

Assessment of urinary cultures and catheter-associated urinary tract infection (CAUTI) rates at a free-standing rehabilitation hospital

Abstract

Background: Catheter-associated urinary tract infections (CAUTIs) are an expensive and harmful reality for patients in rehabilitation hospitals. Reduction in incidence of CAUTIs depends on duration of catheterization, appropriate catheter care and hand hygiene policy compliance. The effectiveness of HealthSouth indwelling catheter-related infection control policies were assessed through a case-series study.

Methods: HealthSouth catheter utilization rates and CAUTI incidence rates for 2014 were collected using Electronic Medical Services (EMS). These rates were compared to the National Healthcare Safety Network (NHSN) averages for similar type of facilities across the nation. Binomial confidence intervals were calculated and rates were compared using the Z-test. Hand hygiene compliance rates for HealthSouth were collected for the 1st quarter of 2015 and compared to the national average.

Results: During the 1st quarter of 2015, *E. coli* (27.7%), *E. faecalis* (16.9%), and *K. pneumoniae* (12.3%) were the most common identified organisms growing at a minimal concentration of 100,000 CFU per milliliter. HealthSouth 12-month catheter utilization rate was 0.05 per patient day for 2014. A significant difference was found between this HealthSouth rate and the 2013 NHSN national catheter utilization rate of 0.08 per patient day ($p < 0.001$). HealthSouth 12-month CAUTI rate was 0.90 per 1,000 urinary catheter days for 2014. HealthSouth CAUTI rate was not statistically different from the 2013 NHSN national CAUTI rate of 2.1 per 1,000 urinary catheter days ($p = 0.390$). The hand-hygiene compliance rate (78%) for HealthSouth for the 1st quarter of 2015 was lower than the national average compliance rate (45%).

Discussion: Current HealthSouth infection control protocols were effective in guiding the clinical staff to utilize urinary catheters only when indicated. This resulted in a urinary catheter usage rate for HealthSouth being significantly lower than the national rate for similar facilities. The HealthSouth CAUTI rate and the national CAUTI rate were similar statistically. Missing components of the ABCDE guideline were recommended to be adopted into HealthSouth policies to decrease the CAUTI rate. Further education and increased alcohol-based sanitization stations were recommended to stabilize the hand-hygiene compliance rate.

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Background

Urinary tract infections (UTIs) are one of the most common healthcare-associated infections (HAIs).¹ 70% of HAIs are associated with urinary catheters.² In 2007, there were 139,000 catheter-associated UTIs (CAUTIs) in U.S. hospitals.³ Each episode is estimated to cost \$600.³ If the CAUTI leads to a bloodstream infection, costs escalate to \$2800 per episode.³ Nationally, CAUTIs cause an estimated \$131 million in annual excess medical costs.⁴ This is critical because Centers for Medicare and Medicaid Services (CMS) no longer include CAUTIs among conditions that are reimbursed for the extra cost of care.⁵ Among all hospitals with inpatient beds, rehabilitation facilities had the highest rates of CAUTIs.³ Modifiable risk factors include limiting duration of catheterization, appropriate catheter care and following hand hygiene protocols.² UTIs may present as symptomatic or asymptomatic and as complicated or uncomplicated.² It is important to avoid treating asymptomatic UTIs except for special cases as in during pregnancies.⁶ To gain insight into the effectiveness of HealthSouth indwelling catheter-related infection control policies, a case-series study was conducted. HealthSouth urinary catheter

utilization rates and CAUTI rates for 2014 were compared to national rates to establish whether prevention protocols adopted at HealthSouth were effective.⁷

Methods

Electronic Medical Services (electronic patient records) were used to identify all urine cultures growing at least one organism during the 1st quarter of 2015 at HealthSouth. Electronic records were also used to review catheter utilization rates and incidence of CAUTIs during 2014. These data were compared to the 2013 National Healthcare Safety Network (NHSN) national averages for in-patient rehabilitation facilities.⁷ As the sub-stratified information on catheter utilization and CAUTI was not available, we computed binomial confidence intervals and compared the rates to the NHSN national averages for in-patient rehabilitation facilities using the Z-test.⁸ Additionally, hand hygiene compliance tests were conducted during the 1st quarter of 2015 to tabulate the HealthSouth compliance rate. Hospital policies and orientation education materials were also examined.

