

**Outbreaks of MDR-Gram-negative bacteria: what works and what does not work?****TIMING OF THE EMERGENCE OF THE HAWTHORNE EFFECT IN HAND HYGIENE SURVEILLANCE: A MULTICENTER PROSPECTIVE COHORT STUDY**

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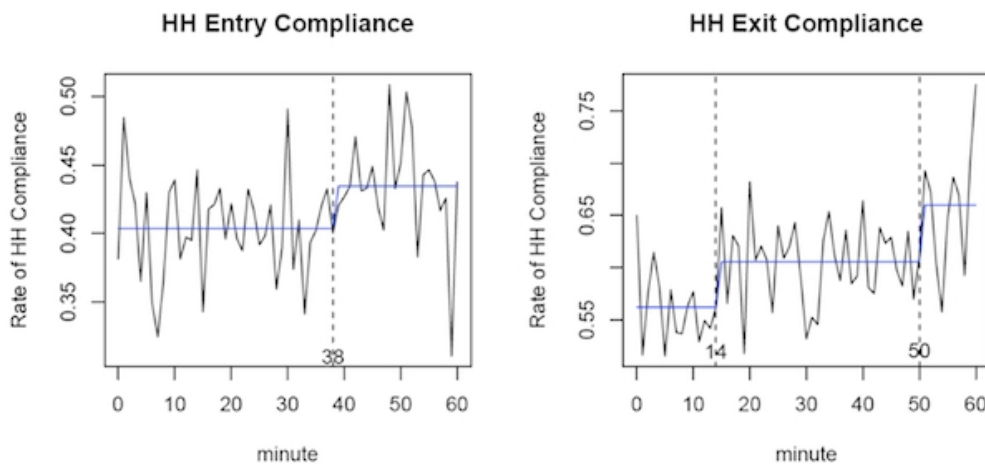
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**OBJECTIVES.** Hand hygiene surveillance programs that rely on direct observations of healthcare worker activity may be limited by the Hawthorne effect. We aimed to statistically determine if the Hawthorne effect is stable over time in order to inform observation strategies, which could improve the validity of measured hand hygiene compliance estimates.

**METHODS.** We completed a multicenter prospective cohort study over a 26-month period. The primary outcome, directly observed hand hygiene compliance, was collected in a total of 11 units including five intensive care units and six medical/surgical wards in three geographically distinct acute-care hospitals. Trained covert observers monitored hand hygiene compliance during routine care in fixed 1-hour periods, using a standardized collection tool. As observers were stationed outside rooms, surveillance was limited to two moments: room entry and exit. Our hypothesis was that if the Hawthorne effect was continuous across all time periods, we would expect compliance rates to remain unchanged during the entire 1-hour observation period. We estimated the impact of the duration of observation on hand hygiene compliance rates using empirical fluctuation processes and  $F$  tests for structural change. These methods test the null hypothesis of no change in regression parameters before and after each possible time point based on a sequence of  $F$  statistics, and then identify the time point giving the lowest  $p$  value as the breakpoint, if this is significant ( $p < 0.05$ ). This study was reviewed and approved by our institutional review board and the abstract was prepared following the STROBE Statement criteria.

**RESULTS.** 11,444 hand hygiene opportunities were observed during 3,432 hours of direct observation across 3 hospitals. Average hand hygiene compliance was 41.3% (4,546/11,018 opportunities) on room entry and 59.4% (6,225/10,488 opportunities) on room exit. Exit HH compliance increased after 14 minutes of observation (from 56.2% to 60.5%,  $p < 0.001$ ) and increased further after 50 minutes (from 60.5% to 66.0%,  $p < 0.001$ ). Entry compliance increased after 38 minutes (from 40.4% to 43.4%,  $p = 0.005$ ). See Figure 1.

**CONCLUSIONS.** Limiting direct observation periods to shorter than 15 minutes to minimize the Hawthorne effect would be expected to improve the validity of hand hygiene compliance measurement within a directly-observed hand hygiene surveillance program. Evidence-based methods such as those described could be incorporated into future hand hygiene guidelines or policies.



**Figure 1.** HH compliance as a function of observation time in fixed 1-hour observation sessions. Horizontal stepped lines are the fitted linear regression models for the HH compliance. The dashed vertical lines are the positions of the change points.