



Introduction of an electronic monitoring system for monitoring hand hygiene compliance in a neurosurgical unit

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Background:

MedSense is an electronic hand hygiene compliance monitoring system that provides Infection Control Practitioners with continuous access to hand hygiene compliance information in open cubicles with multiple beds and does not disrupt existing workflows (Figure 1).

Methods:

This study was conducted in the 6-bed neurosurgical intensive care unit with technical development and evaluation phases (Figure 2). Healthcare workers (HCWs) wore an electronic device in the style of an identity badge to detect hand hygiene opportunities and compliance. We compared the compliance determined by the system and an infection control nurse. At the same time, the system compliance by time of day, day of week, work shift, professional category of healthcare workers, and individual subject were assessed, while the workload of HCWs was monitored by measuring the amount of time they spent in patient zones.

Results:

During the three-month evaluation phase, the system identified 13,694 hand hygiene opportunities from 17 nurses, 3 physiotherapists, and 1 healthcare assistant, resulting in an overall compliance of 35.1% for the unit (Figure 3). The per-indication compliance for Moment 1, 4, and simultaneous 1 and 4 were 21.3% (95%CI: 19.0, 23.6), 39.6% (95%CI: 37.3, 41.9), and 49.2% (95%CI: 46.6, 51.8), respectively, and were all statistically significantly different ($p < 0.001$). In the four 20-minute sessions when hand hygiene was monitored concurrently by the system and infection control nurse, the compliance were 88.9% and 95.6% respectively ($p = 0.34$), and the activity indices were 11.1 and 12.9 opportunities per hour, respectively. The hours from 12:00 to 14:00 had a notably lower compliance (21.3%, 95%CI: 17.2, 25.3) than nearly three quarters of the other periods of the day ($p < 0.001$). Nurses who used shared badges had significantly ($p < 0.01$) lower compliance (23.7%, 95%CI: 17.8, 29.6) than both the registered nurses (36.1%, 95%CI: 34.2, 37.9) and nursing officers (34.0%, 95%CI: 31.1, 36.9) who used named badges (Figure 4).

Conclusion:

MedSense provides an unobtrusive and objective measurement of hand hygiene compliance. The information is important for staff training by the infection control team and allocation of manpower by hospital administration.

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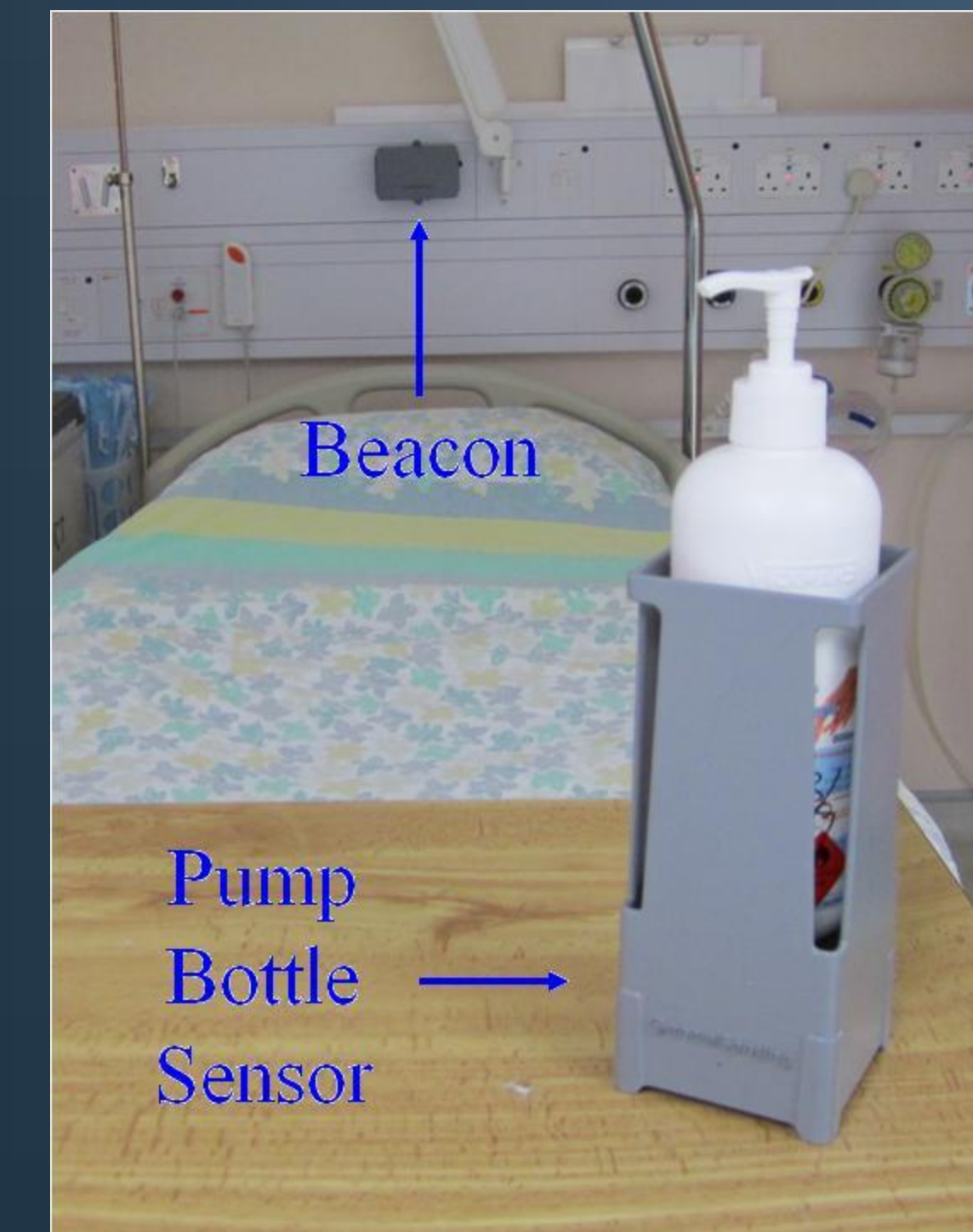


