3.35, and 2.94 respectively.

In related to diaper use, 639 (78.9%) of the total participants wore diaper , and use of adhesive-tape diaper is 475 (74.3%). For the people using diapers, 99 (12.2%) of them could ambulate independently without assistance but still wearing diapers. And 247(51.5%) of the subjects who wear adhesive-tape diaper were able to stand for 30 seconds.

### INTERPRETATION OF RESULTS

The results of this study discover that urinary tract infections, pressure sores, dementia and muscle strength for standing and hip lifting were risk factors in developing incontinence. Effective assessment of the related risk factors can slow down the occurrence of incontinence.

### CONCLUDING MESSAGE

This study suggested that long term care institutions should implement an incontinence assessment system for early detection of high risk groups to improve the quality of the institutionalized elderly population by early intervention and treatment, by keeping daily physical activities, body functions and reduction of diaper use.

**Funding** None **Clinical Trial** No **Subjects** Human **Ethics Committee** Tzu Chi Hospital Research **Ethics Committee** Helsinki Yes **Informed Consent** Yes

**208** | [www.ics.org/2018/abstract/208](http://www.ics.org/2018/abstract/208)

### A NOVEL MOBILE ACOUSTIC UROFLOWMETRY: COMPARISON OF UROFLOWMETRY AND MOBILE ACOUSTIC UROFLOWMETRY

Young Ju L<sup>1</sup>, Jeeyoung S<sup>2</sup>, Jiyoung J<sup>2</sup>, Min-Ho S<sup>3</sup>, Hansol C<sup>4</sup>, Sangchul L<sup>1</sup>

1. Seoul National University Bundang Hospital, Seongnam-si, Republic of Korea, 2. Dain Technology, Inc., Seoul, Republic of Korea, 3. Department of Electrical Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark, 4. Faculty of Biology, University of Freiburg, Freiburg im Breisgau, Germany

### HYPOTHESIS / AIMS OF STUDY

Uroflowmetry is a screening urodynamic test in urology. Standard conventional uroflowmetry is inconvenient for patients because the measurement environment is unfamiliar and unnatural, demanding a timed voiding for the test. A novel acoustic uroflowmetry is based on sound analysis using a smart phone, and can be used at home without cumbersome settings. The aim of this study is to evaluate the accuracy of this method comparing the new acoustic uroflowmetry to a standard uroflowmetry.

### STUDY DESIGN, MATERIALS AND METHODS

A novel mobile acoustic uroflowmetry is an easy-to-use, non-invasive method to estimate the urine flow simply by recording the sound during voiding with a smart phone. After the approval of institutional review board, patients with voiding complaints were recruited and the voiding sound was recorded during standard uroflowmetry measurements. Male subjects were recorded in standing position and females in sitting position. The urine flow rate is calculated as the voiding sound was recorded and processed. Voided volume can be obtained by integrating the calculated flow rate. Cases with voided volume <20mL or having recording problems were excluded. Pearson's correlation coefficient (PCC,  $r$ ) was used to compare the maximal flow rate ( $Q_{max}$ ), average flow rate ( $Q_{avg}$ ), and voided volume estimated by the standard uroflowmetry with those calculated via acoustic uroflowmetry.

## RESULTS

A total of 97 patients including 60 males and 37 females were analyzed. Mean age was 59.8, 59.9 years for men and women respectively. Urination sounds differently by gender, perhaps due to differences in their anatomy of pelvis/lower urinary tract and posture during urination. Therefore, the data was analyzed separately for men and women. Flow patterns recorded by acoustic uroflowmetry and conventional uroflowmetry showed a good visual correlation (Fig 1). For male patients, average Qmax, Qavg and voided volume were 15.4mL/s, 8.4mL/s and 198mL, respectively. An excellent correlation was observed between the two methods for Qmax ( $r=0.88$ ), Qavg ( $r=0.91$ ) and voided volume ( $r=0.95$ ). For female patients, average Qmax, Qavg and voided volume were 18.5mL/s, 9.7mL/s and 204mL, respectively. Qavg ( $r=0.93$ ) and voided volume ( $r=0.96$ ) showed excellent correlation, while Qmax showed good correlation ( $r=0.78$ ) between the two methods in females.

Figure 1. Examples of flow pattern recorded by the standard uroflowmetry (line) and acoustic uroflowmetry (dots) using voiding sound record after processing.

