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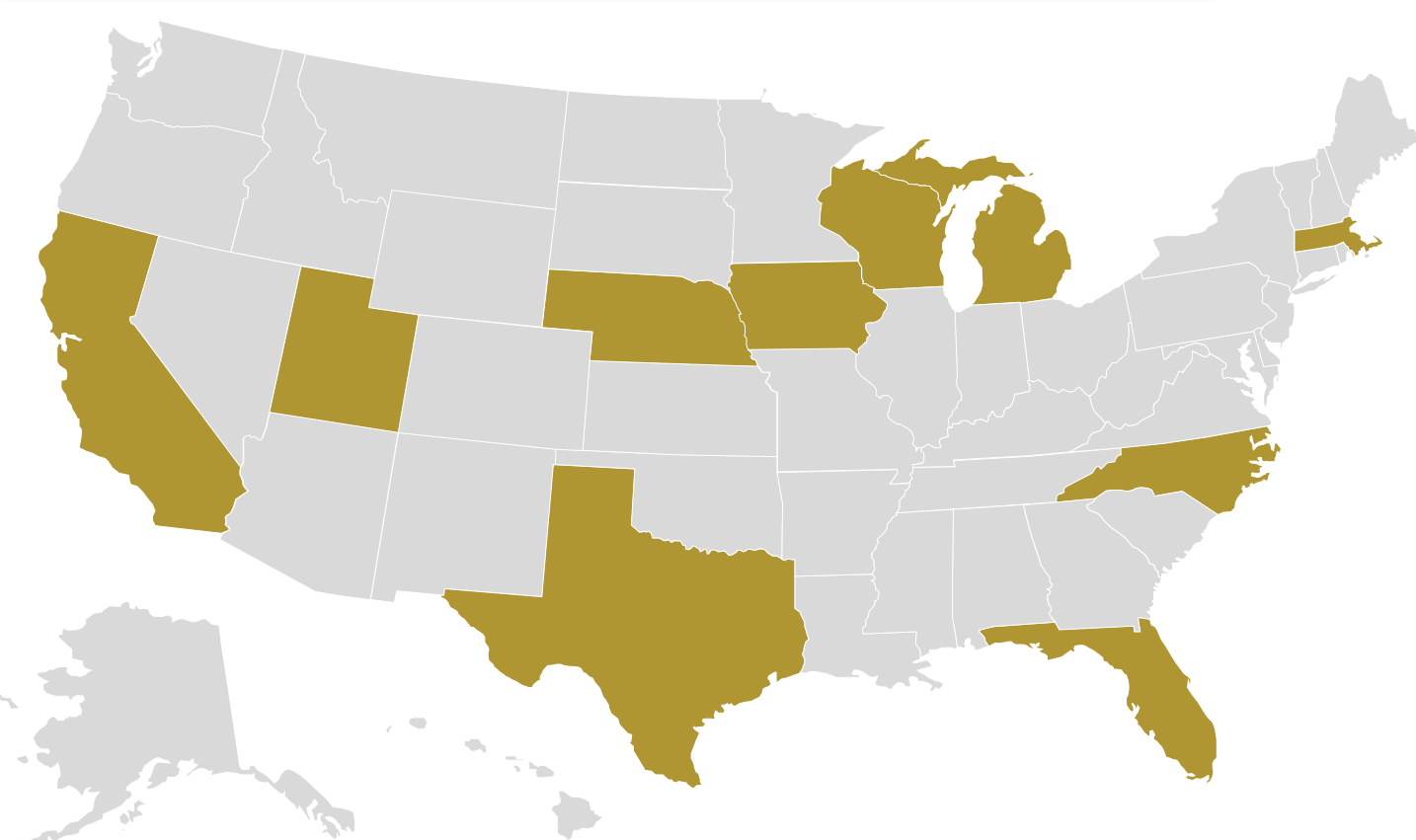
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THE PROBLEM

Surgical site infections (SSIs) complicate nearly 6% of all surgeries performed in Veterans Health Administration (VA) hospitals.¹ These infections occur despite widespread adoption of practices known to reduce SSI risks, and they lead to prolonged hospitalizations and increased risk of readmission, reoperation and Veteran mortality.² Operating room (OR) door openings during surgery are common, disrupt desired OR air flow patterns, are associated with increased wound microbe counts and may increase SSI risk.³

The objectives of the FOOT Patter study were to: 1) develop a methodological approach for collecting data on entry/exit traffic patterns in VA ORs and 2) characterize these patterns across different surgery types.

METHODS



After obtaining permission to access VA operating rooms, trained researchers from 10 sites out of the VA-Centers for Disease Control and Prevention (CDC) Practice-based Research Network observed OR personnel entering and exiting VA ORs during knee or hip replacement, spinal, coronary artery bypass graft or cardiac valve surgeries.

Using a standardized tracking sheet, room exit and entry movements were recorded. Surgery type and observation duration were noted with count of door openings starting at time of surgical incision and ending at wound closure. OR layout and number of doors to monitor mandated location of researchers to track the OR entries and exits, so some sites required observers to be present in the OR to see all access points.