Figure 1. MedSense devices including beacon and pump bottle sensor at the bedside.

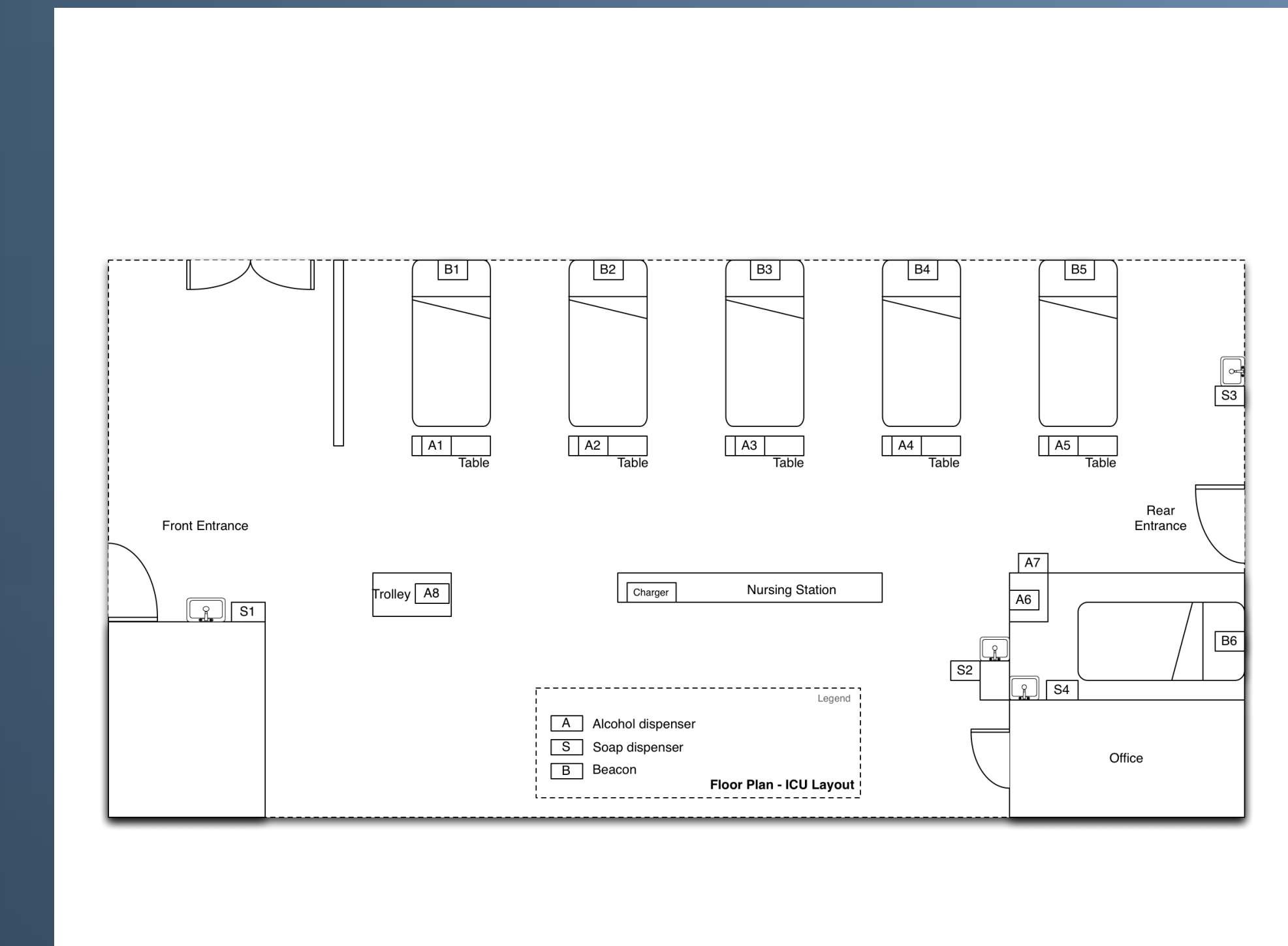


Figure 2. Diagram of the trial unit showing the six patient beds with beacons behind them, eight alcohol dispensers