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Challenging Residual Contamination of Instruments for Robotic Surgery in Japan

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To the Editor—Infectious complications after surgery are drivers of both costs and morbidity. We therefore read with considerable interest the recent paper "Challenging Residual Contamination of Instruments for Robotic Surgery in Japan" by Saito et al.[1] In their study, the authors assess residual protein concentration on reusable surgical instruments both immediately following surgery and after standard hospital cleaning. They found that, compared to traditional open instruments, robotic surgical instruments retained significantly more residual protein both immediately after surgery and after routine cleaning.

Robot-assisted surgery is an approach that has grown in popularity over the past decade. It has now become the most widely used approach for many common operations in the developed world.[2] In robotic surgery, instruments and cameras are inserted through small laparoscopic port sides and the surgeon sits at a console and manipulates the surgical instruments under direct video control. These robotic instruments contain miniaturized mechanical and electronic components that may be more difficult to clean than traditional surgical instruments.

Saito et al placed both robotic and open instruments in an ultrasonic sink and used sterile water flushes in combination with ultrasonication and protein assays to infer the amount of protein on instruments after surgery and after routine cleaning. They found that robotic surgical instruments had both higher residual protein concentration compared with open surgical instruments and a slower rate of decline in protein concentration.

These results make sense; instruments with complex miniaturized mechanical components have an exponentially larger surface area and probably should retain more protein compared to open surgical instruments, many of which are simple metal grasping tools like scissors or forceps. There are, however, some key questions that this paper does not address.

First, the authors did not control for size or surface area of instruments: robotic surgical instruments have a vastly greater length and surface area. In addition, the largest part of the robotic surgical instrument never enters the patient and is purely used to attach the instrument to the surgical robot. Another study of cleaning methods for robotic surgical devices showed false-positive results after cleaning robotic instruments because it was not clear whether the protein or substances were obtained from the distal working part or from the shaft.[3]

Second, the total number of instruments used during the operation was not assessed. For example, robot-assisted prostatectomy may be performed with a total of only 5 robotic instruments (2 needle drivers, a grasper, bipolar forceps, scissors, and large grasping forceps), whereas open surgery may require a larger number of individual instruments. A typical open prostatectomy may require multiple pairs of long and short forceps, both toothed and smooth, as well as many instruments that are obsolete in robotic surgery such as retractors, sponge sticks, or scalpels. Comparing the aggregate protein remaining on all instruments used in an operation may be more relevant than the per-instrument concentration.

Another methodological point relates to the measurement of protein remaining on the instruments. With the exception of rare entities like prion diseases, protein itself does not have the ability to cause wound infections. Why not perform assays that specifically measure pathogenic organisms (eg, cultures or PCR assays)? This approach would probably provide a more clinically relevant measure of whether viruses or bacteria are being retained on robotic instruments after cleaning.

Finally, and most importantly, there is a practical question: How do the findings of higher residual protein on robotic surgical instruments impact actual clinical outcomes? An extensive body of observational data suggests that minimally invasive surgeries may have lower rates of infectious complications than open surgeries.[4,5] Recently, 2 prospective randomized trials found no higher rates of infectious complications with robotic cystectomy and prostatectomy than with open operations. While the precise impact of robotic surgery on postoperative complications remains a topic of debate and active research, there is certainly no evidence for exponentially greater infectious rates with robotic surgical instruments.

In addition, the proven incidence of infection due to surgical devices is very low.[6] Surgical wound infections are vastly more likely to be due to contamination from the patient's skin flora. Thus, benefits due to smaller incision could easily outweigh any theoretical increase in risk due to retained biomaterial on instruments.

The results of Saito et al underscore one of the ways that robotic surgical instruments differs from traditional open surgical instruments: The former tend to have a larger amount of residual protein left after cleaning, which makes sense given their design and size. While novel approaches for cleaning surgical instruments should adapt to new types of instruments, this should not dissuade innovators. Ultimately, new technologies and techniques are judged by their clinical outcomes. Specifically, the evaluation of novel techniques should include careful assessment of infectious risks in concert with careful basic scientific research. At the end of the day, this is what matters for patients, surgeons, and other stakeholders.

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More Doctor–Patient Contact Is Not the Only Explanation For Lower Hand-Hygiene Compliance in Australian Emergency Departments

To the Editor—Previous reports have demonstrated low hand-hygiene (HH) compliance in emergency departments (EDs).[1,2] Barriers to compliance in this setting include crowding, higher patient acuity, nonstandardized workflow, higher staff turnover, lower penetration of HH promotion activities, and high representation of doctors in ED audits, a group with known suboptimal HH compliance.[1,3,4] We sought to use a nationwide dataset to describe HH performance in Australian EDs and to test the hypothesis that lower HH compliance in EDs is explained by a higher proportion of observed HH activity by doctors in this setting.

We used data collected for the Australian National Hand Hygiene Initiative (NHHI), which is described elsewhere.[5] Briefly, the NHHI was launched in 2008 as a standardized national approach to HH culture change adapted from the WHO Multimodal Hand Hygiene Improvement Strategy.[6] At the institutional level, the core components of the NHHI are alcohol-based hand rub at the point of care, healthcare-worker education about HH and infection control, and HH auditing with performance feedback using the WHO "5