Results

During the 1st quarter of 2015, there were 126 positive urinary cultures with 79% growing gram-negative rods and 21% growing gram-positive cocci. Among these, 65 were confirmed as growing at least one organism at a concentration of 100,000 CFU per milliliter. *E. coli* (27.7%), *E. faecalis* (16.9%), and *K. pneumonia* (12.3%) were the most common identified organisms. Frequencies of positive urine cultures during the 1st quarter indicate a decrease in overall numbers in March 2015. HealthSouth 12-month catheter utilization rate was 0.05 per patient day for 2014. A significant difference was found between

this HealthSouth rate and the 2013 NHSN national catheter utilization rate of 0.08 per patient day⁸ ($p < 0.001$).⁹ The 95% confidence intervals for this comparison were HealthSouth (0.05, 0.05) and NHSN data (0.08, 0.08).¹⁰ HealthSouth 12-month CAUTI rate was 0.90 per 1,000 urinary catheter days for 2014. This HealthSouth CAUTI rate was not statistically different from the 2013 NHSN national CAUTI rate of 2.1 per 1,000 urinary catheter days⁸ ($p = 0.390$).⁹ The 95% confidence intervals for this comparison were HealthSouth (0.0006, 0.0015) and NHSN data (0.002, 0.002).¹⁰ The hand-hygiene compliance rate for HealthSouth was 78% for the entire 1st quarter of 2015 (Figures 1-4) (Tables 1-3).

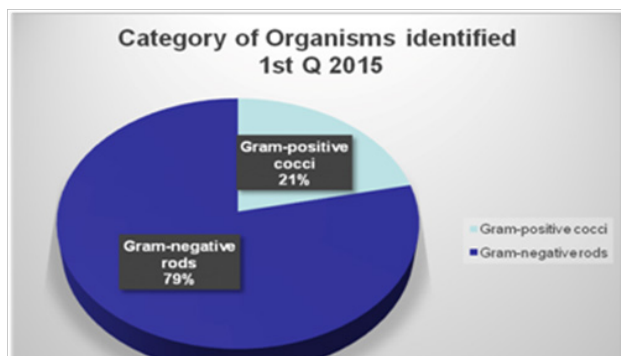


Figure 1 Categories of organisms detected.

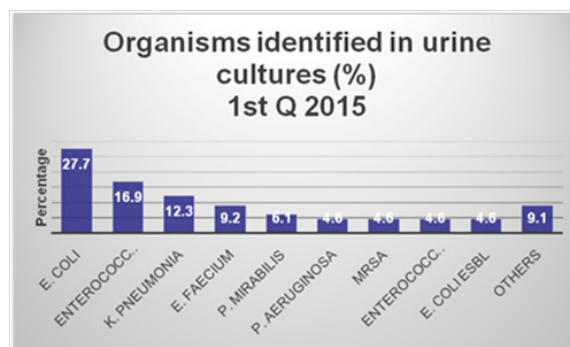


Figure 2 Organisms identified.

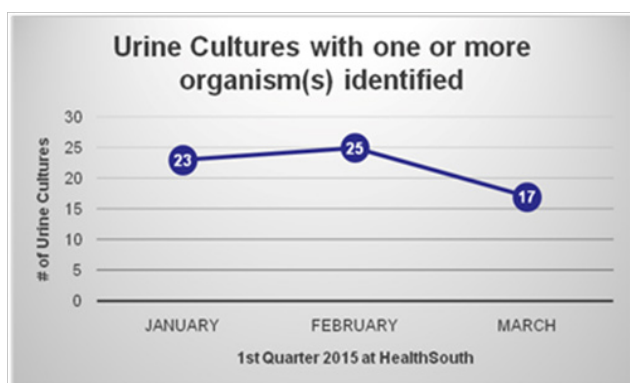


Figure 3 Frequencies of urine cultures.

