Single-center analysis of water wasted at operating room scrub sinks

Carolyn J. Hu[1,2], Imadh Khan[3], Margaret Reilly[2], Deena El-Gabri[2], Andrew W. Hoel[2], Cord Sturgeon[2], Karen J. Ho[1,2]

[1]Northwestern University Feinberg School of Medicine, [2]Northwestern Medicine Department of Surgery, [3]Southern Illinois University School of Medicine

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Background

- Healthcare systems adversely impact the environment through resource consumption, waste generation, and greenhouse gas emission[1-3]
- Scrub sinks used for sterile hand scrubs are a source of operating room (OR) resource waste
  - Water is often left running after the conclusion of hand scrubs

Objective

To quantify water wasted at OR scrub sinks at a single center and identify modifiable factors for reducing water waste in the OR.

Methods

1. Observed scrubbing at 98 OR sinks at 2 academic hospitals; included sinks with electronic timers (N=84) and knee panels controls (N=14)
   - Water waste = seconds of water flow after conclusion of a scrub
   - Sampled water flow rates at both sink types
2. Anonymous, voluntary surveys to assess frequency of scrubbing with soap and water and scrub preferences
3. Estimate cost of water waste using annual water utility bill

Figure 1. OR Scrub Sinks. A: Sink with preset electronic timer; B: sink with knee panel controls; C-D: Scrub cycle options

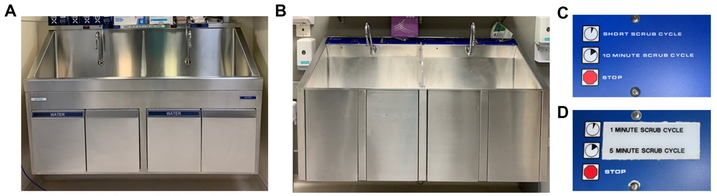

Table 1. Operating Room Sinks

Floor	Knee-Operated Sink	Timer-Controlled Sink	Total
A	4	48	52
B	0	12	12
C	10	0	0
D	0	20	20
Total	14	80	94

Table 2. Median water waste by sink type

	All Sinks (N=94)	Knee-Operated (N = 14)	Timer-Controlled (N = 80)
Time (min)*	2 (0.82; 3)	0 (0; 2)	2.02 (0.95; 3)
Flow Rate (L/min)	5.1 (4.6; 6.8)	6.5 (5.9; 6.8)	5.1 (4.5; 6.6)
Water Wasted per Scrub (L)	10.2 (3.7; 20.4)	0 (0; 27.1)	10.2 (4.2; 19.9)

Table 3a. Hand Scrub Habits of Survey Respondents

Affiliation	Respondents (N)	Types of sterile scrubs*			P value	Total Scrubs (N)*
		Wet N (%)	Alcohol-Based N (%)	Both** N (%)		
All	224	323 (25.9)	837 (67.1)	89 (7)		1247
Surgical Staff	63	111 (25.6)	300 (69.3)	22 (5.1)	p=0.11	433
Attending Surgeons	161	212 (26.0)	537 (66.0)	67 (8.2)		814

Table 3b. Attending Hand Scrub Habits Among Attending Surgeons

Attending Specialty	Respondents (N)	Types of sterile scrubs*			Total Scrubs (N)
		Wet N (%)	Alcohol-Based N (%)	Both** N (%)	
Ob/Gyn	77	82 (38.1)	98 (45.6)	35 (16.3)	215
Surgery	30	66 (28.6)	157 (68)	10 (4.3)	231
Ophtho	24	44 (28.8)	109 (71.2)	0 (0)	153
Ortho	14	13 (13.3)	67 (68.4)	18 (18.4)	98
ENT	8	5 (11.6)	38 (88.4)	0 (0)	43
Urology	8	2 (2.7)	68 (91.9)	4 (5.4)	74

Ob/Gyn, Obstetrics and Gynecology; Ophtho, Ophthalmology; Ortho, Orthopedics; ENT, Otolaryngology
*Refers to scrubs performed in 2-week period
**Refers to wet scrub followed by alcohol-based scrub

Table 4. Estimated Annual Water Wasted in Pavilion A-D

	All cases (N=34,554)	Cases in OR With Knee-Operated Sinks (N=8996)	Cases in OR With Timer-Controlled Sinks (N=25,558)
Volume (L)	301,498.9 (124,146.6;804,601.2)	0 (0; 216,382.9)	301,498.9 (124,146.6; 588,218.4)
Cost ($)	891.17 (366.95; 2,378.25)	0 (0; 639.59)	891.17 (366.95;1,738.66)

Values shown are median (interquartile range)

Results

- Observed 201 instances of OR sink use, 159 instances of water waste
- Median: 131 seconds (IQR 64, 182 seconds) of water wasted
- Water flow rates varied from 3-7 L/min; median flow rate 5.1 L/min
  - Median 10 L (IQR 5.440, 15.470 L) of water wasted per wet scrub
  - ~2000 L of water waste observed during the study period
- More water wasted at timer-controlled sinks than knee-operated (P=.01)
- Attending surgeons and OR staff perform wet scrubs in 25.9% of cases
- OR users have significantly different scrub type preferences
- **Estimated median total volume of water waste for 34,554 cases/year: 301,498.9 L (IQR 124,146.6; 804,601.2)**

Limitations

The following assumptions were made in the analytic process to comply with resource restraints and institutional research policies:

- Water wasted and number of people scrubbed per case during 5-week observation period is representative of all scrub sink activity and all cases
- Water flow rates are similar at all OR sinks
- Hand scrub habits of survey respondents are representative of everyone who scrubs in the OR despite skewed distribution of responding specialties
- Recall of hand scrub habits of survey respondents is accurate

Conclusions

- The estimated median volume of water wasted is approximately the volume of water used in 6 months by an average American household of four[4] or the volume of drinking water needed in one day by 94,000 people[5]
- We found significant differences in water waste between types of sink controls, agreeing with previous studies[6-10]
- We found significant differences in user scrub choice
- We encourage examination of facility characteristics and practices to develop and implement plans that will conserve water without compromising safety.

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