Use of Cloth Operating Theatre Caps

1. Hats Off: A Study of Different Operating Room Headgear Assessed by Environmental Quality Indicators.

**Author(s):** Markel, Troy A; Gormley, Thomas; Greeley, Damon; Ostojic, John; Wise, Angie; Rajala, Jonathan; Bharadwaj, Rahul; Wagner, Jennifer

**Source:** Journal of the American College of Surgeons; Nov 2017; vol. 225 (no. 5); p. 573-581

**Publication Date:** Nov 2017

**Publication Type(s):** Journal Article

**PubMedID:** 29106842

**Abstract:** BACKGROUND The effectiveness of operating room headgear in preventing airborne contamination has been called into question. We hypothesized that bouffant style hats would be as effective in preventing bacterial and particulate contamination in the operating room compared with disposable or cloth skull caps, and bouffant style hats would have similar permeability, particle penetration, and porosity compared with skull caps.

**STUDY DESIGN** Disposable bouffant and skull cap hats and newly laundered cloth skull caps were tested. A mock surgical procedure was used in a dynamic operating room environment. Airborne particulate and microbial contaminants were sampled. Hat fabric was tested for permeability, particle transmission, and pore sizes.

**RESULTS** No significant differences were observed between disposable bouffant and disposable skull caps with regard to particle or actively sampled microbial contamination. However, when compared with disposable skull caps, disposable bouffant hats did have significantly higher microbial shed at the sterile field, as measured by passive settle plate analysis (p < 0.05). When compared with cloth skull caps, disposable bouffants yielded higher levels of 0.5 μm and 1.0 μm particles and significantly higher microbial shed detected with passive analysis. Fabric assessment determined that disposable bouffant hats had larger average and maximum pore sizes compared with cloth skull caps, and were significantly more permeable than either disposable or cloth skull caps.

**CONCLUSIONS** Disposable bouffant hats had greater permeability, penetration, and greater microbial shed, as assessed by passive microbial analysis compared with disposable skull caps. When compared with cloth skull caps, disposable bouffants yielded greater permeability, greater particulate contamination, and greater passive microbial shed. Disposable style bouffant hats should not be considered superior to skull caps in preventing airborne contamination in the operating room.

**Database:** Medline
2. Bouffant vs Skull Cap and Impact on Surgical Site Infection: Does Operating Room Headwear Really Matter?

**Author(s):** Kothari, Shanu N; Anderson, Madeline J; Borgert, Andrew J; Kallies, Kara J; Kowalski, Todd J

**Source:** Journal of the American College of Surgeons; Aug 2018; vol. 227 (no. 2); p. 198-202

**Publication Date:** Aug 2018

**Publication Type(s):** Journal Article

**PubMedID:** 29733905

**Abstract:** BACKGROUND The American College of Surgeons guidelines indicate that skull caps are acceptable, and the Association of Perioperative Registered Nurses recommends bouffant caps. However, no scientific evidence has shown a significant advantage in surgical site infection (SSI) reduction with either cap. The objective of this study was to determine the influence of surgical cap choice on SSIs.

**STUDY DESIGN** Data from a previously published prospective randomized trial on the impact of hair clipping on SSIs were analyzed. Patients were grouped by the attending surgeons' preferred cap choice into either bouffant or skull cap groups.

**RESULTS** Overall, 1,543 patients were included in the trial. Attending surgeons wore bouffant caps in 39% and skull caps in 61% of cases. Prevalence of diabetes and tobacco use were similar between the groups. Bouffant caps were used in 71% of colon/intestinal cases, 42% of hernia/other cases, 40% of biliary cases, and only 1% of foregut cases. Overall, SSIs occurred in 8% and 5% of cases with a bouffant and skull cap, respectively (p = 0.016); with 6% vs 4% classified as superficial (p = 0.041), 0.8% vs 0.2% classified as deep (p = 0.12), and 1% vs 0.9% classified as organ space (p = 0.79); however, when adjusting for the type of operation, no significant differences in SSI rates were observed for skull caps vs bouffant caps.

**CONCLUSIONS** Attending surgeon preference for bouffant vs skull cap does not significantly impact SSI rates after accounting for surgical procedure type. Future guidelines should consider these clinical outcomes data and surgeon preference should dictate operating room headwear.

