



# Pre/Post Comparison After Introduction of a Female External Urinary Collection Device

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## Background

- Catheter associated urinary tract infections (CAUTIs) are the most common hospital acquired infections in the United States.
- External urinary collection devices (EUCDs) may serve as an alternative to indwelling urethral catheters (IUCs) and decrease the rate of CAUTIs.
- PureWick®* is a novel female EUCD, with early case reports suggesting safe and efficacious use.
- No study to date has definitively proven benefit of *PureWick®* regarding reduction of CAUTIs.

## Objectives

We sought to compare the CAUTI rate and median indwelling catheter days before and after availability of *PureWick®* at a single academic institution, as well as provide a descriptive analysis of female medical patients receiving an EUCD.

## Methods and Materials

- Retrospective review of adult female medical patients admitted to a single academic center
- Inclusion: Non-pregnant female patients admitted to a non-surgical service in the 3 months before (PRE) and 12 months after (POST) *PureWick®* availability
- Primary outcomes: CAUTI rate before and after *PureWick®* introduction
- Secondary outcome: Median indwelling catheter days, *PureWick®* - associated UTI rate, UTI rate
- Two groups were compared: PRE patients who received an IUC vs. POST patients who received an IUC and/or EUCD
- Chi-squared test for categorical variables and Mann-Whitney U test for continuous variables

## Results

- From 866 female patients meeting inclusion criteria, 296 received an EUCD in the POST cohort
- 673 patients received an IUC (261 (100%) PRE vs. 412 (68.1%) POST)
- There were no differences between the cohorts regarding age and comorbidities (all p>0.05)

**Table 1.** Characteristics and comorbidities of female catheterized patients admitted to a medical service before (PRE) and after (POST) PureWick implementation

Characteristic	PRE (n=261)	POST (n=605)	p-value
Age, year, median (IQR)	70 (53, 81)	72.0 (59, 82)	0.294
BMI, median (IQR)	24.8 (21.4, 29.1)	24.9 (21.3, 30.5)	0.831
Hospital LOS, days, median (IQR)	5 (3, 8.5)	7 (4, 12)	0.001
Indwelling catheter days, median (IQR)	2 (1, 5)	3 (1, 7)	<0.001
PureWick catheter days, median (IQR)	N/A	2 (1, 5)	N/A
Indwelling urinary catheter, n (%)	261 (100%)	412 (68.1%)	<0.001
PureWick, n (%)	N/A	296 (48.9%)	N/A
Medical comorbidities, n (%)			
Diabetes	95 (36.4%)	205 (33.9%)	0.476
CHF	51 (19.5%)	131 (21.7%)	0.484
ESRD	19 (7.3%)	36 (6.0%)	0.462
Dementia	29 (11.1%)	65 (10.7%)	0.873
Current malignancy	60 (23.0%)	126 (20.8%)	0.477
HIV infection	1 (0.4%)	2 (0.3%)	0.904

BMI = body mass index, LOS = length of stay, IQR = interquartile range, CHF = congestive heart failure, ESRD = end stage renal disease, HIV = human immunodeficiency virus

- Compared to the PRE cohort, the POST cohort had a higher rate of CAUTI (infections per 1,000 catheter days, 11.8 vs. 4.1, p=0.003) and a higher number of IUC days (median, 3 vs. 2 days, p<0.001)
- Compared to the PRE cohort, the POST cohort had a longer hospital length of stay (median, 7 vs. 5 days, p=0.001)
- Overall UTI rate was similar between the PRE and POST groups (infections per 1,000 patient days, 19.1 vs. 14.12, p=0.410)
- In the POST cohort, the rate of UTI associated with EUCD use was 11.3 infections per 1,000 device days
- Measurement of strict ins and outs (56.8%) was the most common indication for use of EUCD

**Table 2.** Urinary tract infection rates of female catheterized patients PRE and POST PureWick implementation

Characteristic	PRE (n=261)	POST (n=605)	p-value
Urine culture, n (%)	114 (43.7%)	354 (58.5%)	<0.001
CAUTI, n (*)	4 (4.1)	38 (11.8)	0.003
PAUTI, n (*)	N/A	15 (11.3)	N/A
UTI, n (**)	36 (19.1)	97 (14.12)	0.410

CAUTI = catheter-associated urinary tract infection, PAUTI = PureWick-associated UTI, UTI = urinary tract infection

\* CAUTI and PAUTI rate are presented as number of infections per 1,000 catheter days.

\*\* UTI rate is presented as number of infections per 1,000 patient days.

**Table 3.** Characteristics of female patients admitted to a medical service who received a PureWick catheter

Characteristic	POST (n=296)
Age, year, median (IQR)	75.0 (63, 85)
BMI, median (IQR)	24.6 (21.5, 30.0)
Hospital LOS, days, median (IQR)	6 (3, 11)
Indwelling catheter days, median (IQR)	2 (1, 5)
PureWick catheter days, median (IQR)	2 (1, 5)
Indwelling urinary catheter, n (%)	107 (36.1%)
PureWick, n (%)	296 (100%)
Indication for catheterization, n (%)	
Urinary retention	41 (13.9%)
Strict ins/outs	168 (56.8%)
Incontinence	64 (21.6%)
Surgery	1 (0.3%)
Management of immobilized patient	12 (4.1%)
Comfort	10 (3.4%)
Provider service ordering catheter, n (%)	
Emergency medicine	2 (0.7%)
Family medicine	14 (4.7%)
Medicine	236 (79.7%)
Neurology	44 (14.9%)

IQR = interquartile range, BMI = body mass index, LOS = length of stay

## Discussion

- This pre/post analysis at a single institution found that both the CAUTI rate and median number of IUC days increased after introduction of an EUCD
- The increased number of IUC days in the POST cohort may be related to hospital length of stay, as the POST cohort had a significantly longer median length of stay
- Additionally, the increase in median IUC days may explain the increase in CAUTI rate in the POST group
- The similar rate of CAUTI and EUCD-associated UTI in the POST cohort may be due to selection bias, with EUCDs being ordered for patients who would not otherwise have received an IUC

## Conclusions

While EUCDs might appear to be a promising alternative to IUCs for female patients, this single center pre/post analysis found that both the median number of IUC days and the CAUTI rate increased after introduction of a single EUCD. Further research is needed to clarify if female EUCDs can be effective in decreasing IUC days and/or CAUTI rates prior to any widespread adoption.



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