Place de l'Anesthésie dans la Transmission ou la Survenue des Infections Péri-Opératoires

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Opening Session ASA 2017

THE NEW YORKER

« On November 18th, Bigelow published his report on the discovery of "insensibility produced by inhalation" in the Boston Medical and Surgical Journal. The idea spread like a contagion, travelling through letters, meetings, and periodicals. By mid-December, surgeons were administering ether to patients in Paris and London. By February, anesthesia had been used in almost all the capitals of Europe, and by June in most regions of the world………

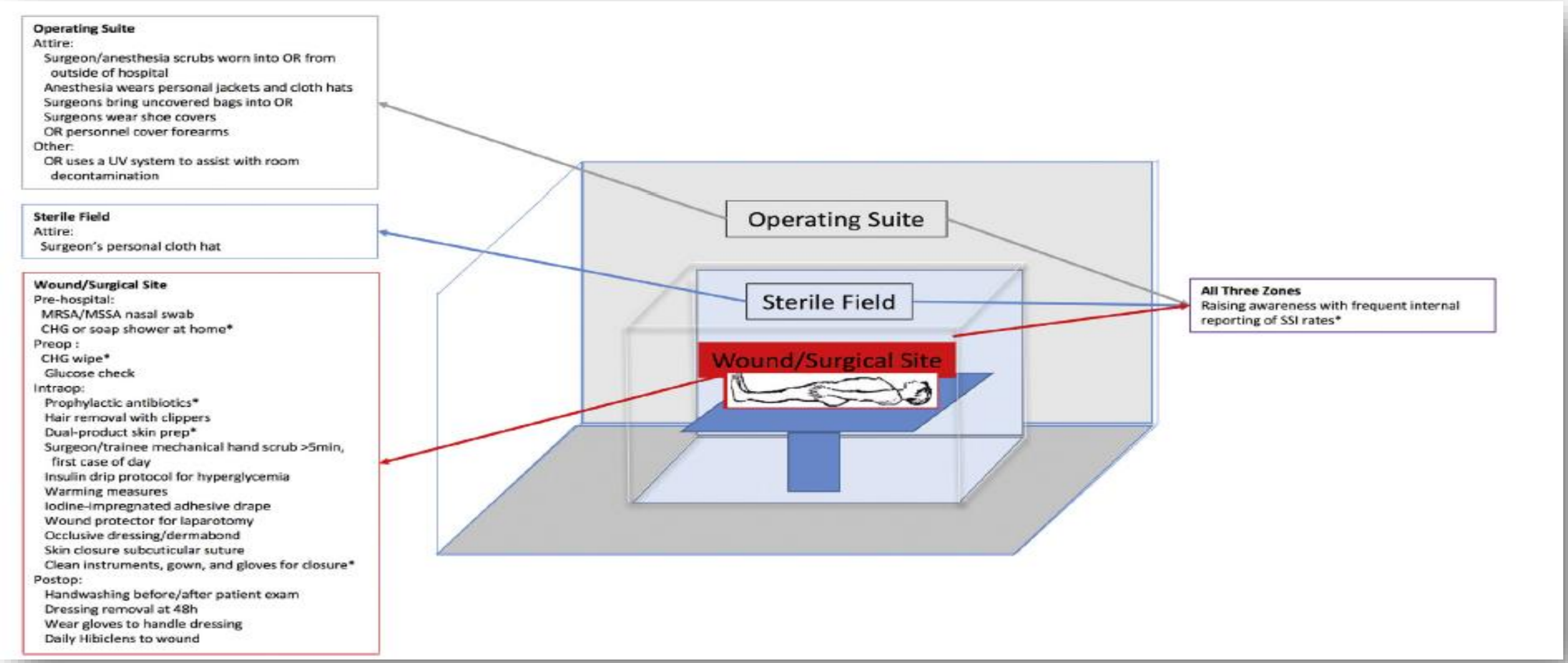
…….Concerning asepsis, it was a generation before Lister's recommendations became routine and the next steps were taken toward the modern standard of asepsis—that is, entirely excluding germs from the surgical field, using heat-sterilized instruments and surgical teams clad in sterile gowns and gloves. »

« So what were the key differences? First, one combatted a visible and immediate problem (pain); the other combatted an invisible problem (germs) whose effects wouldn't be manifest until well after the operation. »

Multi-Institution Analysis of Infection Control Practices Identifies the Subset Associated with Best Surgical Site Infection Performance: A Texas Alliance for Surgical Quality Collaborative Project

Catherine H Davis, MD, MPH, Lillian S Kao, MD, MS, FACS, Jason B Fleming, MD, FACS, Thomas A Aloia, MD, FACS, for the Texas Alliance for Surgical Quality Collaborative

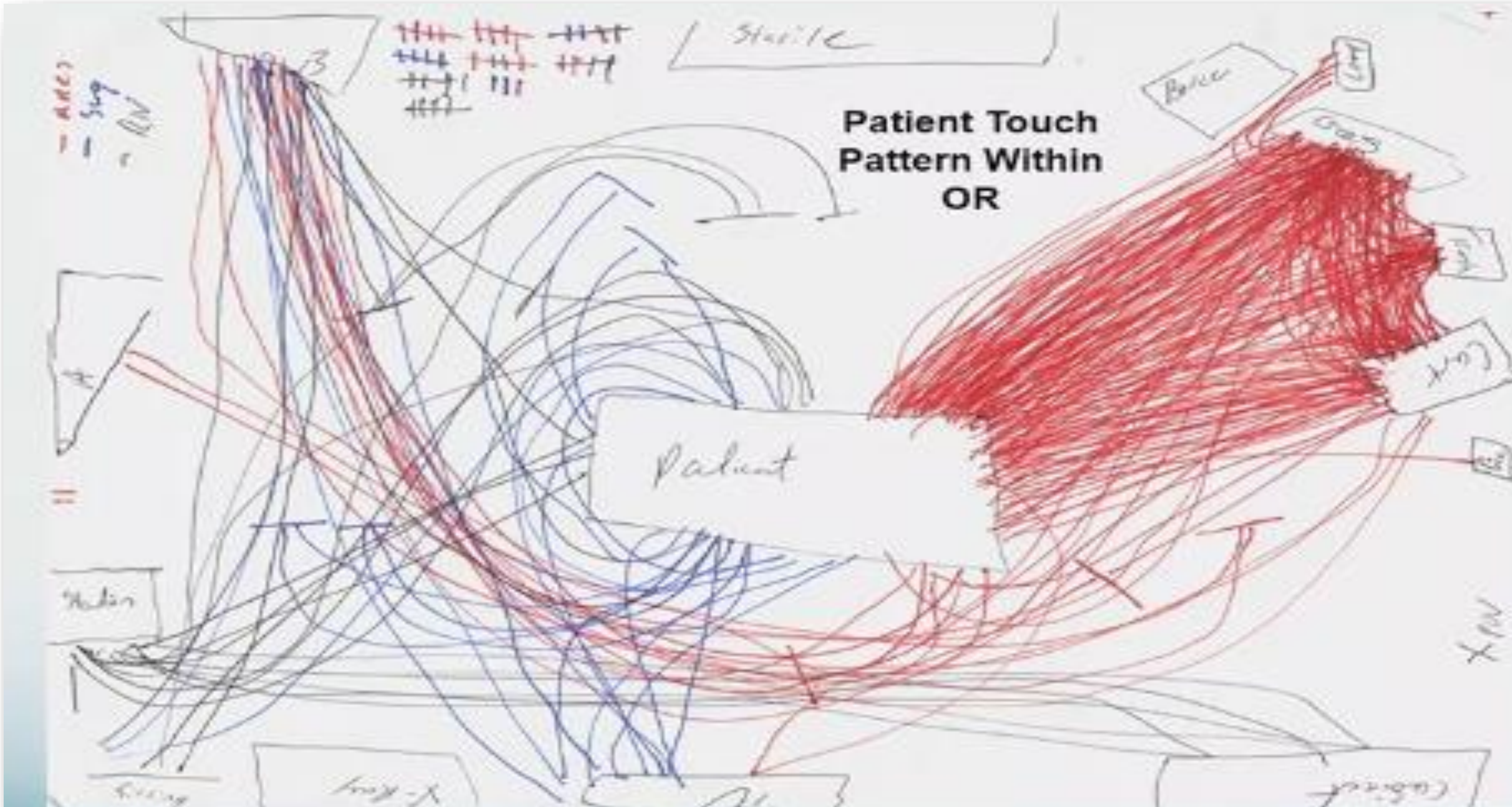
J Am Coll Surg 2017



This analysis suggests that the subset of ICPs that focus on perioperative patient skin and wound hygiene and transparent display of SSI data, not operating room attire policies, correlated with SSI rates.

Un jour en salle d'opération!