## INTERPRETATION OF RESULTS

In 2015, Krhut et al. have reported a sound-based uroflowmetry, named 'sono-uroflowmetry (SUF)' [1]. This study was consisting 25 healthy male volunteers and demonstrated strong correlation for the duration ( $r=0.87$ ). However, moderate correlation was observed in voided volume ( $r=0.68$ ), and Qavg ( $r=0.57$ ). For Qmax, poor correlation ( $r=0.38$ ) was observed. Another study from the same team with 36 healthy female volunteers showed strong correlation for duration ( $r=0.95$ ) but moderate correlation for voided volume ( $r=0.68$ ) and poor correlation for the Qmax ( $r=0.38$ ) [2].

While SUF focused on the basic relationship between sound intensity to instant flow rate in time domain, our prediction method analyzes various sound features and its combination in spectral domain. Additional algorithms were applied to suppress sound artifacts, offset environmental characteristics, and improve its prediction accuracy. Our results showed strong correlation between the result of standard uroflowmetry and estimated parameters by the acoustic sound based uroflowmetry. Qmax, Qavg and voided volume showed a strong correlation both in men and women who are with wide range of severity and various voiding patterns.

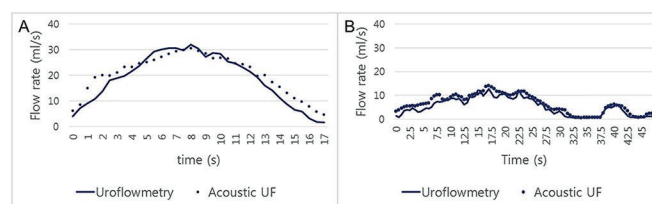
This easy to use mobile acoustic uroflowmetry can be used to check and monitor the urinary flow rate and volume both in patients and healthy people in daily, natural settings. It can also offer longitudinal trends of key urodynamic parameters in a quantitative manner, so would be helpful for not only patients and caregivers, but also for healthcare providers and payers who need to pre-screen and monitor lower urinary tract symptoms. The smartphone app has a uses an automatic voiding diary for daily usage. Time to void and voided volume can be calculated and filled by predicted urine flow from recording each voiding event, and automatically consolidated for each day. This quantitative and ease-

of-use app might improve shortcomings of current voiding diary such as incomplete voiding diaries with missing values and low compliance. Limitations include that males voiding in sitting position are not included for the analysis. The concept and baseline technology can also be applied for pediatric applications, but more investigation and validation will be necessary.

## CONCLUDING MESSAGE

This study shows that an acoustic uroflowmetry is possible with a good correlation with the standard uroflowmetry. Further works on prediction accuracy and error with different toilet settings is needed for broader use.

FIGURE 1



## REFERENCES

1. Krhut, J., et al., Comparison between uroflowmetry and sonouroflowmetry in recording of urinary flow in healthy men. *Int J Urol*, 2015. 22(8): p. 761-5.
2. Gartner, M., et al., Evaluation of Voiding Parameters in Healthy Women Using Sound Analysis. *Low Urin Tract Symptoms*, 2018. 10(1): p. 12-16.

**Funding** Funding - This work was supported by grant No S2534278 from the Ministry of SMEs and Start-Ups Research Fund. **Clinical Trial** Yes **Public Registry** No **RCT** No **Subjects** Human **Ethics Committee** Ethics approval and consent to participate - Seoul National University Bundang Hospital Institutional Review Board (IRB) approved this study. IRB approval number is B-1709-423-301. **Helsinki** Yes **Informed Consent** Yes

209 | [www.ics.org/2018/abstract/209](http://www.ics.org/2018/abstract/209)

## ULTRASOUND EVALUATION OF THE INFLUENCE OF CUBE PESSARIES ON FEMALE'S PELVIC FLOOR

Wlazlak E<sup>1</sup>, Kociszewski J<sup>2</sup>, Krzycka M<sup>1</sup>, Wlazlak W<sup>1</sup>, Dunicz A<sup>1</sup>, Surkont G<sup>1</sup>

1. Clinic of Operative Gynecology and Gynecologic Oncology, 1st Department of Gynecology and Obstetrics, Medical University of Lodz, Poland, 2.

Department of Gynecology and Obstetrics, Lutheran Hospital Hagen-Haspe, Hagen, Germany

## HYPOTHESIS / AIMS OF STUDY

In some clinics daily used cube pessaries are offered to the women with pelvic organ prolapse (POP) as first line treatment, in most of the centers - as second or third line. Some specialists advocate that cube pessary can activate pelvic floor muscles (1). It was not investigated if avulsion of puborectalis muscle can have negative influence on effec-