Wearing Surgical Attire Outside the Operating Room: A Survey of Habits of Anesthesiologists and Surgeons in Israel

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BACKGROUND: Nurses observe regulations restricting the use of uncovered surgical attire outside the operating room (OR), but there are no guidelines for physicians nor data on their habits in this matter. We assessed physicians’ attitudes and behavior about OR attire in non-OR areas.

STUDY DESIGN: A multicenter study was conducted among 106 units and departments in 23 university-affiliated, teaching and public hospitals and 2 private hospitals in Israel. Physicians were asked to respond “yes” or “no” to seven questions about their own habits of wearing OR attire outside the OR.

RESULTS: The response rate was 62.3%. More than one-half (53%) reported not observing any policy on wearing surgical attire outside the OR; 86% believed that such a policy is needed. Most (80%) left the OR area still wearing OR attire, 82% did not change to regular clothes later on, 63% responded that wearing covering apparel or a laboratory coat is acceptable, and 38% considered it obligatory to change to regular attire when leaving the OR. Most (71%) of the orthopaedic surgeons reported that they changed to regular clothing, compared with fewer gynecologists, general surgeons, and anesthesiologists. More anesthesiologists than other specialists covered themselves with some garment when leaving the OR area and 67% of them considered covering OR attire mandatory.

CONCLUSIONS: Israeli physicians behave differently with regard to wearing OR attire outside the OR. Orthopaedic surgeons and anesthesiologists are more disciplined, and gynecologists are the least observant. Most physicians recognize the importance of establishing strict guidelines of behavior. (J Am Coll Surg 2007;205:314–318. © 2007 by the American College of Surgeons)

The operating room (OR) may be considered a restrictive or semirestrictive area with regard to sterility versus pathogen-residing areas.1 Several reports, mostly in OR nursing literature, have raised concerns about OR sterility and its link to OR attire being worn outside the OR, although the rate of infections and their control have not been investigated in such settings. Wearing or not wearing OR attire outside the OR is a controversial issue worldwide that has not been investigated in depth.

Nurses in the United Kingdom, the US, and in Israel observe regulations that restrict the use of surgical attire outside the OR.1-4 Our Medline search, however, yielded no specific data on whether other medical personnel are inclined to wear the attire outside the OR, nor any information about the extent of their doing so.

The aim of this study was to assess attitudes and behavior about the use of OR attire and its covering outside the immediate OR area among physicians of various specialties in Israel.

METHODS
Study design
This multicenter study included medical staff members involved in OR activity at least twice weekly. The survey was conducted in 106 units and departments in Israel between February and April 2005. Questionnaires were given to the heads of departments of gynecology and obstetrics, orthopaedics, and general surgery. The same
questionnaires were sent to heads and deputy heads of departments of anesthesia in 23 university-affiliated public hospitals, 5 of which are tertiary medical centers. Two additional hospitals are private medical institutes. The reasons two administrators in anesthesia departments were approached were because of their larger representation in this setting and the fact that anesthetists are the only specialists who “live” in the OR and it was believed that they should have a larger say in the matter.

All compliant physicians were asked to respond to the items in the written questionnaire (Table 1) with a “yes” or “no” answer. The questionnaire was composed of seven items about their habits of wearing OR attire (scrub suits) outside the OR and their opinions on the matter.

**Data collection**

Answers were collected by mail, transferred, and kept in an electronic file by a secretary who was not involved in the study. The physicians were given 12 months to respond, and two reminders were sent to the initial non-responders, after which the study was closed and the data were analyzed.

**Statistical analysis**

Analyses were performed at the Statistical Laboratory of the School of Mathematics, Tel-Aviv University, using the SPSS Release for Windows, Version 12.01. An affirmative answer was given a score of “1” and a negative answer was given a score of “0.” Comparison among the groups was done by the Pearson chi-square test. All values are expressed as absolute numbers, with statistical significance defined as $p \leq 0.05$.

**RESULTS**

The overall response rate to the questionnaire was 62.3% and included 66 heads of surgical or anesthesia departments. The breakdown of medical and surgical specialties among the responders is given in Table 1.

Overall, 53% of the physicians reported having no preestablished policy about whether or not to wear sur-
gical attire outside the OR, although 86% believed that such a policy needed to be standardized. The data also showed that the majority of physicians (80%) leave the OR wearing scrub suits, without wearing anything over them. Most (59%) of the responders admitted that they did not use a laboratory coat regularly, and 82% did not bother changing to regular clothing later on. Only 38% of the responders considered it mandatory to change to regular attire when leaving the OR; 63% believed that wearing some kind of covering apparel or a laboratory coat is acceptable.

When stratifying the collected data according to the various specialties, orthopaedic surgeons were the most observant in terms of changing from OR attire to regular clothing outside the OR. Their overall opinion was in favor of a policy of wearing regular clothes after leaving the OR: 71% of them already had an existing policy, and 100% wished that a standardized policy existed. Most of these physicians also thought that all OR users needed to cover their OR attire when leaving the OR (question #6), but 43% admitted to not covering or changing their attire when leaving the OR (question #4) compared with scores of 67%, 73%, and 93% for the gynecologists, the general surgeons, and the anesthesiologists, respectively.

Among the anesthesiologists, who wear OR attire practically as second skin, the rate of covering themselves when leaving the OR was only 50%, and most of them did not change from scrub suits to regular attire when temporarily leaving the OR area. Nevertheless, 67% of them considered it mandatory to cover the attire, and 90% wished there was a standardized policy to do so. This opinion was far different from the attitude expressed by physicians in other specialties, with the exception of orthopaedic surgeons, although all responding physicians favored some form of standardized guidelines for the use of OR attire.