Les contacts avec le patient au cours d'une intervention: AR, IDE, Chirurgien



Fecal Patina in the Anesthesia Work Area

L. Silvia Munoz-Price, MD, PhD,* and Robert A. Weinstein, MD†

Stethoscopes as potential intrahospital carriers of pathogenic microorganisms

Alejandro Campos-Murguía MD [a], Ximena León-Lara MD [a], Juan M. Muñoz MD [a],
Alejandro E. Macías MD [a,b], José A. Álvarez MD [a,c,*]

American Journal of Infection Control 42 (2014) 82-3

Staphylococcus aureus isolated from 112 stethoscopes cultured in clinical services

	Cultured stethoscopes	Stethoscopes with bacterial pathogens*		*Staphylococcus aureus*		MRSA	
Department	n	n	%	n	%	n	%
Pediatrics	28	13	46	13	100	2	15
Neonatology	23	6	26	4	67	0	0
Internal medicine	21	11	52	11	100	6	55
Emergency	12	4	33	3	75	2	67
Surgery	11	7	64	7	100	3	43
Intensive care	9	6	67	4	67	4	100
Obstetrics and gynecology	8	1	13	1	100	1	100
Total	112	48	43	43	90	18	42

Video observation to map hand contact and bacterial transmission in operating rooms

American Journal of Infection Control 42 (2014) 698-701

John Rowlands MD [a], Mark P. Yeager MD [b,*], Michael Beach MD, PhD [c],
Hetal M. Patel BS [a], Bridget C. Huysman BA [a], Randy W. Loftus MD [a]

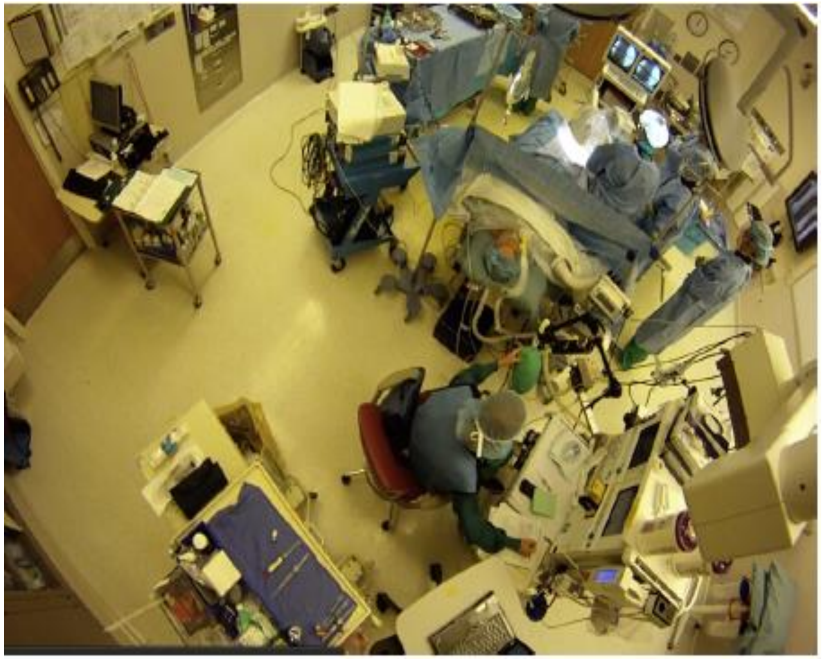


Fig 1. View of anesthesia work environment from the video recording camera.

Overall compliance rates for hand hygiene (HH) (expressed as number of observed HH events relative to total observed opportunities) during 5 surgical cases requiring general anesthesia

Procedure	Observed HH events	Observed HH opportunities	Compliance rate (%)
Open repair of forearm fracture	4	174	2.3
Lumbar disc excision	7	226	3.1
Metacarpal pin placement	5	185	2.7
Hardware removal from ankle	6	167	3.6
Repair nasal septal deviation	6	200	3
Mean			2.9
Standard error of the mean			0.2

Hand-hygiene practices in the operating theatre: an observational study

BJA

A. C. Krediet[1], C. J. Kalkman[1*], M. J. Bonten[2], A. C. M. Gigengack[3] and P. Barach[1]

Table 1 Interactions between members of staff and patients or OT (operating theatre) implements. Data are presented as *n* (%), per group

Perioperative staff	Patient contact without prior hand hygiene			Potential contamination of OR implements			Total
	>5 times	1–5 times	0 times	>5 times	1–5 times	0 times	
Anaesthesiologist	37 (95%)	2 (5%)	0 (0%)	35 (90%)	1 (3%)	0 (0%)	39
Anaesthesia nurse	33 (94%)	0 (0%)	0 (0%)	35 (100%)	0 (100%)	0 (0%)	35
Surgeon	19 (37%)	17 (32%)	14 (27%)	18 (35%)	27 (52%)	7 (13%)	52
Surgical nurse	1 (2%)	19 (29%)	45 (69%)	18 (28%)	22 (34%)	14 (22%)	65
Medical student	0 (0%)	17 (57%)	13 (43%)	0 (0%)	16 (53%)	14 (47%)	30

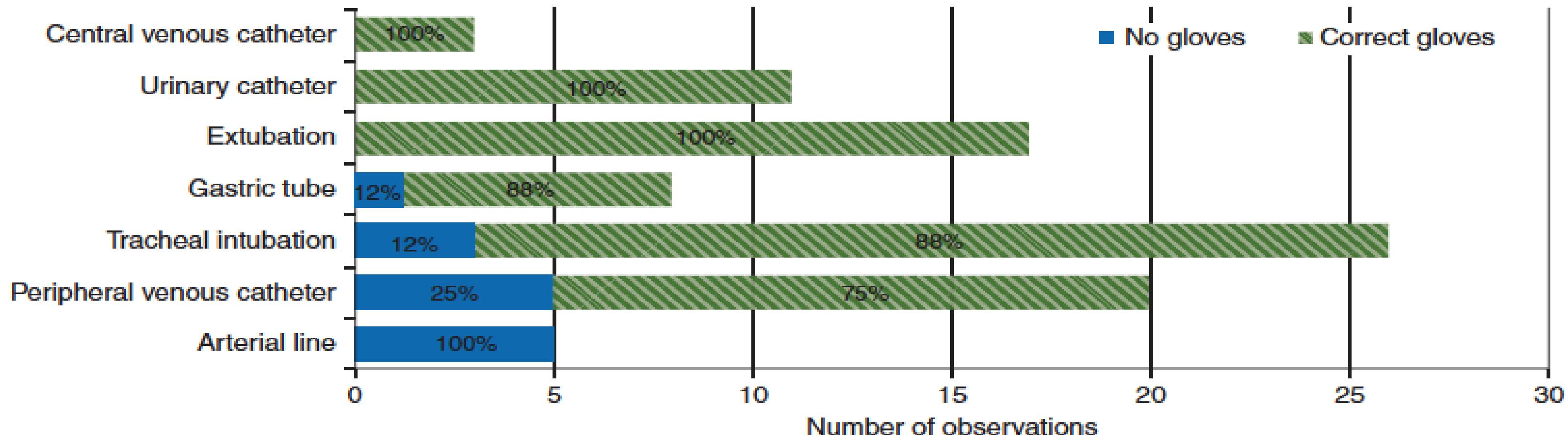


Fig 3 Usage of gloves (sterile and non-sterile depending on the procedure) for each invasive procedure.

Hand Hygiene Knowledge and Perceptions Among Anesthesia Providers

Anesth Analg 2015;120:837–43

Patrick G. Fernandez, MD,* Randy W. Loftus, MD,* Thomas M. Dodds, MD,*
Matthew D. Koff, MS, MD,* Sundara Reddy, MD,† Stephen O. Heard, MD,‡
Michael L. Beach, MD, PhD,* Mark P. Yeager, MD,* and Jeremiah R. Brown, MS, PhD§

Table 3. Measured Knowledge Regarding WHO Opportunity-Based Hand Hygiene

Opportunity	Correct N	Incorrect N	Percent guidelines[6]
Placing a peripheral IV catheter (aseptic task)	658	137	82.77
After intubation (exposure to secretions)	521	274	65.53
After adjusting OR bed height (exposure to environment)	167	628	21.01
Before a preoperative exam (before patient contact)	638	157	80.25
After palpating a pulse (after patient contact)	310	485	38.99

Table 4. Mixed-Effects Logistics Regression Model for Incomplete Knowledge ($N = 761$)

Covariate	OR	95% confidence interval	P value
I wash after contact with the environment	0.23	0.15–0.37	<0.001
I can influence my colleagues	0.43	0.27–0.68	<0.001
I disinfect my environment	0.55	0.35–0.82	0.004
I intend to adhere to guidelines	0.56	0.36–0.86	0.008

Les recommandations OMS qui protègent

CONCLUSIONS: Anesthesia provider knowledge deficits around to hand hygiene guidelines occur frequently and are often due to failure to recognize opportunities for hand hygiene after prior contact with contaminated patient and environmental reservoirs.

Interactions between anesthesiologists and the environment while providing anesthesia care in the operating room

American Journal of Infection Control 41 (2013) 922-4

L. Silvia Munoz-Price MD[a,b,c,d,*], David A. Lubarsky MD, MBA[b], Kristopher L. Arheart EdD[c], Guillermo Prado PhD[c], Timothy Cleary PhD[e], Yovanit Fajardo-Aquino MD[d], Dennise DePascale MT[d], Scott Eber MD[b], Philip Carling MD[f], David J. Birnbach MD, MPH[b,c]

