Surgical Helmets Harbor Common Pathogens that can Contaminate the Surgical Field
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INTRODUCTION: Surgical helmet/hood systems are not routinely cleaned between cases. Thus, these helmets serve as a potential source of organisms spread to the patients. The purpose of this study was to determine whether surgical helmets worn by surgical team are carriers of pathogens that can ultimately increase the bioburden of an operative room and pose a risk for surgical field contamination and subsequent infection.

METHODS:
This study is a prospective, observational study. Swab samples were obtained from the helmets and the forehead of surgeons using the helmets at three timepoints: prior to the first case, at the mid-point of the day between cases, and at the completion of the last case. Separate samples were taken from the forehead and surgical helmet of each individual. Samples were sent for culture and next generation sequencing (16S and ITS amplicon sequencing) for bacterial identification.

RESULTS:
Twenty-eight individuals wearing the helmets were included, resulting in 84 samples taken from surgical helmets, and 84 corresponding samples taken from forehead. In total, 73.8% of the samples taken from helmets isolated pathogen(s) at all timepoints, and 100% were positive for a pathogen at one point during the day. Some 82% of helmets demonstrated an increase in colony forming units on culture over the course of the day. In total, 64% of helmets grew bacterial species from corresponding skin samples of the helmet user that were not present at the start of the day. The most common organisms were skin flora including *C. acnes* (56/84), *Staphylococcus capitis* (32/84), and *Staphylococcus epidermidis* (31/84). Significant pathogens of orthopaedic interest include coagulase negative staph (10/84), Enterococcus species (9/84), Enterobacter species (8/84), and *Staphylococcus aureus* (5/84), and *Staphylococcus hominis* (5/84).

DISCUSSION AND CONCLUSION:
Organisms that commonly cause orthopaedic infection are frequently identified on the surface of surgical helmets used during total joint arthroplasty (TJA). Amount of bacteria as well as number of species increase over the course of the operative day, suggesting a dynamic transfer between the skin of the helmet user and the surgical helmet.