**Database:** Medline
3. Mandatory Change From Surgical Skull Caps to Bouffant Caps Among Operating Room Personnel Does Not Reduce Surgical Site Infections in Class I Surgical Cases: A Single-Center Experience With More Than 15 000 Patients.

**Author(s):** Shallwani, Hussain; Shakir, Hakeem J; Aldridge, Ashley M; Donovan, Maureen T; Levy, Elad I; Gibbons, Kevin J

**Source:** Neurosurgery; Apr 2018; vol. 82 (no. 4); p. 548-554

**Publication Date:** Apr 2018

**Publication Type(s):** Journal Article

**PubMedID:** 29447369

Available at Neurosurgery - from Ovid (LWW Total Access Collection 2015 - Q1 with Neurology)

**Abstract:**
BACKGROUND: Surgical site infections (SSIs) are noteworthy and costly complications. New recommendations from a national organization have urged the elimination of traditional surgeon’s caps (surgical skull caps) and mandated the use of bouffant caps to prevent SSIs.

OBJECTIVE: To report SSI rates for >15 000 class I (clean) surgical procedures 13 mo before and 13 mo after surgical skull caps were banned at a single site with 25 operating rooms.

METHOD: SSI data were acquired from hospital infection control monthly summary reports from January 2014 to March 2016. Based on a change in hospital policy mandating obligatory use of bouffant caps since February 2015, data were categorized into nonbouffant and bouffant groups. Monthly and cumulative infection rates for 13 mo before (7513 patients) and 13 mo after (8446 patients) the policy implementation were collected and analyzed for the groups, respectively.

RESULTS: An overall increase of 0.07% (0.77%-0.84%) in the cumulative rate of SSI in all class I operating room cases and of 0.03% (0.79%-0.82%) in the cumulative rate of SSI in all spinal procedures was noted. However, neither increase reached statistical significance (P > .05). The cumulative rate of SSI in neurosurgery craniotomy/craniectomy cases decreased from 0.95% to 0.75%; this was also not statistically significant (P = 1.00).

CONCLUSION: National efforts at improving healthcare performance are laudable but need to be evidence based. Guidelines, especially when applied in a mandatory fashion, should be assessed for effectiveness. In this large, single-center series of patients undergoing class I surgical procedures, elimination of the traditional surgeon’s cap did not reduce infection rates.

**Database:** Medline

4. Cloth skull caps shown to be more effective at preventing airborne contamination in the OR.

**Author(s):**

**Source:** Healthcare Purchasing News; Dec 2017; vol. 41 (no. 12); p. 14-14

**Publication Date:** Dec 2017

**Publication Type(s):** Trade Publication

**Abstract:** The article focuses on studies which examined the effectiveness of different operating room (OR) head coverings in preventing airborne contamination.

**Database:** CINAHL
5. Surgical Head Coverings: A Literature Review.

**Author(s):** Spruce, Lisa

**Source:** AORN Journal; Oct 2017; vol. 106 (no. 4); p. 306-306

**Publication Date:** Oct 2017

**Publication Type(s):** Academic Journal

Available at [AORN Journal](https://www.aornjournal.org) - from ProQuest (Hospital Premium Collection) - NHS Version

Available at [AORN Journal](https://www.aornjournal.org) - from Ovid (Journals @ Ovid) - London Health Libraries

**Abstract:** Microorganisms that cause surgical site infections may either be present on the patient’s skin or mucous membranes or transmitted to the patient by health care personnel, the environment, or other items in the perioperative setting. This literature review analyzes the evidence used to support the recommendation that perioperative personnel should cover their heads, hair, and ears in the semirestricted and restricted areas. A literature search produced 27 articles related to bacterial shedding from skin and hair, pathogenic organisms present on the hair and ears, and case reports of infectious organisms passed from health care providers to patients. Although there is no conclusive evidence that wearing a head covering can help prevent surgical site infections, the potential benefits to patients when compared with the risks suggest that perioperative team members should cover their heads, hair, and ears in the semirestricted and restricted areas to provide the best possible protection for surgical patients.