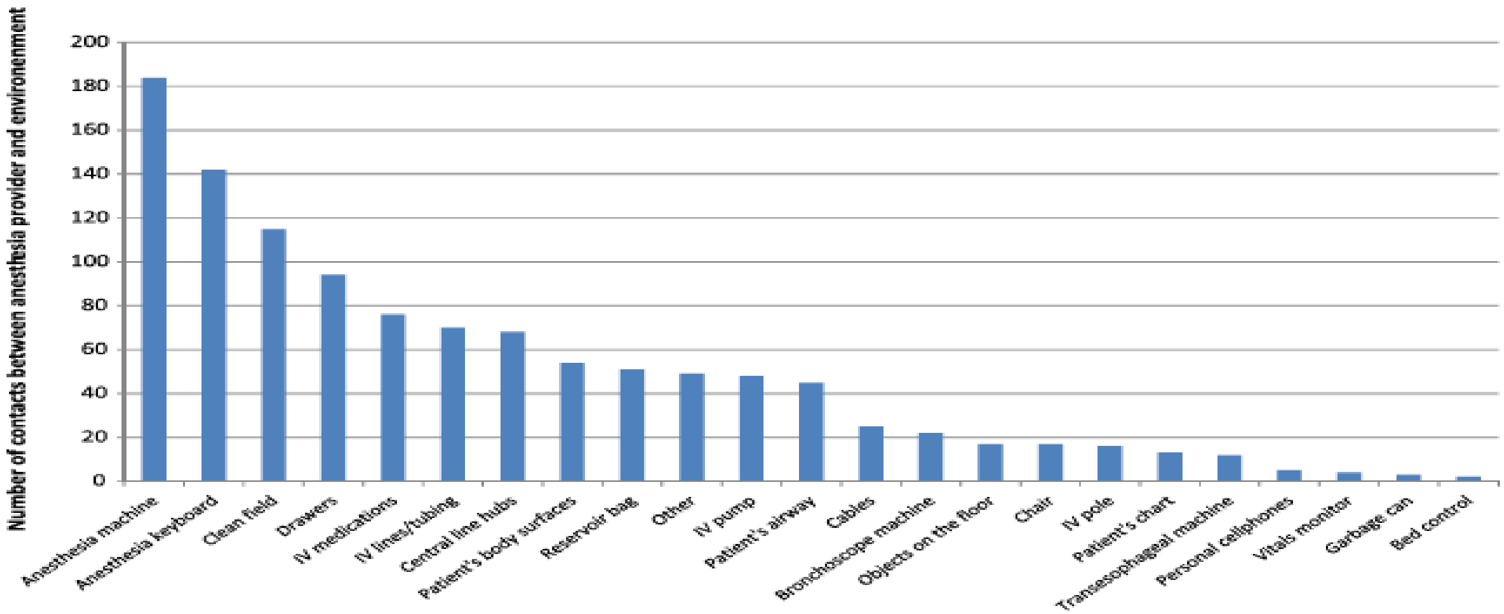


Fig 1. Number of contacts between anesthesia personnel and environment.

We describe 1,132 contacts between anesthesiologists and the operating room. Objects most commonly touched included anesthesia machines and keyboards. Only 13 hand hygiene events were witnessed during 8 hours of observations. Line insertions, bronchoscopies, or blood exposures were not followed by hand hygiene. Stopcocks were accessed 66 times and only disinfected on 10 (15%) of these occasions.

The Use of a Novel Technology to Study Dynamics of Pathogen Transmission in the Operating Room

David J. Birnbach, MD, MPH,*|| Lisa F. Rosen, MA,† Maureen Fitzpatrick, MSN, ARNP-BC,†
Philip Carling, MD, MPH,‡ and L. Silvia Munoz-Price, MD, PhD§||¶

Anesth Analg 2015;120:844–7

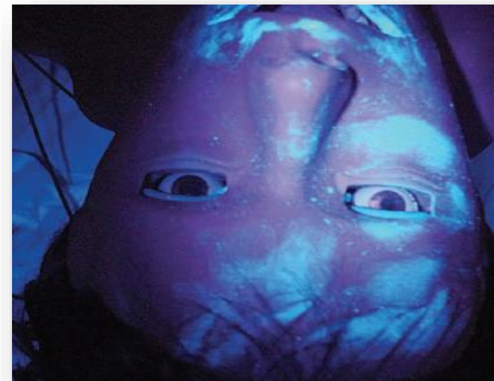


Table 2. Locations Which Were Contaminated in 100% of Scenarios
• Laryngoscope handle and blade
• Head of bed
• Eyes
• Nose
• Forehead
• Oxygen mask
• Reservoir bag
• Anesthesia machine surface
• Oxygen valve
• Anesthesia circuit
• Anesthesia cart
• IV hub
• Drape/ether screen

The Dynamics and Implications of Bacterial Transmission Events Arising from the Anesthesia Work Area

Randy W. Loftus, MD,* Matthew D. Koff, MS, MD,* and David J. Birnbach, MD, MPH†

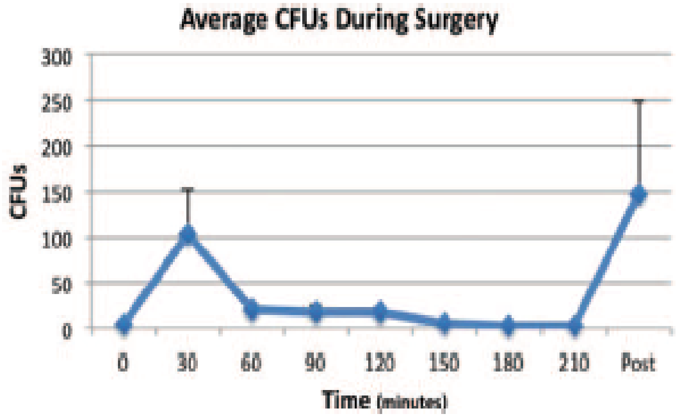
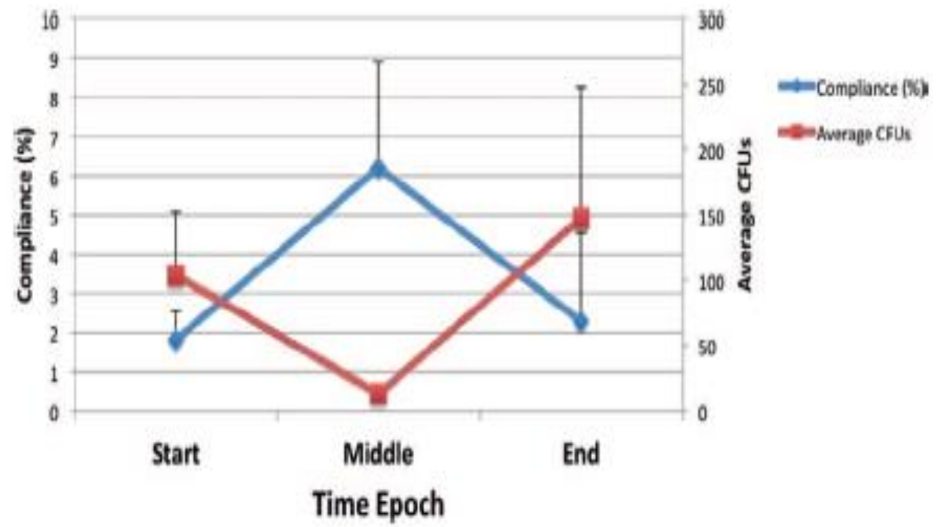


Figure 3. Bacterial contamination of the anesthesia environment reaches a peak during the 2 busiest phases of anesthesia care, induction and emergence of anesthesia. CFUs = colony-forming units.



Health care–associated infections are a hospital-wide concern associated with a significant increase in patient morbidity, mortality, and health care costs. Bacterial transmission in the anesthesia work area of the operating room environment is a root cause of 30-day postoperative infections affecting as many as 16% of patients undergoing surgery. A better understanding of anesthesia-related bacterial transmission dynamics may help to generate improvements in intraoperative infection control and improve patient safety. (Anesth Analg 2015;120:853–60)

Multiple Reservoirs Contribute to Intraoperative Bacterial Transmission

Anesth Analg 2012;114:1236–48

Randy W. Loftus, MD,* Jeremiah R. Brown, PhD, MS,† Matthew D. Koff, MD, MS,* Sundara Reddy, MD,‡ Stephen O. Heard, MD,§ Hetal M. Patel, BS, MLT,* Patrick G. Fernandez, MD,* Michael L. Beach, MD,* Howard L. Corwin, MD,‖ Jens T. Jensen, MS,* David Kispert, BA,* Bridget Huysman, BA,* Thomas M. Dodds, MD,* Kathryn L. Ruoff, PhD,¶ and Mark P. Yeager, MD*

Stopcock contamination was detected in **23%** (126 out of 548) of cases with 14 between-case and 30 within-case transmission events confirmed.

Table 5. Multivariable Analysis of Risk Factors for Health Care–Associated Infections

Contaminated stopcock	Odds ratio	95% confidence interval	*P* value
Site 0[a]	14.06	2.72–72.77	0.002
ASA	2.61	1.39–4.86	0.003
SENIC	1.87	1.12–3.12	0.017
Discharge other	6.48	1.01–41.65	0.049
Site 2[a]	1.53	.254–9.22	0.641
Age	1.01	.982–1.03	0.553
Gender	0.66	.304–1.42	0.287
Case 2	2.20	.992–4.88	0.052
Contaminated stopcock	0.68	.289–1.63	0.396
Duration	1.19	.890–1.58	0.244
Comorbidity	0.39	.149–1.03	0.057
Origin	0.84	.292–2.38	0.737
Discharge floor	1.19	.504–2.85	0.681
Discharge ICU	0.82	.072–9.38	0.875
Square root HDEs	0.99	.643–1.52	0.964
Procedure			
Orthopedics	0.74	.249–2.20	0.593
General abdominal	0.78	.288–2.07	0.613
Gynecological	0.76	.224–2.59	0.665
Ear/nose/throat	0.23	.047–1.14	0.071