Personnel categorized and identified by role:

- **Surgeons** (including resident and fellow trainees)
- **Anesthesia** (including anesthesiologists, certified nurse anesthetists and anesthesiology technicians)
- **RN** (including nurses functioning in a nursing capacity regardless of licensing credential, i.e., RN, LPN, MSN, APRN, APNP, etc.)
- **Surgical technicians** (including staff responsible for managing supplies involved in a procedure)
- **Imaging** (including radiologists and radiology technicians using any imaging device)
- **Other** (including students, observers or others not falling into any other category)
- **Vendor** (including for supplies or devices)









Data were entered into REDCap for analysis. Descriptive analyses were performed using Excel, and we statistically compared the average door openings per hour across the different procedure and role types via a one-way ANOVA using Stata ver. 15.0.

RESULTS

(A) UNIQUE INDIVIDUALS OBSERVED BY ROLE

SURGEON	169	
ANESTHESIA	165	
RN	219	
SURGICAL TECH	96	
PERFUSION	23	
IMAGING	31	
OTHER	22	
VENDOR	41	

(B) AVG. HOURLY DOOR OPENINGS BY ROLE

SURGEON	2.4	
ANESTHESIA	4.3	
RN	11.1	
SURGICAL TECH	2.2	
PERFUSION	4.9	
IMAGING	1.9	
OTHER	1.3	
VENDOR	4.9	

(C) AVG. DOOR OPENINGS BY PROCEDURE

HIP	55.2	
KNEE	53.1	
CABG/VALVE	98.9	
SPINAL	61.8	

(D) AVG. HOURLY OPENINGS BY PROCEDURE

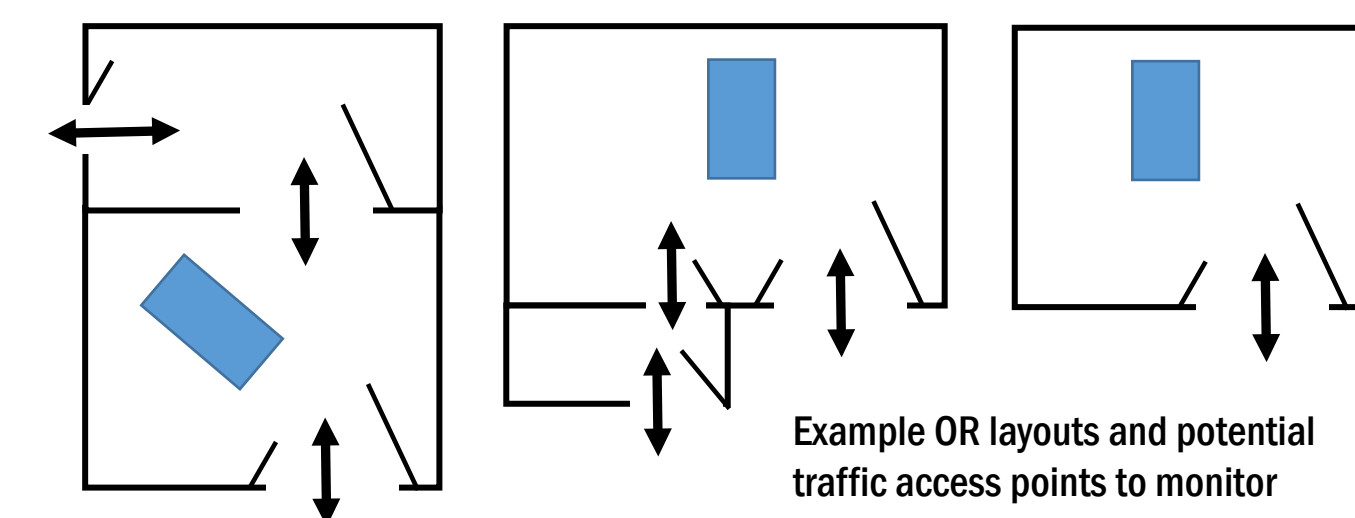
HIP	25.9	
KNEE	21.7	
CABG/VALVE	23.9	
SPINAL	23.4	

- 56 surgical procedures performed on 55 patients across the 10 VA sites (procedure count range: 1-9; median: 6).
- 9,801 minutes of observations.
- 766 staff opened doors 3,882 times.
- **B:** Door-opening frequency by role was significantly different ($p < 0.001$) with nursing staff, perfusionists, anesthesia and vendors having the highest average hourly door-opening rate.
- **C:** On average, CABG procedures had the highest frequency of door openings and surgical duration was significantly greater than hip, knee, or spine procedures ($p = 0.012$).
- **D:** When adjusted for time, the rate of OR door openings was similar across all procedure types at ~22-26 openings per hour ($p = 0.186$).

LIMITATIONS

There were several challenges to undertake this study:

- Gaining access and approval to observe
- Potential misidentification and categorization of entering/exiting staff
- Achieving ideal observer positioning in complex floor plans



CONCLUSIONS

- There were substantially more door openings observed during CABG procedures, but this was related to longer operative times and was not influenced by differences in traffic patterns when accounting for observation time.
- The per-hour rate of door openings varied notably by personnel role.
- The ability of researchers to collect data on 56 procedures demonstrated concept feasibility.
- Additional studies examining influence of traffic patterns on measures of OR air quality and impact on risk of SSI are needed.
- An automated process may be necessary to study this on a larger scale.
- Identifying rationale for door openings, necessity of door openings and effective strategies for reducing unnecessary door openings are other areas of need.

References

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