**Database:** CINAHL

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6. Policies requiring coverage of ears and all facial hair do not affect surgical site infection rates: A NSQIP review of 6, 517 cases

**Author(s):** Farach S.; Kelly K.N.; Farkas R.; Ruan D.T.; Matroniano A.; Linehan D.C.; Moalem J.

**Source:** Journal of the American College of Surgeons; Oct 2017; vol. 225 (no. 4)

**Publication Date:** Oct 2017

**Publication Type(s):** Conference Abstract

**Abstract:** INTRODUCTION: After a Department of Health site visit, 2 teaching hospitals imposed strict regulations on operating room attire including bouffant full coverage of ears and all facial hair. We hypothesized that this intervention would reduce superficial surgical site infections (SSI). METHODS: We compared American College of Surgeons NSQIP data from all patients undergoing surgery in the 9 months before implementation (n = 3, 077) to time-matched data 9 months post-implementation (n = 3, 340). Univariate and multivariable analyses were used to examine patient, clinical, and operative factors associated with SSI. Power analysis was performed using pre-intervention SSI rates. RESULTS: Despite a shift toward more clean cases, there were more SSIs post-implementation (33 vs 30 (1%) (p = 0.95). Overall, SSI increased with wound class: 0.6%, 0.9%, 2.3%, and 3.8% in clean, clean-contaminated, contaminated, and dirty/infected cases, respectively. Limiting the review to clean or clean-contaminated cases, SSI increased slightly, from 0.7% (20/2, 754) to 0.8% (24/3, 115), p = 0.85. There were no differences in length of stay, complications, or mortality between the 2 time periods. A multivariable analysis showed that implementation of these policies was not associated with a decreased SSI (odds ratio 1.2, CI 0.70e1.96, p = 0.56). The largest predictors of SSI were preoperative infection, operative time >75th percentile, open wound, and dirty/contaminated wound. A hypothetical analysis revealed that a sample size of 485, 154 patients would be required to demonstrate a 10% SSI reduction among patients with clean or clean-contaminated wounds. CONCLUSIONS: Implementation of stringent operating room attire policies do not reduce SSI rates. A study to prove this principle further would be impractical to conduct.

**Database:** EMBASE
7. Is there an association between surgeon hat type and 30-day wound events following ventral hernia repair?

**Author(s):** Haskins I.N.; Prabhu A.S.; Krpata D.M.; Perez A.J.; Tastaldi L.; Rosenblatt S.; Rosen M.J.; Tu C.; Poulose B.K.

**Source:** Hernia; Aug 2017; vol. 21 (no. 4); p. 495-503

**Publication Date:** Aug 2017

**Publication Type(s):** Review

**PubMedID:** 28631104

Available at [Hernia](https://www.proquest.com) - NHS Version

**Abstract:** Introduction: While several patient and operative variables have been shown to be associated with an increased risk of postoperative wound events, the association between surgical hat type worn by surgeons and postoperative wound events remains controversial. The purpose of this study is to investigate the association between type of surgical hat worn by surgeons and the incidence of postoperative wound events following ventral hernia repair using the Americas Hernia Society Quality Collaborative database. Methods: All surgeons who input at least ten patients with 30-day follow-up into the AHSQC were identified. These surgeons were sent a survey asking them to identify the type of surgical hat they wear in the operating room. The association of the type of surgical hat worn, patient variables, and operative factors with 30-day wound events was investigated using multivariate logistic regression. Results: A total of 68 surgeons responded to the survey, resulting in 6210 cases available for analysis. The type of surgical hat worn by surgeons was not found to be associated with an increased risk of 30-day surgical site infections or surgical site occurrences requiring procedural intervention. Conclusion: Our study is the first study to directly compare the association of surgical hat type with postoperative wound events. There is no association between the type of surgical hat worn and the incidence of postoperative wound events following ventral hernia repair. Our findings suggest that surgical hate type may be chosen at the discretion of operating room personnel without fear of detriment to their patients. Copyright © 2017, Springer-Verlag France.

**Database:** EMBASE
8. Surgical attire and the operating room: Role in infection prevention
Author(s): Salassa T.E.; Swiontkowski M.F.
Source: Journal of Bone and Joint Surgery - American Volume; Sep 2014; vol. 96 (no. 17); p. 1485-1492
Publication Date: Sep 2014
Publication Type(s): Review
PubMedID: 25187588
Abstract: Although there is some evidence that scrubs, masks, and head coverings reduce bacterial counts in the operating room, there is no evidence that these measures reduce the prevalence of surgical site infection. The use of gloves and impervious surgical gowns in the operating room reduces the prevalence of surgical site infection. Operating-room ventilation plays an unclear role in the prevention of surgical site infection. Exposure of fluids and surgical instruments to the operating-room environment can lead to contamination. Room traffic increases levels of bacteria in the operating room, although the role of this contamination in surgical site infection is unclear. Copyright © 2014 by The Journal of Bone and Joint Surgery Incorporated.
Database: EMBASE