Table 6. Multivariable Analysis of Risk Factors for Mortality

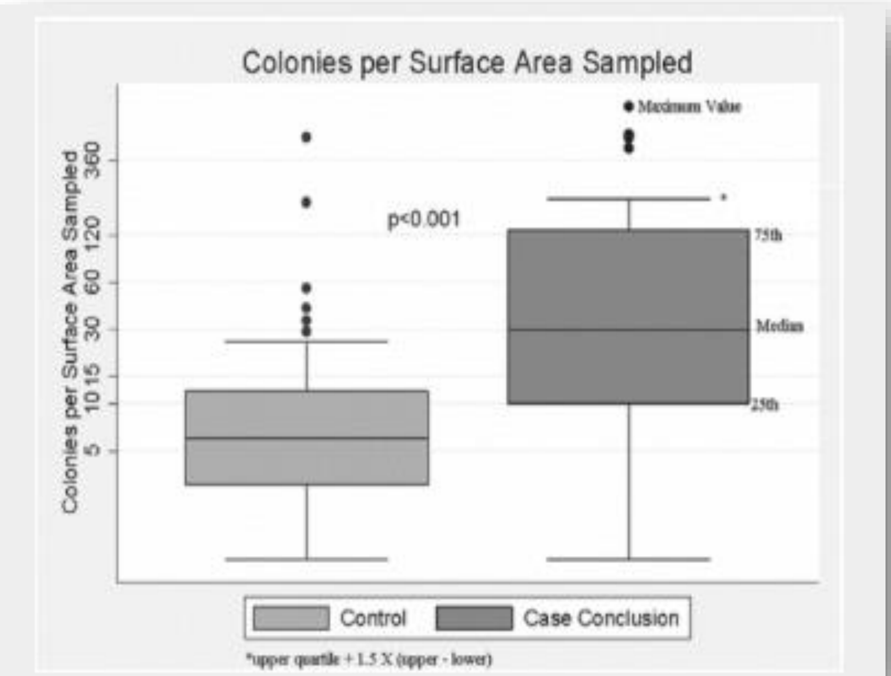
Contaminated stopcock	Odds ratio	95% confidence interval	*P* value
Site 0[a]	0.01	.000–.389	0.014
Site 2[a]	0.00	.000–.425	0.021
ASA	74.1	4.94–1112.15	0.002
Contaminated stopcock	58.5	2.32–1477.02	0.014
Age	0.97	.893–1.05	0.415
Gender	1.55	.112–21.45	0.742
Case 2	0.80	.053–12.17	0.875
SENIC	1.12	.292–4.29	0.868
Case duration	0.51	.183–1.42	0.199
Comorbidity	5.28	.240–116.29	0.291
Origin	0.87	.182–4.19	0.866
Discharge floor	0.48	.035–6.65	0.588
Square root HDEs	6.53	.958–44.61	0.055
Procedure			
Orthopedics	1.15	.017–76.48	0.949
General abdominal	26.2	.925–742.8	0.056
Ear/nose/throat	10.0	.245–408.9	0.224

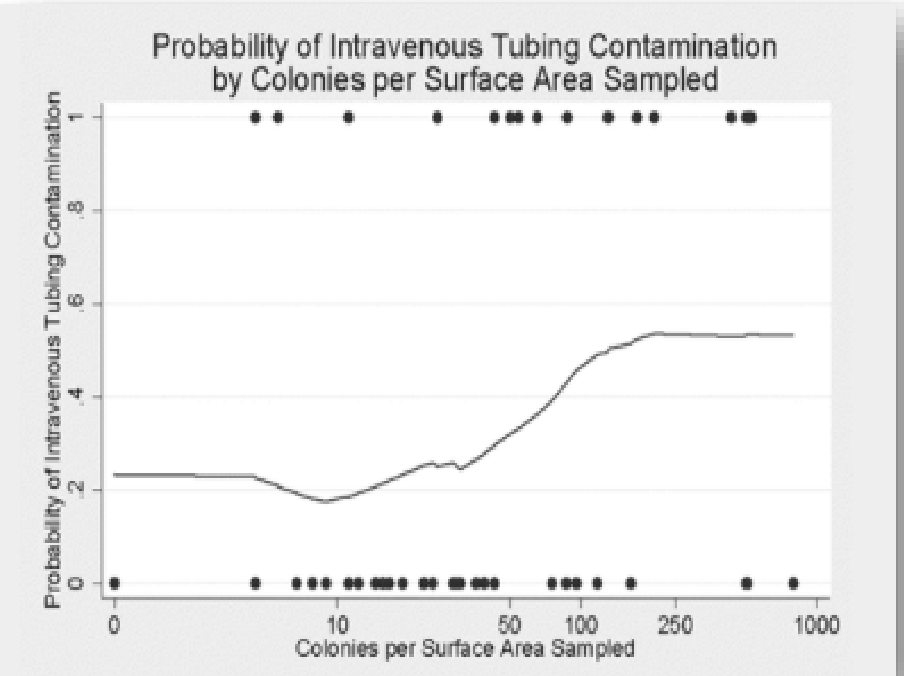
CONCLUSIONS: Bacterial contamination of patients, provider hands, and the environment contributes to stopcock transmission events, but the surrounding patient environment is the most likely source. Stopcock contamination is associated with increased patient mortality. Patient and provider bacterial reservoirs contribute to 30-day postoperative infections.

Transmission of Pathogenic Bacterial Organisms in the Anesthesia Work Area

Anesthesiology 9 2008, Vol.109, 399-407

Randy W. Loftus, M.D.; Matthew D. Koff, M.D.; Corey C. Burchman, M.D.; Joseph D. Schwartzman, M.D.; Valerie Thorum, M.T. (A.S.C.P.); et al





« We hypothesized that intraoperative bacterial contamination of the anesthesia work area was associated with contamination of peripheral intravenous stopcock sets, partially explaining the association of general anesthesia with the development of nosocomial infections. »

Investigating the impact of clinical anaesthetic practice on bacterial contamination of intravenous fluids and drugs

Journal of Hospital Infection 90 (2015) 70–74

N. Mahida [a,*], K. Levi [a], A. Kearns [b], S. Snape [a], I. Moppett [c]

[a] *Department of Clinical Microbiology, Nottingham University Hospitals NHS Trust, Nottingham, UK*
[b] *Antimicrobial Resistance and Healthcare Associated Infection Reference Unit, Public Health England, London, UK*
[c] *Anaesthesia and Critical Care, Division of Clinical Neuroscience, University of Nottingham, Nottingham, UK*

Risk factors associated with contamination of syringe contents

Risk factor	Odds ratio	95% Confidence interval	*P*-value
Emergency/urgent case	4.50	1.37–14.8	0.01
Hand hygiene that deviated from handwashing/alcohol gel followed by new gloves when drawing up drugs	2.89	0.75–11.10	0.11
Needles not used when drawing up drugs and flushes	2.42	0.75–7.79	0.13
Multiple boluses of drugs or flushes administered from some syringes	1.22	0.31–4.80	0.77
Syringe not capped between uses when administering multiple boluses of drug from same syringe	1.75	0.42–7.26	0.43
Cannula not inserted in theatre	1.95	0.36–10.5	0.43
Hand hygiene that deviated from handwashing/alcohol gel followed by new gloves before accessing three-way tap	0.35	0.10–1.19	0.08
Three-way tap not capped between uses	0.89	0.26–3.11	0.85

Syringes (N . 426), ventilator machine swabs (N . 202) and intravenous (IV) fluid administration sets (N . 47) from 101 surgical cases were evaluated for bacterial contamination. Cultures from the external surface of syringe tips and syringe contents were positive in 46% and 15% of cases, respectively. The same bacterial species was cultured from both ventilator and syringe in 13% of cases, and was also detected in the IV fluid administration set in two cases.

Hand Contamination of Anesthesia Providers Is an Important Risk Factor for Intraoperative Bacterial Transmission

Randy W. Loftus, MD,* Matthew K. Muffly, MD,* Jeremiah R. Brown, PhD, MS,* Michael L. Beach MD, PhD,* Matthew D. Koff, MD,* Howard L. Corwin, MD,* Stephen D. Surgenor, MD,* Kathryn B. Kirkland, MD,* and Mark P. Yeager, MD*

Anesth Analg 2011;112:98–105

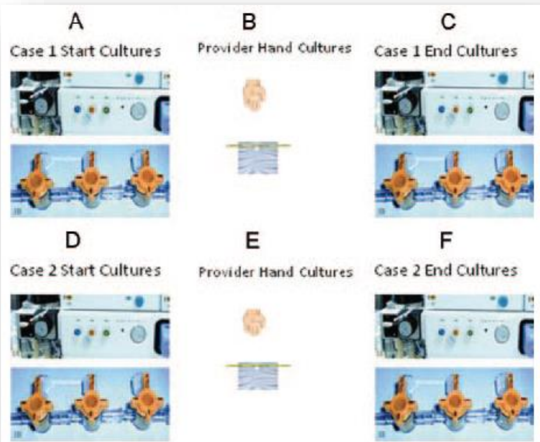


Table 2. Baseline Provider Hand Contamination[a]

Organism	Providers *N*/total (%)
MRSA	12/164 (7%)
MSSA	18/164 (11%)
VRE	4/164 (2%)
Enterococcus (non-VRE)	1/164 (0.6%)
Staph other	164/164 (100%)
Micrococcus	110/64 (67%)
Corynobacterium	14/164 (9%)
Streptococcus	128/164 (78%)
Gram negative[b]	81/164 (49%)

Table 3. Evidence for Intraoperative Transmission of Bacterial Pathogens from Anesthesia Provider Hands to the Anesthesia Environment and Patient IV Catheters

	Case 1			Case 2			
	Before case 1	End case 1		Before case 2		End case 2	
	Provider hands (site B)	Stopcock	Machine APL/D	Machine APL/D	Provider hands (site E)	Stopcock	Machine APL/D
Direction of transmission →							
Organism							
Micro	Attending		X				
S. epi	Attending	X					
S. hae	Attending	X					
S. epi	Attending	X					
S. epi	Attending				Attending[a]		
S. epi	Attending		X			X	X
Micro	Attending		X			X	
S. epi	Attending		X	X			X
Strep	Resident	X					X
Pseudo	Attending						
Pseudo	Resident		X				X
Micro	Resident	X		X		X	X
MRSA	Resident		X	X	Attending[a]		X
MSSA	Resident		X				X
S. auric	CRNA		X	X			
Micro	CRNA			X	Attending[a]		X
S. epi	CRNA			X			
Micro					CRNA[a]	X	X

Microbiological Contamination of Drugs during Their Administration for Anesthesia in the Operating Room

Derryn A. Gargiulo, M.Pharm.Clin., Reg.Pharm.N.Z., Simon J. Mitchell, Ph.D., F.A.N.Z.C.A., Janie Sheridan, Ph.D., Reg.Pharm.N.Z., F.R.Pharm.S., Timothy G. Short, M.B.Ch.B., M.D., F.A.N.Z.C.A., Simon Swift, Ph.D., Jane Torrie, M.B.Ch.B., F.A.N.Z.C.A., Craig S. Webster, Ph.D., Alan F. Merry, M.B.Ch.B., F.F.P.M.A.N.Z.C.A., F.R.C.A., F.A.N.Z.C.A.