instrumented with sensors, and four soap dispensers instrumented with sensors.

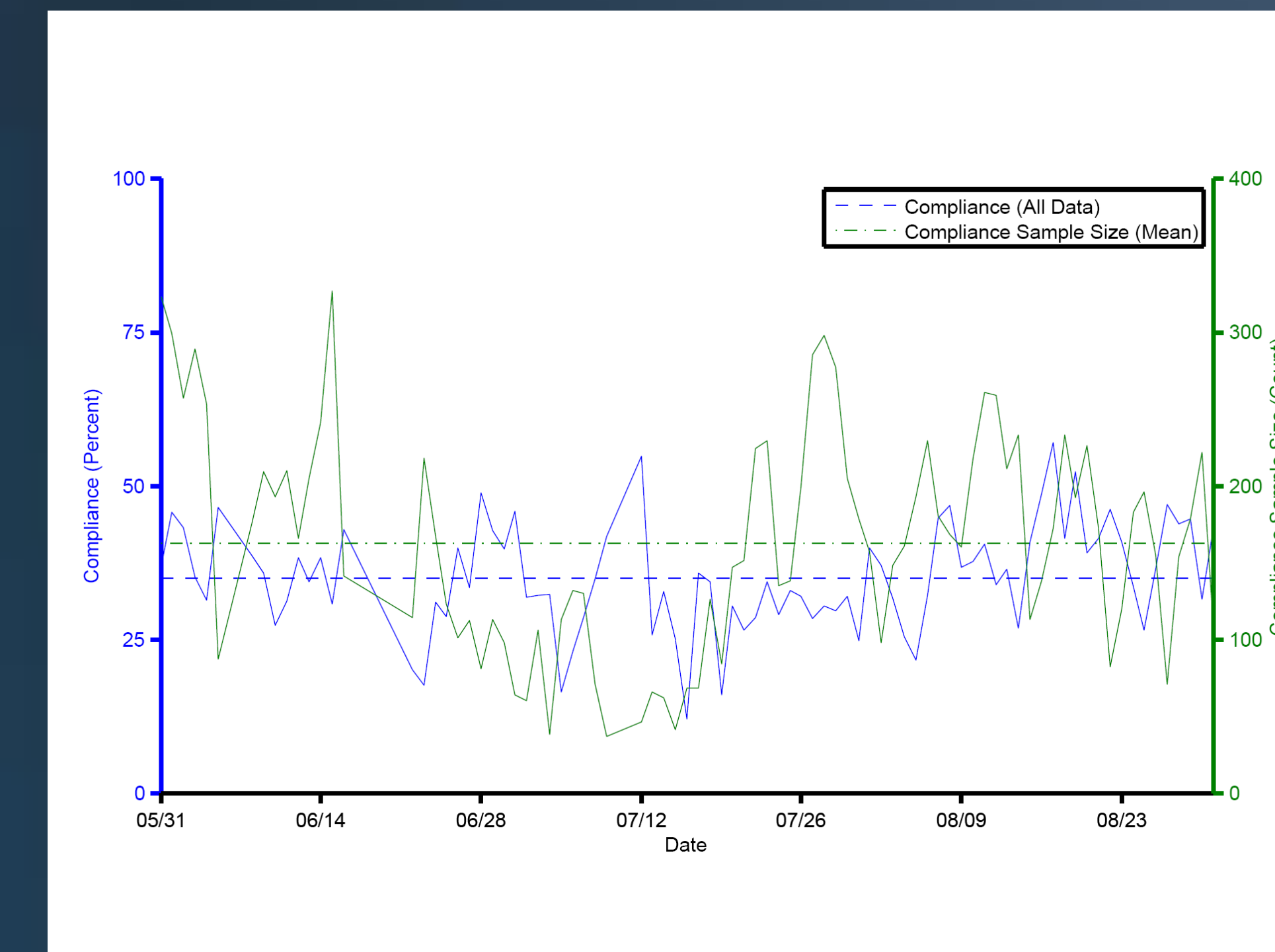


Figure 3. Daily aggregate compliance and compliance data sample size shown over the course of the evaluation phase of the trial.