9. Institutional observations of bacterial colonization of operating room surfaces and personnel attire
Author(s): Van Sweringen H.; Van Oss K.; Alexander J.W.; Edwards M.
Source: Surgical Infections; May 2012; vol. 13
Publication Date: May 2012
Publication Type(s): Conference Abstract
Abstract: Background: Surgical site infections (SSI) are a significant source of morbidity and mortality amongst surgical patients. Standard measures have been implemented to minimize the transfer of organisms from operating room personnel to the patient. These measures include sterile gloves, gown, masks, and draping; and antiseptic cleansers used at the surgical site of the patient and for cleansing hands and arms of personnel. Operating rooms are cleansed to prevent transmission of organisms from case to case. Hypothesis: We assessed the microbial densities on operating room surfaces and personnel attire at our institution in an effort to further delineate the effectiveness of decontamination at selected sites. Methods: Petrifilm Aerobic Count Plates and Petrifilm Staph Express Count Plates (3M, St. Paul, MN) were used for sampling of different surfaces. Plates were made according to manufacturer's instructions and applied directly to the surface in question for sample collection. Plates were allowed to incubate for twenty-four hours and colony counts were assessed. Statistical analysis was performed using the Student t-test. Results: A total of 518 samples were taken from flat surfaces and personnel attire in the operating room. Flat surfaces included anesthesia equipment, operating room equipment, and the floor, revealing overall low levels of bacterial growth, averaging < 10 colony forming units (CFU)/20 cm2. Personnel attire, as expected, revealed higher levels of microbial contamination, with personal hats and uncovered shoes having the highest counts, averaging 50-60 CFU/20 cm2. When compared to disposable shoe covers and hats, there was a statistically significant difference in levels of microbial contamination (p = 0.01 and p = 0.02, respectively). Masks worn during operative procedures showed a low level of organisms present on the outside of the mask, averaging 25 CFU/20 cm2, although these levels were significantly less than both the staphylococcal and aerobic samples taken from the inside of the
masks (p < 0.01 for both). Conclusions: Bacterial transfer from personal attire of staff in the operating room is a concern as a possible source for transmission to patients undergoing surgical procedures. Further research is necessary to determine the validity of interventions such as more tightly-fitted masks, changing masks after a set duration of time, or utilization of shoe covers and disposable caps over personal surfaces.

**Database:** EMBASE

10. **Comparison of bacteria on new, disposable, laundered, and unlaunched hospital scrubs**

**Author(s):** Nordstrom J.M.; Gerba C.P.; Reynolds K.A.

**Source:** American Journal of Infection Control; Aug 2012; vol. 40 (no. 6); p. 539-543

**Publication Date:** Aug 2012

**Publication Type(s):** Article

**PubMedID:** 22177668

**Abstract:** Background: As a cost-saving measure, an increasing number of hospitals allow personnel to launder their uniforms, lab coats, and operating room scrubs at home. With rising nosocomial infection rates and increasing levels of multidrug-resistant bacteria in hospital settings, uniform contamination may be an environmental factor in the spread of infection. Methods: We quantified the number and identity of bacteria found on swatches cut from unwashed operating room, hospital-laundered, home-laundered, new cloth, and new disposable scrubs. Results: Of the 29 unwashed hospital operating room scrub swatches analyzed, 23 (79%) were positive for some type of gram-positive cocci, with 3 (10%) of those classified as Staphylococcus aureus, and 20 (69%) were positive for coliform bacteria, 3 of which were Escherichia coli. Home-laundered scrubs had a significantly higher total bacteria count than hospital-laundered scrubs (P = .016). There was no statistical difference in the bacteria counts between hospital-laundered scrubs and unused new and disposable scrubs. In the home-laundered scrubs 44% (18/41) were positive for coliform bacteria, but no isolates were Escherichia coli. Conclusions: Significantly higher bacteria counts were isolated from home-laundered scrubs and unwashed scrubs than from new, hospital-laundered, and disposable scrubs. Copyright © 2012 by the Association for Professionals in Infection Control and Epidemiology, Inc. Published by Elsevier Inc. All rights reserved.