ANESTHESIOLOGY 2016; 124:785-94

What We Already Know about This Topic

- Postoperative infections represent a significant proportion of healthcare-associated infections
- Anesthesiologists' aseptic technique when making bolus injections of drugs may sometimes be deficient and could lead to postoperative infection
- Anesthesiologists make an average of 10 bolus injections per case

What This Article Tells Us That Is New

- Anesthesiologists were asked to make bolus injections of all drugs, except propofol and antibiotics, through a 0.2-µm filter in a prospective, open, microbiological audit of 300 cases
- Microorganisms with the potential to cause infections were isolated from the 0.2-µm filters of 19 (6.3%) of the 300 cases

Table 2. Number of Cases Undertaken, Number of Syringes Collected from Each Participant, Number of Cases with Contaminated Filter Units, and Number of Syringe Contents Contaminated

Participant Number (n = 23)*	No. of Cases Undertaken (%), n = 300	No. of Cases with a Contaminated Filter Unit (%), n = 19	No. of Syringes Collected (%), n = 2,318	No. of Syringe Contents Contaminated (%), n = 55
1	25 (8.3)	2 (10.5)	216 (9.3)	8 (3.7)
2	23 (7.8)	3 (15.7)	145 (6.3)	4 (2.8)
3	23 (7.8)	3 (15.7)	182 (7.9)	0
4	22 (7.3)	2 (10.5)	169 (7.3)	2 (1.2)
5	22 (7.3)	1 (5.3)	186 (8)	3 (1.6)
6	20 (6.7)	1 (5.3)	133 (5.7)	6 (4.5)
7	20 (6.7)	1 (5.3)	181 (7.8)	2 (1.2)
8	17 (5.7)	2 (10.5)	130 (5.6)	4 (2.5)
9	14 (4.7)	1 (5.3)	124 (5.4)	2 (1.6)
10	10 (3.3)	1 (5.3)	73 (3.1)	5 (7.5)
11	9 (3)	1 (5.3)	58 (2.5)	3 (5.2)
12	6 (2)	1 (5.3)	59 (2.6)	5 (8.5)
13	21 (7)	0	129 (5.6)	2 (1.6)
14	17 (5.7)	0	134 (5.8)	1 (0.7)
15	15 (5)	0	98 (4.2)	2 (2)
16	15 (5)	0	124 (5.4)	3 (2.4)
17	5 (1.7)	0	57 (2.5)	2 (3.5)
18	5 (1.7)	0	54 (2.3)	1 (1.9)
19	2 (0.7)	0	22 (0.9)	1 (4.6)
20	6 (2)	0	42 (1.8)	0
21	1 (0.3)	0	12 (0.5)	0
22	1 (0.3)	0	7 (0.3)	0
23	1 (0.3)	0	5 (0.2)	0

*Participants have been numbered to show those with contaminated filters first (1–12) and then those without (13–23), in a descending order of number of cases in each category.

Centers for Disease Control

- Prevent infections in patients undergoing surgery.
- Prevent patient-to-patient transmission of bacteria.
- Improve antibiotic stewardship.

Centers for Disease Control and Prevention. Updated guidelines for evaluating public health surveillance systems: recommendations from the guidelines working group. MMWR 2001; 50:1-35

http://www.whitehouse.gov/the-press-office/2014/09/18/fact-sheet-obama-administration-takes-actions-combat-antibiotic-resistan

- Le SARM est plus transmissible à partir des réservoirs de la salle d'opération que le SAMS
- Le SARM est plus pathogène (18% mortalité) et implicitement plus résistant
- Le but est d'amplifier la surveillance des transmissions (désinfection des mains, environnement, hubs IV et décontamination du patient (recommandations OMS 2016))
- Générer une réduction des infections invasive à SAMR

The Epidemiology of *Staphylococcus aureus* Transmission in the Anesthesia Work Area

Randy W. Loftus, MD,* Matthew D. Koff, MS, MD,* Jeremiah R. Brown, MS, PhD,† Hetal M. Patel, BS,* Jens T. Jensen, MS,* Sundara Reddy, MD,‡ Kathryn L. Ruoff, PhD,§ Stephen O. Heard, MD,|| Mark P. Yeager, MD,* and Thomas M. Dodds, MD*

Anesth Analg 2015;120:807–18

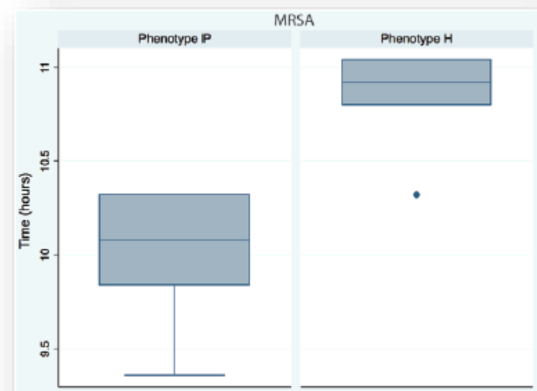
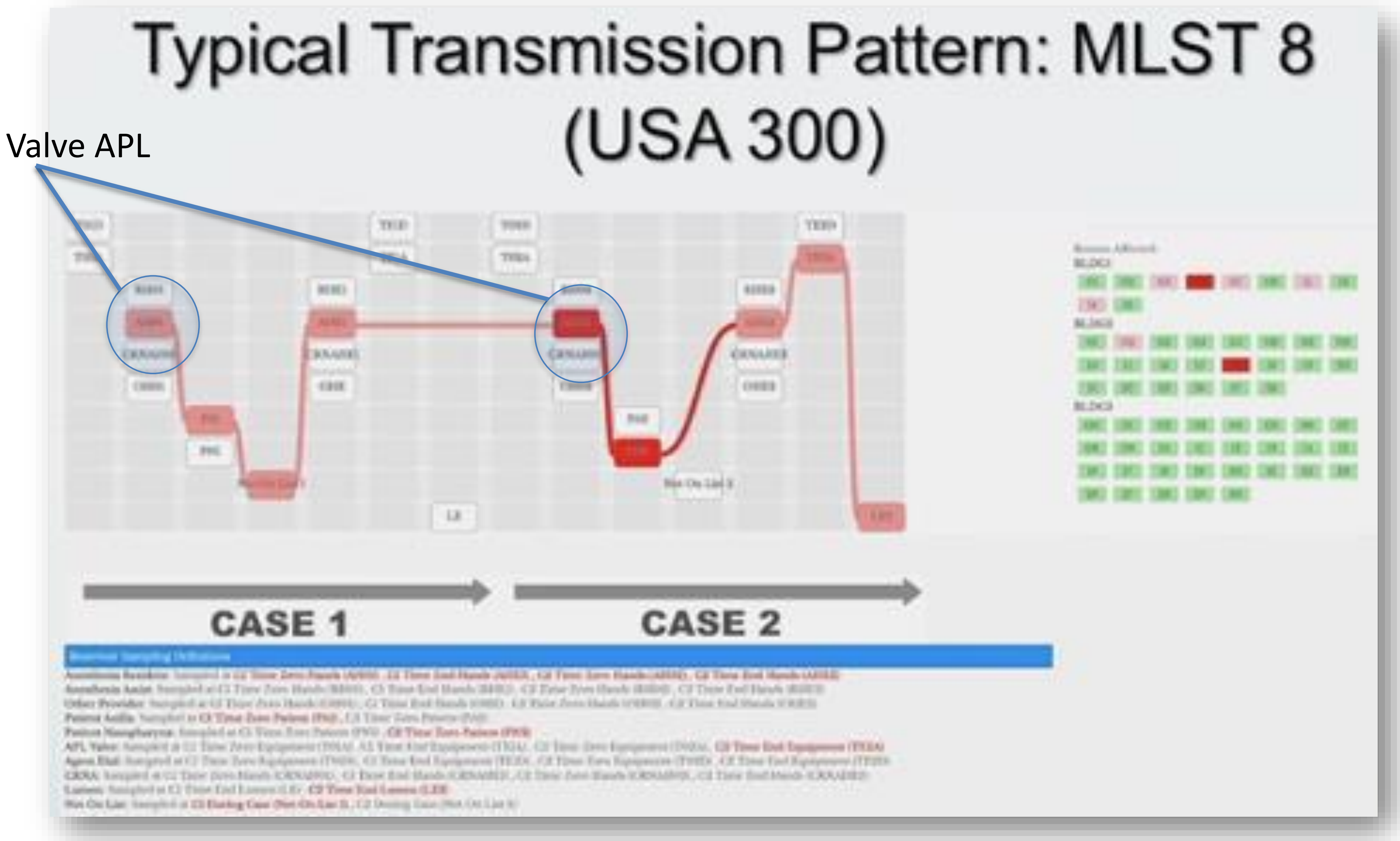


Figure 4. Growth rate (h) for phenotype H (hands) as compared with phenotype P (patients) for methicillin-resistant *Staphylococcus aureus* (MRSA).