**DISCUSSION**

This study was intended to assess two aspects that have never been settled in the surgical literature: an estimation of the rate of covering OR attire by physicians from different medical specialties when leaving the restricted area, and the opinion of the same physicians about such behavior. No such guidelines have been justified or published in the medical literature, nor do they exist within our institutions. This is probably one of the reasons for the wide divergence of opinions expressed in the survey whose results we now present—findings apparently reported for the first time.

For decades, surgical scrub apparel has represented the uniform of the health care staff in OR areas. It is supposed to promote a high level of cleanliness and hygiene within the surgical environment and protect the patient from infection transmitted by the OR staff. The topic of prevention of infections in the OR is closely related to our questionnaire, but it was not the reason for our study. Local epidemiology departments and regional or governmental authorities are the usual sources of instructions on correct behavior of personnel coming in and going out of the OR. In the US, these rules are influenced by recommendations made by the Association of Perioperative Registered Nurses (AORN). These recommendations oversee the aspects of the work in the OR as “semirestricted and restricted areas of the surgical suite.” The United Kingdom’s National Association of Theater Nurses (NATN) guidelines also direct surgeons and associated personnel not to wear surgical attire outside the perioperative environment. So, there are authorities in several Western countries who recommend that OR personnel change into outer clothes when leaving the perioperative environment and put on a new set of OR attire when they return.

Covering apparel (generally a white laboratory coat or jacket) worn over scrub suits has been advocated to prevent contamination of the scrub suits outside the OR. Orders issued by the National Association of Theater Nurses state that wearing covering apparel when leaving the perioperative environment is acceptable only if the staff puts on a “clean single use gown or coat, completely secured by ties or button fasteners, which is worn one time and then appropriately discarded.” Some institutions allow their staff to leave the restricted area while wearing their surgical attire if they cover it with a white coat; others, however, forbid this practice, arguing that pathogens living on scrub suits worn by health care personnel may still cause spread of infection. Surprisingly, no scientific data have validated the benefits of these practices as a means for preventing transmission of infection. In addition, there are no convincing studies demonstrating a relationship between the use of covering apparel and prevention of infection. A recent study among clinicians checked the contamination of scrub suits worn with or without covering apparel in outside designated areas, in or out of the hospital. No marked differences in rates of contamination were found, sug-
gesting that wearing covering garments over scrub suits does not reduce rates of contamination of surgical patients. Besides, the garments themselves may be a source of contamination.

Different opinions on this issue have been expressed in the literature. Mailhot and colleagues showed that wearing covering apparel outside the OR may exert a protective effect against bacterial contamination, and that using it when leaving the OR was comparable with changing into a clean scrub suit on return. It has been recommended that scrub suits worn when entering the OR from outside should be replaced before entering the semirestricted or restricted areas to reduce the potential of cross-contamination from other uncontrolled environments. It is noteworthy that this is true despite the fact that changing into fresh scrub suits after each trip to other areas increases costs and is time consuming.

Whether microorganisms actually live on the scrub suits worn by OR staff is beyond the scope of this paper. Briefly, however, cultures performed from the front shoulders of home-laundered and hospital-laundered scrubs of OR nurses grew no pathogens in either group, indicating that scrub suits may safely be laundered at home. On the other hand, several studies demonstrated the transport of bacteria such as Staphylococcus aureus, Clostridium difficile, and vancomycin-resistant enterococci (VRE) on nurses’ uniforms. So, transmission of germs from contaminated personnel attire to other clothes and team hands and to patients would be likely. Although rare, it may be a profound contributing factor in the spread of nosocomial infections among surgical patients, but results of bacterial sampling from clothing did not demonstrate any marked increase in patients’ risk of acquiring nosocomial infection.

It was found that the source of contamination in orthopaedic surgery was the patient’s skin in 2% of the cases and OR sources in 98% of cases, with the contaminants reaching the wound through the air in 30% and through the hands of the surgical personnel or the instruments in the rest. These figures implicate orthopaedic surgeons in patient cross-infection; they, however, contrast with their relatively low response rate in our study and their rare use of covers. Implementation of advanced means of sterility control in the OR settings and perioperative antibiotic prophylaxis have enabled a low incidence of infections associated with orthopaedic prostheses in recent years, but the occurrence of infection in these devices still represents a severe epidemiologic problem, but one that is apparently unrelated to the issue of OR attire.

One limit of this survey is the relatively small number of respondents among each surgical specialty, with the exception of the anesthesiologists, whose greater interest is understandable, considering that one of their primary responsibilities is the sterility of the OR and its surroundings. Another reason for the anesthesiologists’ advocacy of standardization could relate to the frequent coming and going of other personnel, because surgeons often leave the OR to see patients in their offices, the emergency department, or other wards and areas where they are in contact with patients and devices that can cause bacterial transmission of nosocomial infection.

In conclusion, data from this survey revealed considerable variation in behavior patterns concerning OR attire among Israeli physicians, with orthopaedic surgeons and anesthesiologists being more vigilant and the gynecologists being least disciplined. Nevertheless, most of them appreciate the importance of establishing and following strict behavioral guidelines concerning changing from scrub suits to other attire when leaving the OR.

Author Contributions
Study conception and design: Weinbroum, Ezri, Harow, Serour
Acquisition of data: Weinbroum, Ezri, Harow, Serour
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