**Database:** EMBASE

11. **Deep vein thrombosis; cloth hats; corkboards in the OR; count sheets in charts.**

**Author(s):** Burlingame BL

**Source:** AORN Journal; Jan 2007; vol. 85 (no. 1); p. 189-192

**Publication Date:** Jan 2007

**Publication Type(s):** Academic Journal

Available at [AORN Journal](https://aornjournal.aorn.org) - from ProQuest (Hospital Premium Collection) - NHS Version

Available at [AORN Journal](https://aornjournal.aorn.org) - from Ovid (Journals @ Ovid) - London Health Libraries

Available at [AORN Journal](https://aornjournal.aorn.org) - from EBSCO (CINAHL Plus with Full Text)

**Database:** CINAHL
12. Home laundering of soiled surgical scrubs: Surgical site infections and the home environment

Author(s): Belkin N.L.
Source: American Journal of Infection Control; 2001; vol. 29 (no. 1); p. 58-64
Publication Date: 2001
Publication Type(s): Review
PubMedID: 11172320

Abstract: An increasing number of hospitals have implemented programs that permit their operating room (OR) personnel to launder their soiled "scrubs" at home. Not only have they not experienced an increase in the incidence of surgical site infections (SSIs), but they have also found the policy to be financially rewarding. Whereas the Association of periOperative Registered Nurses (AORN) opposes the practice, the Centers for Disease Control and Prevention (CDC) describes it as an unresolved issue. The variances in the positions taken by these two organizations obviously accounts for the differences in positions taken by the infection control community. In the absence of any evidence in the literature, the only alternative is to draw from knowledge and experience to determine whether the practice can be considered clinically effective and does not have a harmful effect on the home environment. On the basis of the results of that examination, it is concluded that the need for having soiled scrubs laundered by a facility-approved laundry is indefensible and simply predicated on the "that's the way we've always done it" syndrome.

Database: EMBASE

13. Clinical issues. Stained surgical linen; gowning at the back table; cloth hats; removing medication stoppers; patient privacy.

Author(s): Peterson C
Source: AORN Journal; Jun 2001; vol. 73 (no. 6); p. 1169-1171
Publication Date: Jun 2001
Publication Type(s): Academic Journal

Available at AORN Journal - from ProQuest (Hospital Premium Collection) - NHS Version
Available at AORN Journal - from Ovid (Journals @ Ovid) - London Health Libraries

Database: CINAHL

14. Rationale for home laundering of scrub attire

Author(s): Jurkovich P.
Source: AORN journal; May 1999; vol. 69 (no. 5); p. 1024-1025
Publication Date: May 1999
Publication Type(s): Article
PubMedID: 10391834

Available at AORN journal - from ProQuest (Hospital Premium Collection) - NHS Version
Available at AORN journal - from Ovid (Journals @ Ovid) - London Health Libraries

Database: EMBASE
15. Tracking perinatal infection: is it safe to launder your scrubs at home?

Author(s): Kiehl, E; Wallace, R; Warren, C

Source: MCN. The American journal of maternal child nursing; 1997; vol. 22 (no. 4); p. 195-197

Publication Date: 1997

Publication Type(s): Journal Article

PubMedID: 9234607

Abstract: PURPOSE This descriptive pilot study was conducted during 1991 and 1992 to determine the effect of wearing home-laundered scrub clothing in labor and delivery on the perinatal infection rate. METHOD Unit meetings were conducted to instruct the 68 participating employees to launder their scrub clothing in an automatic washing machine, and to dry them in an automatic dryer on a hot setting. Statistics, including total births and cesarean births, were gathered, including all cesarean births during the years of 1991 and 1992 at the two study sites. Infection rates were monitored by the infection control department and reported frequently to the infection control committee and the medical and nursing staff. Employees were surveyed to assess their satisfaction after purchasing and wearing their own scrub clothing. The method for determining the perinatal infection rate in this study was based on the National Nosocomial Infections Surveillance System, which combines exogenous and endogenous factors when assessing the rate of wound infections(6). The method for monitoring the newborn infection rate in this study was outbreak surveillance. CONCLUSION Home-laundered scrub clothing can be worn safely in labor and delivery units, including the operating rooms contained in those units. This practice can reduce costs without increasing surgical wound infection rates.

Database: Medline
**Strategy 474847**

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