« Two S aureus phenotypes are frequently transmitted in the anesthesia work area.
A patient and environmentally derived phenotype is associated with increased risk of antibiotic resistance and links to 30-day postoperative patient cultures as compared with a provider handderived phenotype ».

La transmission d’un SARM à partir d’une valve APL ballon/ventilateur-mains-robinet trois voies



Transmission Dynamics of Gram-Negative Bacterial Pathogens in the Anesthesia Work Area

Anesth Analg 2015;120:819–26

Randy W. Loftus, MD,* Jeremiah R. Brown, MS, PhD,† Hetal M. Patel, BS,* Matthew D. Koff, MD, MS,* Jens T. Jensen, MS,* Sundara Reddy, MD,‡ Kathryn L. Ruoff, PhD,* Stephen O. Heard, MD,§ Thomas M. Dodds, MD,* Michael L. Beach, MD,* and Mark P. Yeager, MD*

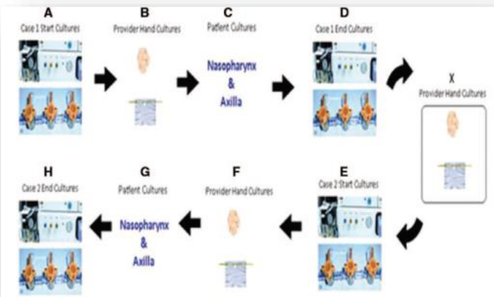


Table 3. Mode of Transmission for Frequently Encountered Gram-Negative Genera

All isolates

Mode transmission	*Acinetobacter* (*N* = 327)	*Enterobacter* (*N* = 111)	*Brevundimonas* (*N* = 117)	*Moraxella* (*N* = 61)	*Pseudomonas* (*N* = 151)	Total number of isolates (*N* = 767)	*P* value,[a] Fisher exact test	*P* value,[b] binomial
	N TE	N TE	N TE	N TE	N TE	N (%) TE	0.004	0.176
Within-case	15	6	14	1	5	41 (5.2)		
Between-case	20	12	2	4	16	54 (7.0)		

Excluding duplicates

Mode transmission	*Acinetobacter* (*N* = 321)	*Enterobacter* (*N* = 107)	*Brevundimonas* (*N* = 109)	*Moraxella* (*N* = 61)	*Pseudomonas* (*N* = 150)	Total number of isolates (*N* = 748)	*P* value,[a] Fisher exact test	*P* value,[b] binomial
	N TE	N TE	N TE	N TE	N TE	N (%) TE	0.096	0.036
Within-case	11	4	7	1	5	28 (3.7)		
Between-case	18	9	1	4	15	47 (6.3)		

CONCLUSIONS: Between- and within-case AWE gram-negative bacterial transmission occurs frequently and is linked by pulsed-field gel electrophoresis to 30-day postoperative infections. Provider hands are less likely than contaminated environmental or patient skin surfaces to serve as the reservoir of origin for transmission events.

Microbial growth in propofol formulations with disodium edetate and the influence of venous access system dead space*

Anaesthesia, 2007, 62, pages 575–580

T. Fukada[1] and M. Ozaki[2]

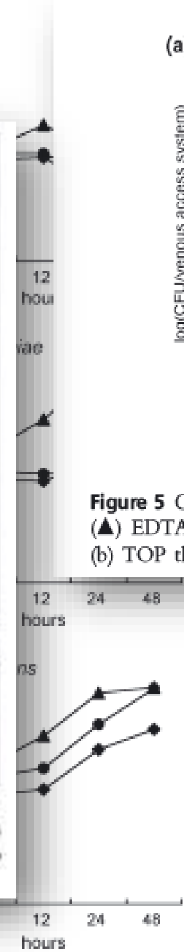


Figure 6 Demonstration of migration of propofol, remaining in the dead space of the venous access system entry port, up into the syringe.

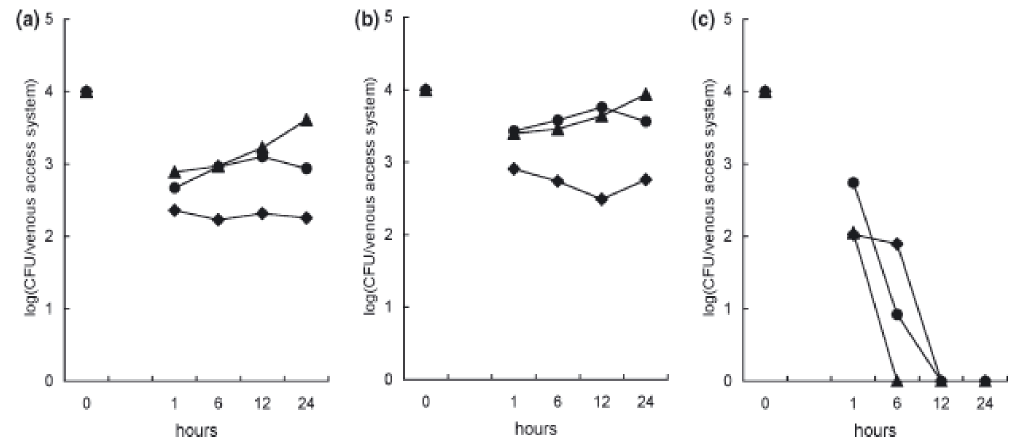


Figure 5 Growth curves of MRSA remaining in three types of venous access systems after injection of propofol with (●) or without (▲) EDTA, or saline (◆) through the injection port and infusing the line with Ringer's acetate: (a) TOP three-way stopcock; (b) TOP three-way stopcock + Interlink injection site; (c) Planecta system.

Figure 4 Growth curves of six bacteria incubated at 22.5 °C in propofol with (●) or without (▲) EDTA, or saline (◆). †$p < 0.05$ compared with saline; §$p < 0.05$ compared with propofol with EDTA.

Leaving More Than Your Fingerprint on the Intravenous Line: A Prospective Study on Propofol Anesthesia and Implications of Stopcock Contamination

Devon C. Cole, MD,* Tezcan Ozrazgat Baslanti, PhD,* Nikolaus L. Gravenstein, BS,† and
Nikolaus Gravenstein, MD*

Anesth Analg 2015;120:861–7

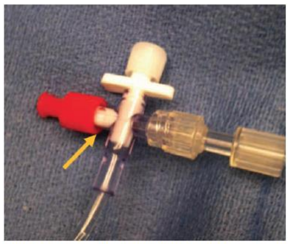


Figure 1. Visible white propofol (arrow) in IV extension set stopcock dead space after routine anesthesia care.

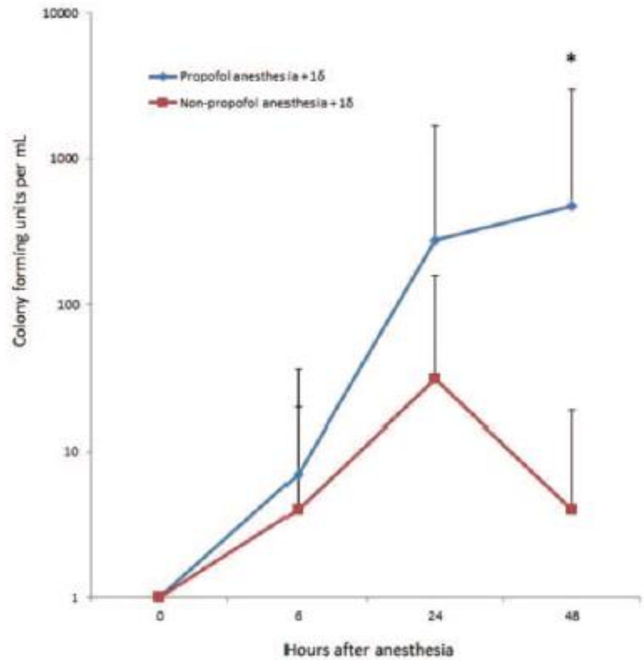


Figure 3. Growth of all samples in average colony forming units per milliliter at respective holding times plus 1 SD (1δ). *$P = 0.0008$.

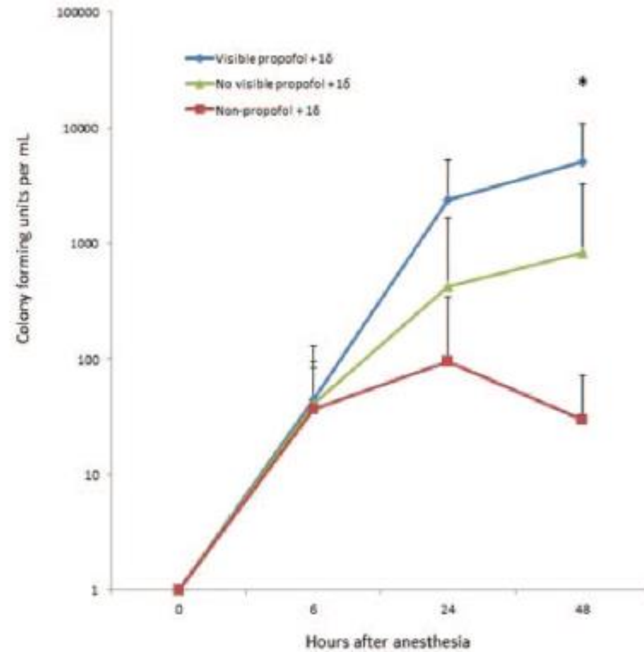


Figure 4. All samples with (+) bacterial growth in average colony forming units per milliliter at respective holding times plus 1 SD (1δ). *$P = 0.03$ visible vs nonvisible vs non.