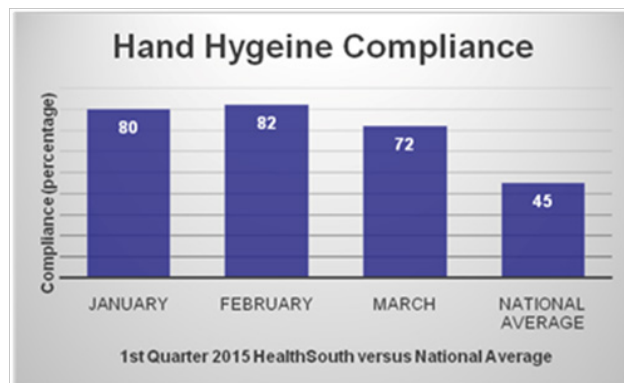


Figure 4 Monthly hand hygiene compliance rates.

Table 1 12-month catheter utilization rate comparison

	Urinary catheter days	Patient days	Catheter utilization rate*	Significant difference***
HealthSouth (2014)	1105	23123	0.05	$P < 0.001$
NHSN national pooled mean	189879	2333441	0.08**	

*Catheter utilization rate = (Urinary catheter days / Patient days)

**Pooled mean for device utilization rate for all in-patient rehabilitation facilities (IRFs)

***95% binomial confidence intervals for the comparison were HealthSouth (0.05, 0.05), NHSN (0.08, 0.08).

Table 2 12-month Catheter-associated UTI (CAUTI) rate comparison

	No. of CAUTIs	Urinary catheter days	CAUTI rate*	No significant difference***
HealthSouth (2014)	1	1105	0.9	P = 0.390
NHSN national pooled mean	395	189879	2.1**	

*CAUTI rate = (No. of CAUTIs / No. of urinary catheter days) x 1000

**Pooled mean for CAUTI rate for all in-patient rehabilitation facilities (IRFs)

***95% binomial confidence intervals for the comparison were HealthSouth (0.0006, 0.0015), NHSN (0.002, 0.002).

Table 3 ABCDE Recommended guidelines for CAUTI prevention.³

S. No	Recommended guidelines for CAUTI prevention
A	Adherence to general infection control principles
B	Bladder ultrasound may avoid indwelling catheterization
C	Condom catheters or other alternatives to an indwelling catheter
D	Do not use the indwelling catheter unless you must
E	Early removal of the catheter using a nurse-initiated removal protocol may be beneficial

Discussion/Conclusion

HealthSouth infection control protocols were effective in guiding the clinical staff to utilize urinary catheters only when indicated. HealthSouth 2014 urinary catheter usage rate was significantly lower than the national rate for similar facilities. While the 2014 HealthSouth CAUTI rate was lower than the national CAUTI rate, the two were similar statistically. In smaller sized hospitals (<100 beds) like HealthSouth, a single CAUTI will cause an exorbitant increase in the infection rate. Missing components of the ABCDE guideline were recommended to be adopted into HealthSouth policies to further decrease the current CAUTI rate. While the hand-hygiene compliance rate for HealthSouth (78%) was lower than the national average (45%),¹¹ there was dramatic variability from month to month. Further education and increased alcohol-based sanitization stations were recommended to stabilize the hand-hygiene compliance rate

Limitations

HealthSouth rehabilitation hospitals are limited in the number of patient beds per facility. This limits the power of the study and results are not generalizable to larger hospitals. National Healthcare Safety Network (NHSN) pooled means used were from 2013,¹⁰ while HealthSouth data were from 2014. NHSN 2013 data were used for comparison because it is the most current national data available.

Acknowledgements

None.

Conflict of interest

The author declares no conflict of interest.

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