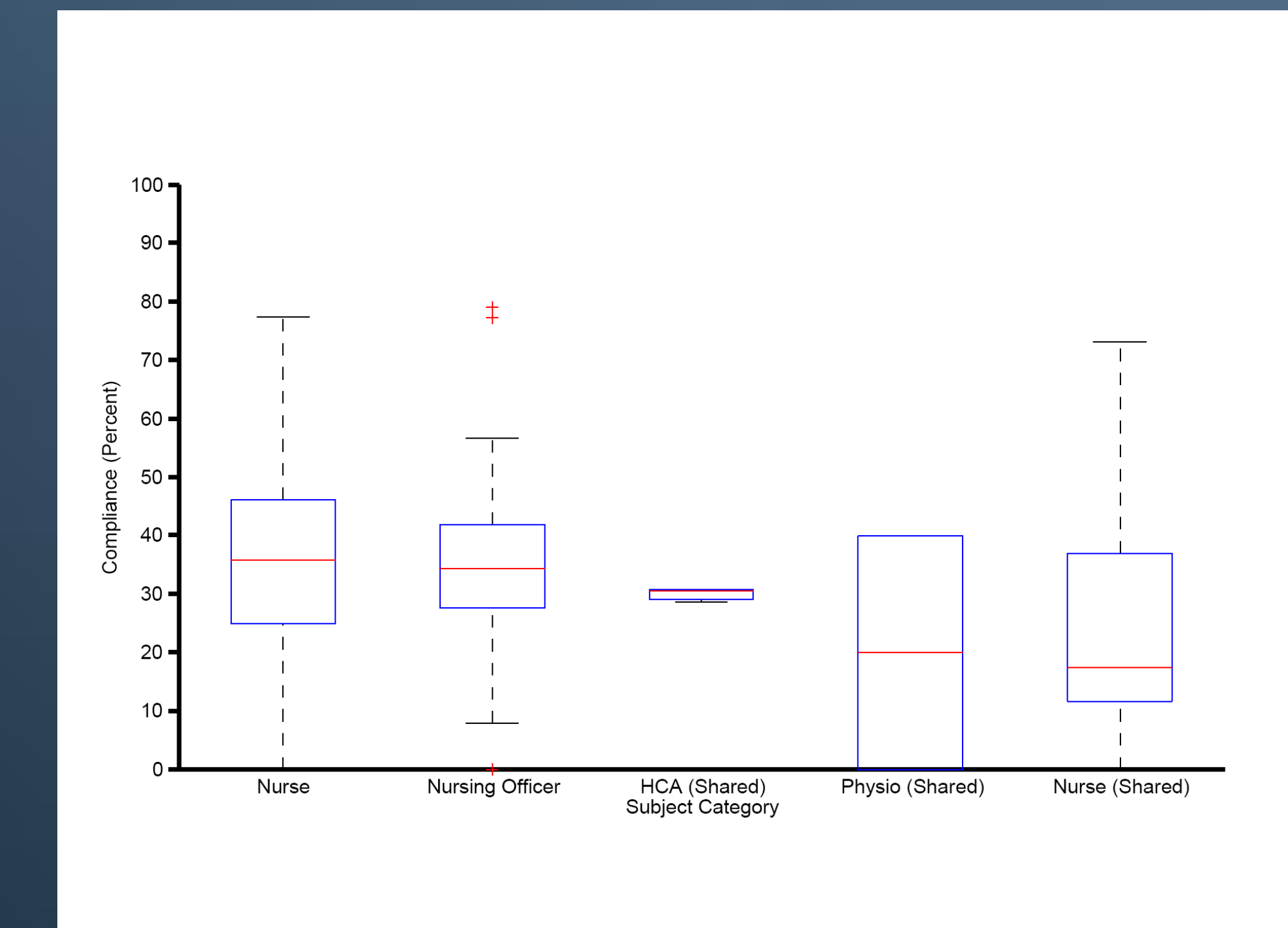


Figure 4. Distribution of compliance calculated per badge per and grouped by subject's HCW category.

Note. A single compliance is calculated per shared badge event though the subjects in these categories may change badges.

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