CONCLUSIONS: There is a covert incidence and degree of IV stopcock bacterial contamination during anesthesia which is aggravated by propofol anesthetic. Propofol anesthesia may increase risk for postoperative infection because of bacterial growth in IV stopcock dead spaces.

Double Gloves: A Randomized Trial to Evaluate a Simple Strategy to Reduce Contamination in the Operating Room

David J. Birnbach, MD, MPH,*† Lisa F. Rosen, MA,* Maureen Fitzpatrick, MSN, ARNP-BC,*
Philip Carling, MD, MPH,‡ Kristopher L. Arheart, EdD,† and L. Silvia Munoz-Price, MD, PhD*†

Anesth Analg 2015;120:848–52

Table 1. Presence of Ultraviolet Markers Based on the Use of Single Versus Double Gloves at the Time of Intubation

	Single glove, *n* = 11		Double gloves, *n* = 11		
Location	UV positive	%	UV positive	%	*P*
Towel on anesth mach	11	100	2	18.2	<0.001
Reservoir bag	9	81.8	1	9.1	0.002
Suction tubing	8	72.7	0	0	0.001
Oxygen valve	7	63.6	1	9.1	0.024
Stethoscope	6	54.6	0	0	0.012
IV hub	5	45.5	0	0	0.035
Volatile agent gauge	4	36.4	0	0	0.090
Keyboard	4	36.4	0	0	0.090
Box of gloves	3	27.3	0	0	0.214
OR door handle	3	27.3	0	0	0.214

A New Approach to Pathogen Containment in the Operating Room: Sheathing the Laryngoscope After Intubation

David J. Birnbach, MD, MPH,* Lisa F. Rosen, MA,* Maureen Fitzpatrick, MSN, ARNP-BC,*
Philip Carling, MD,† Kristopher L. Arheart, EdD,‡ and L. Silvia Munoz-Price, MD, PhD§

Anesth Analg 2015;121:1209–14

RESULTS: Of the 7 sites on the patient, ultraviolet light detected contamination on an average of 5.7 (95% confidence interval, 4.4–7.2) sites under the single-glove condition, 2.1 (1.5–3.1) sites with double gloves, and 0.4 (0.2–1.0) sites with double gloves with sheathing. All 3 conditions were significantly different from one another at $P < 0.001$. Of the 18 environmental sites, ultraviolet light detected fluorescence on an average of 13.2 (95% confidence interval, 11.3–15.6) sites under the single-glove condition, 3.5 (2.6–4.7) with double gloves, and 0.5 (0.2–1.0) with double gloves with sheathing. Again, all 3 conditions were significantly different from one another at $P < 0.001$.

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A Simulation Study to Evaluate Improvements in Anesthesia Work Environment Contamination Following Implementation of a Bundle of Interventions

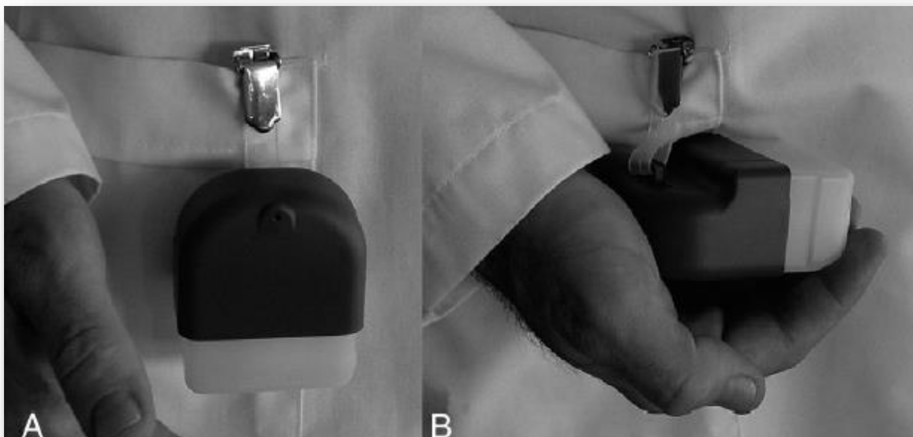
Crystal M. Woodward, M.D.
Virginia Mason Medical Center, Seattle, Washington, United States

The bundle included double gloving prior to intubation, removing outer gloves after intubation, keeping all airway equipment confined to one space, and performing hand hygiene before touching the anesthesia cart.

Reduction in Intraoperative Bacterial Contamination of Peripheral Intravenous Tubing Through the Use of a Novel Device

Anesthesiology 2009; 110:978–85

Matthew D. Koff, M.D., Randy W. Loftus, M.D.,† Corey C. Burchman, M.D.,‡ Joseph D. Schwartzman, M.D.,§ Megan E. Read, M.T. (A.S.C.P.),|| Elliot S. Henry, B.S.,# Michael L. Beach, M.D., Ph.D.***



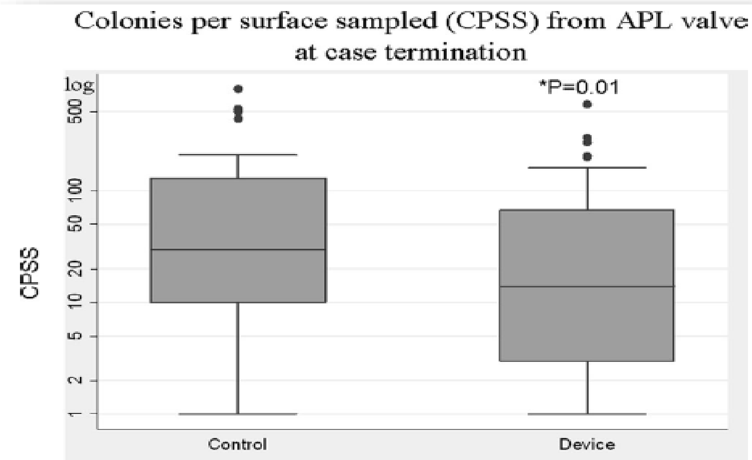


Fig. 3. Box plot of colonies per surface sampled (CPSS) recovered from the anesthesia machine at case termination in the before group (control) and after group (device) (P = 0.01). APL = anesthesia pressure-limiting valve. * indicates statistical significance.

Binary Variables	Percent	Count	Percent	Count	Odds Ratio	95% CI	P Value
Stopcock positive	7.5	4	32.8	20	0.17*	(0.06 to 0.51)	< 0.01
Nosocomial infection	3.8	2	17.2	10	0.19*	(0.00 to 0.81)	0.02
Death	0.0	0	3.4	2	0.00	(0.00 to 2.09)	0.17

Frequency of Hand Decontamination of Intraoperative Providers and Reduction of Postoperative Healthcare-Associated Infections: A Randomized Clinical Trial of a Novel Hand Hygiene System

Infect Control Hosp Epidemiol 2016;1–8

Matthew D. Koff, MD;[1] Jeremiah R. Brown, MS, PhD;[2] Emily J. Marshall, MS;[2] A. James O'Malley, MS, PhD;[2] Jens T. Jensen, MS;[3] Stephen O. Heard, MD;[4] Karen Longtine, RN, BS, CCRC;[4] Melissa O'Neill, RN, BS, CCRC;[4] Jaclyn Longtine, BA, CCRC;[4] Donna Houston, RN;[3] Cindy Robison, RN;[3] Eric Moulton;[3] Hetal M. Patel, BS;[3] Randy W. Loftus, MD[3]

TABLE 2. Hourly Hand Decontamination Event Summary and Comparison

	Hourly use, mean (SD)		Comparison *P* value	
Variable	Control	Treatment	Conventional	Treatment
Wall-mounted device	0.54 (0.34)	0.34 (0.27)	<.001[a]	
Personalized device	N/A	4.30 (2.90)		<.001[b]

TABLE 4. The Impact of the Novel Hand Hygiene System on 30-Day Postoperative Healthcare-Associated Infections (HAIs)

	Crude			Adjusted[a]		
	OR	*95% CI*	*P value*	*OR*	*95% CI*	*P value*
Any HAI	1.07	(0.82–1.40)	.626	1.05	(0.79–1.39)	.735
Subgroup						
SSI	0.95	(0.63–1.43)	.800	0.96	(0.62–1.46)	.832
HCAP	0.91	(0.40–2.06)	.818	0.74	(0.32–1.77)	.497
UTI	0.99	(0.59–1.65)	.973	0.97	(0.57–1.66)	.916
DOSI	1.99	(0.85–4.67)	.113	2.26	(0.90–5.69)	.082
CDI	0.20	(0.02–1.69)	.139	0.03	(0.0003–3.04)	.139
BSI	0.99	(0.25–3.97)	.990	1.01	(0.21–4.88)	.994
Other	2.49	(0.78–7.95)	.124	3.03	(0.88–10.41)	.079

“Priming” Hand Hygiene Compliance in Clinical Environments

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Imperial College London

Health Psychology
2016, Vol. 35, No. 1, 96–101

Ivo Vlaev
University of Warwick

Ruth Everett-Thomas and Maureen Fitzpatrick
University of Miami Miller School of Medicine

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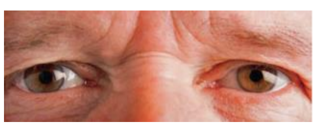
Imperial College London

David J. Birnbach
University of Miami Miller School of Medicine

Nudges



Number of visitors	Performed hand hygiene	HHC (%)	Control vs. intervention p
	Control		
120	18	15.00%	
66 female	13	19.70%	
54 male	5	9.26%	
	Intervention 1—Olfactory prime		
160	75	46.89%	.0001
77 female	40	51.95%	
83 male	35	42.17%	
	Intervention 2—Visual prime		
124 (4 excluded)	26	21.67%	
63	20	33.33%	.038
(3 excluded)	16	38.09%	
42 female 18 male	4	22.22%	
61	6	10.00%	.626
(1 excluded)	5	15.63%	
32 females	1	15.63%	
28 males		3.57%	

Operating Room Computer Keyboards: Is there a Less Contaminated Option?

