



## Importance of Ultrasound Determination of the Urinary Bladder Volume for Care in Patients with Spinal Cord Injury (SCI) who Practice Catheterization.

N. Raue, C. Hitschler, B. Domurath, Department Neuro-Urology, Werner-Wicker-Clinic, Bad Wildungen, Germany

### INTRODUCTION & OBJECTIVES

Patients with SCI usually have no sensitivity in the bladder. They cannot assess when the bladder has to be emptied. Therefore the knowledge about the filling volume of the urinary bladder is important to avoid any complications (NHS Guidelines C040, 2011). For nurses it is a great problem to determine the time necessary for emptying the bladder by catheterization.

The objective of the study was to determine:

1. How accurate is the examination of the urinary bladder volume using ultrasound device.
2. How reliable is the determination of the residual urine volume using ultrasound.
3. Is the residual urine volume a problem in patients with recurrent urinary tract infections.
4. Is there any difference in completeness of bladder emptying depending on the position of patient use.

### MATERIALS & METHODS (I)

Gender	Kind of Emptying	Numbers of Patient	Percent
Male	standing	20	16,1%
	supine	21	16,9%
	sitting	20	16,1%
Female	standing	22	17,7%
	supine	20	16,1%
	sitting	21	16,9%

We examined 124 patients with SCI and multiple sclerosis, 61 men and 63 women. The age ranged from 18 to 74 years.

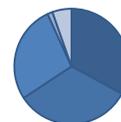
### MATERIALS & METHODS (II)

#### Ultrasound Device



Bladder Scan BVI 9400 (Fa Verathon Medicale)

#### Catheter Materials

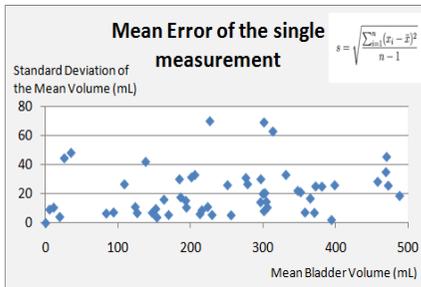


- B.Braun Nelaton
- Sauer IQ Cath
- Coloplast Speddy Cath
- Hollister Vapro
- Astra Tech Lofric

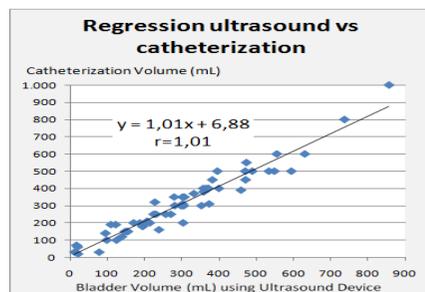
### RESULTS

We measured the urinary bladder volume three times using the ultrasound device, calculate the mean volume and compared with the volume after catheterization. We founded an excellent agreement between the two kinds of volume with a regression coefficient of 1.01

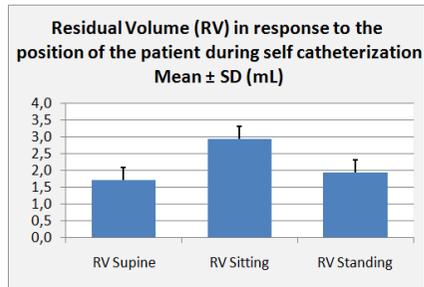
It was no difference in the urine volume measurement between different positions of the patient. The residual volume after catheterization is not the reason why patient with SCI have recurrent urinary tract infections. We did not find a clinical important residual volume after catheterization in these patients.



The mean error of the single measurement of the volume in the bladder is independent from the bladder volume. This causes a greater error of the measurement in the case of volume below 200mL. To reduce the error we recommend to check the bladder volume three times. This is particularly important for the determination of the residual volume.



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The residual urine after catheterization was in the mean - 2,2 mL with a standard deviation of ± 5,0 mL. It was no difference in the urine volume measurement between different positions of the patient.

### CONCLUSIONS

The ultrasound system is an important and accurate device for determination of urine bladder volume.

To prevent any error in the measurement of urine bladder volume it is necessary to examine the bladder volume three times.

The position of SCI- patients during catheterization has no influence on the residual volumes.