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Department of Anesthesiology, University of Florida College of Medicine, Gainesville, FL

Figure 1. Standard Keyboard

Figure 2. Laser Keyboard

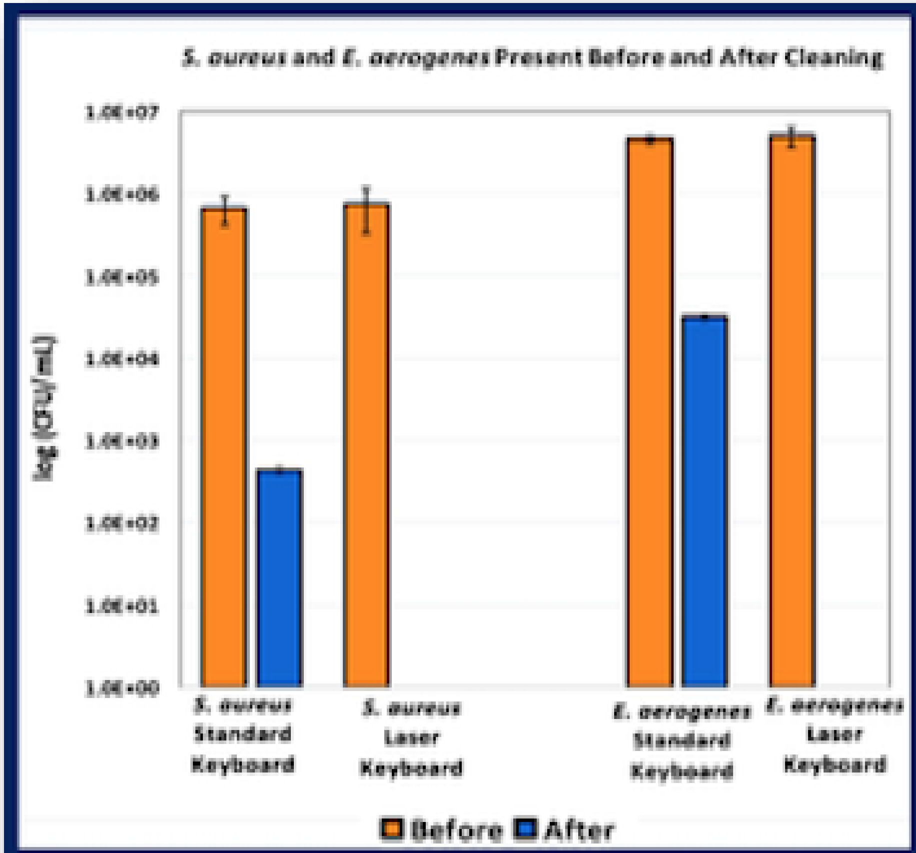

Figure 3. Contamination of standard and laser keyboards before and after cleaning procedure. Note: Logarithmic Scale Used

Bacterial contaminations upon opening of injection needles

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[3]Academia, Industry and Government Collaborative Research Institute of Translational Medicine for Life Innovation, Fukuoka University

Opening method	Wet/ Dry	Mount materials	Concentration of the bacterial suspension	Number of needles
peel-apart method	Wet	Paper	3~8 log (cfu/ml) 5 needles in each concentration	30
		Plastic	↓	↓
	Dry	Paper		
		Plastic		
push-off top method	Wet	Paper		
		Plastic		
	Dry	Paper		
		Plastic	↓	↓

Result

Cochran-Mantel-Haenszel test
Jonckheere test

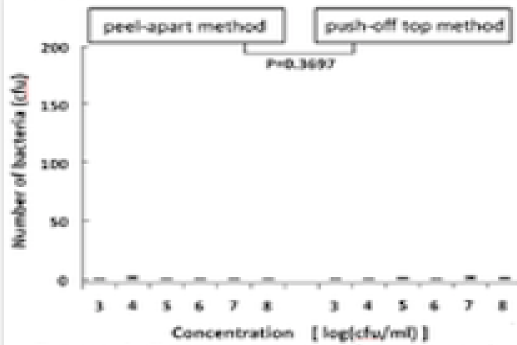

Figure 4 Contamination of the inner lumen

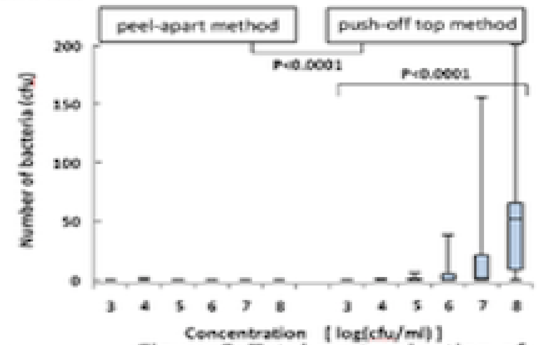

Figure 5 Total contamination of the needle hub.

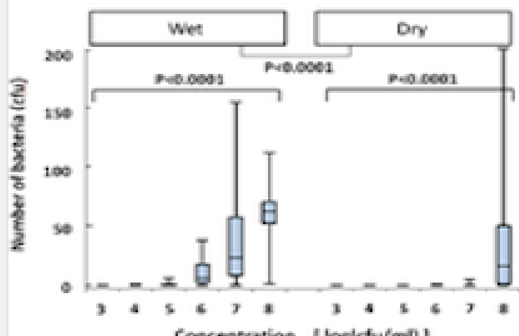

Figure 6 Contamination in push-off top method (Wet/Dry)

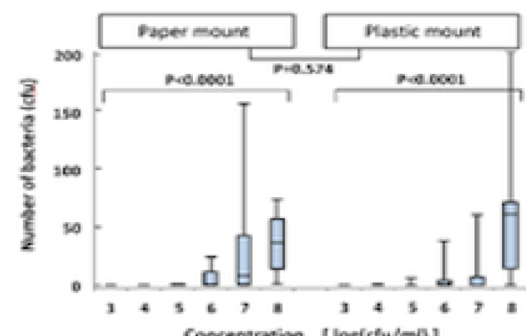

Figure 7 Contamination in push-off top method (Paper/Plastic)

Conclusion

To reduce the contamination of needle hubs, it is desirable that injection needle products are opened using the peel-apart method under dry conditions to prevent contamination in opening portions.

Reduction in Intraoperative Bacterial Contamination of Peripheral Intravenous Tubing Through the Use of a Passive Catheter Care System

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Matthew D. Koff, MD,* Jens T. Jensen, MS,† Thomas M. Dodds, MD,† Mark P. Yeager, MD,†
Kathryn L. Ruoff, PhD,‡ John D. Gallagher, MD,† Michael L. Beach, MD, PhD,† and
Jeremiah R. Brown, PhD, MS§

Anesth Analg 2012;115:1315–23

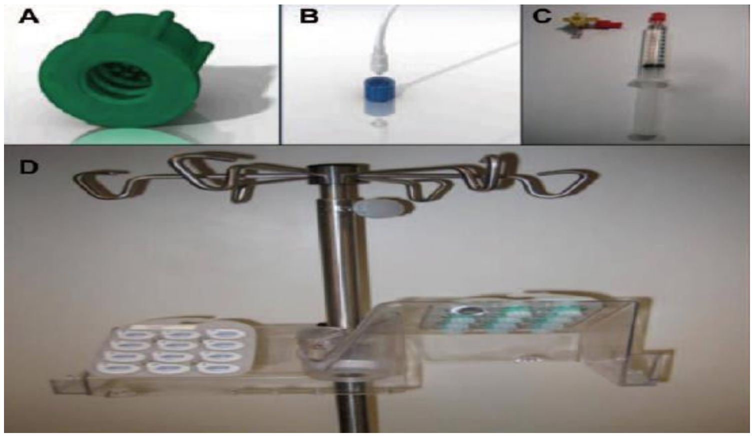

Table 2. Efficacy of the Novel Catheter Care Station in Reducing Lumen Contamination and 30-Day Postoperative Health Care–Associated Infections and Phlebitis

	Unadjusted				Adjusted					
	OR	95% CI	*P* value	Covariate	OR	95% CI	*P* value	OR	95% CI	*P* value
Lumen contamination										
Study arm	0.689	0.488–0.973	0.034	Study arm	0.704	0.493–1.00	0.052	0.703	0.498–0.995	0.047
HCAI/phlebitis										
Study arm	0.638	0.398–1.02	0.062	Study arm	0.589	0.353–0.984	0.04			

Intraoperative use of a passive catheter care station significantly reduced open lumen bacterial contamination and the combined incidence of 30-day postoperative infections and phlebitis.

It had … t ended. I asked her whether she’d made any changes. Lots, she said.

“What

“Takin … , “we did … ore

system

“Wh … ked.

“Was … o it so many times!”