

# Catheter-Related Bloodstream Infection Reduction in the Outpatient Hemodialysis Setting

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#### Introduction

- Approximately 37,000 bloodstream infections occur each year in the United States among hemodialysis patients with central venous catheters (CVC).<sup>1,2</sup> CVC access is associated with higher infection rates (4.2 cases/100 patient-months for permanent CVCs and 27.1 cases/100 patient-months for temporary CVCs) as compared to arteriovenous fistula (AVF; 0.5 cases/100 patient-months) or arteriovenous graft (AVG; 0.9 cases/100 patient-months) access types.<sup>1</sup>
- DaVita initiated a pilot in partnership with the Armstrong Institute to reduce CVC-related bloodstream infections in outpatient hemodialysis patients. The pilot program was based on the validated Johns Hopkins Comprehensive Unit-based Safety Program (CUSP) and Translating Research into Practice (TRIP) approach. CUSP has been shown to reduce catheter-related bloodstream infections in the acute care setting.<sup>3-5</sup>

# Objective

To apply the CUSP/TRIP approaches found to be successful in the acute care setting to the outpatient dialysis setting to improve/prevent CVC-related bloodstream infections.

### Methods

- We conducted a collaborative, multifaceted, quality improvement program in 26 Maryland-area DaVita hemodialysis facilities. Project facilities were compared to 99 nonproject facilities in Maryland.
- In November 2011, following 3 months of training on the principles of CUSP, the pilot in-center teams were surveyed using a modified hospital survey on patient safety culture (HSOPS) tool to examine key elements of safety and practice in the facilities.
- The 56-question survey examined 7 dimensions related to patient safety culture, 5 related to infection prevention, and 4 related to outcomes.
- Tools for outpatient dialysis patients and teams were developed, and dialysis-specific interventions were implemented. CVC-related bloodstream infection rates were monitored using blood culture and treatment data collected from Davita's electronic medical record.
- Bloodstream infections (numerator for infection rates) were defined as a positive blood culture. Positive cultures taken within 3 days were counted as a single infection. All rates were represented per 100 treatments.

#### Results

- The safety survey was completed by 431 out of 497 employees (86.7%). The overall goal of the survey was to:
- Engage employees in an open dialogue about safety
- Encourage a nonpunitive response to error
- Generate sustainable solutions to safety issues identified through teammate engagement
- The survey tool results were reviewed with each individual facility and action plans implemented as needed.
- Composite scores regarding a patient safety culture at baseline are shown in Figure 1
- Composite scores regarding infection prevention at baseline are shown in Figure 2
- Through the TRIP process, areas for systematic improvement in pre-, intra-, and post-dialysis CVC care were identified from medical literature review.
- A procedural CVC dressing kit with checklist, antimicrobial swabs for skin preparation, triple-antibiotic ointment for exit site application, alcohol swabs to facilitate hub scrub, and exit site dressing was developed. Pilot centers received hands-on training to reinforce the CVC dressing change procedure and kit utilization.
- Enhanced teammate engagement was facilitated through the development and implementation of a tool/management process designed as a daily exercise to prepare the team to collectively identify and plan for high-risk patients.
- Teammate engagement was also driven through the utilization of an infection tracking calendar for new CVC-related bloodstream infection episodes.
- During the evaluation period, we saw a greater decline in CVC-related rates in project clinics than in non-project clinics (Figure 3).

Figure 1. Composite Scores: Patient Safety Culture

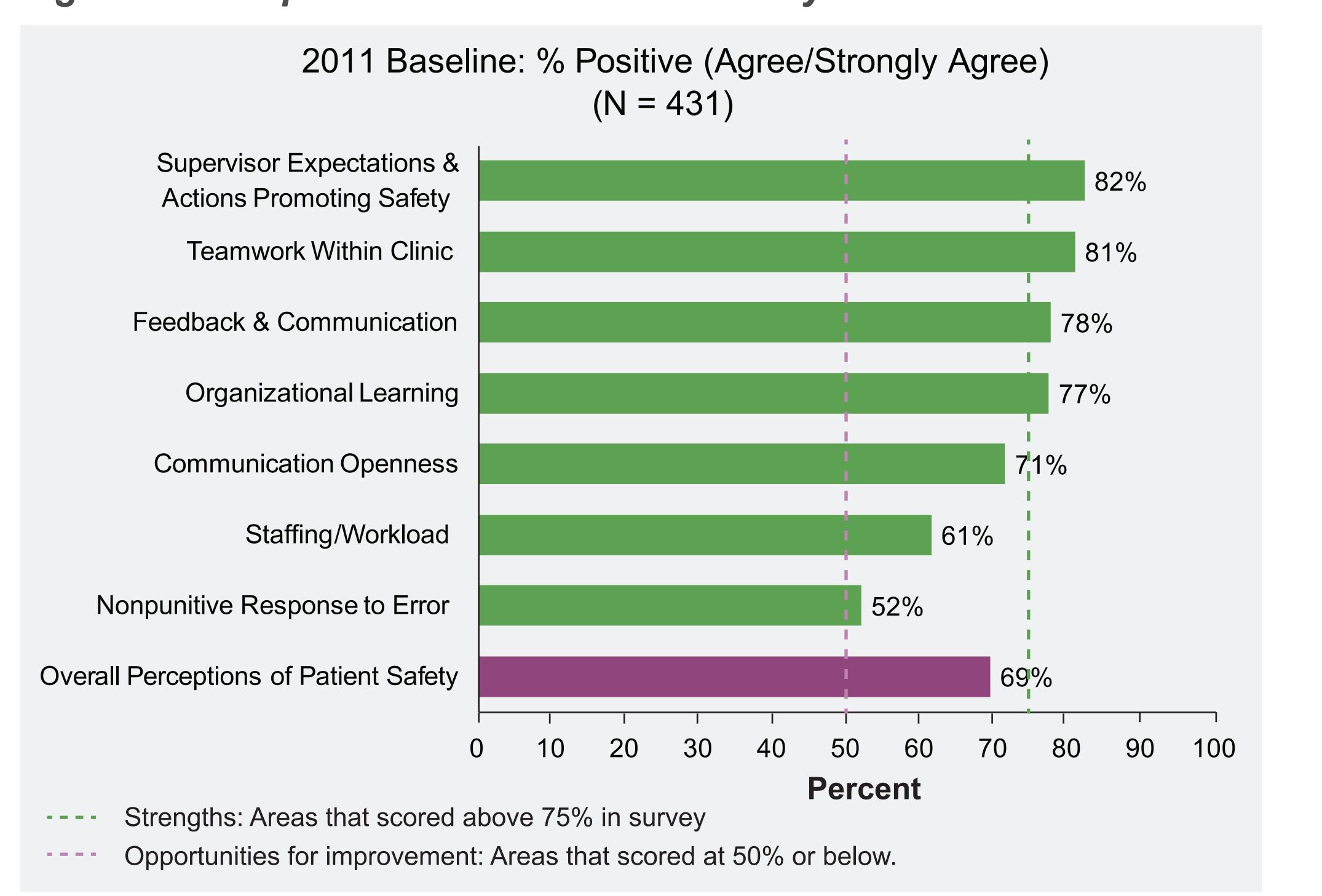


Figure 2. Composite Scores: Infection Prevention

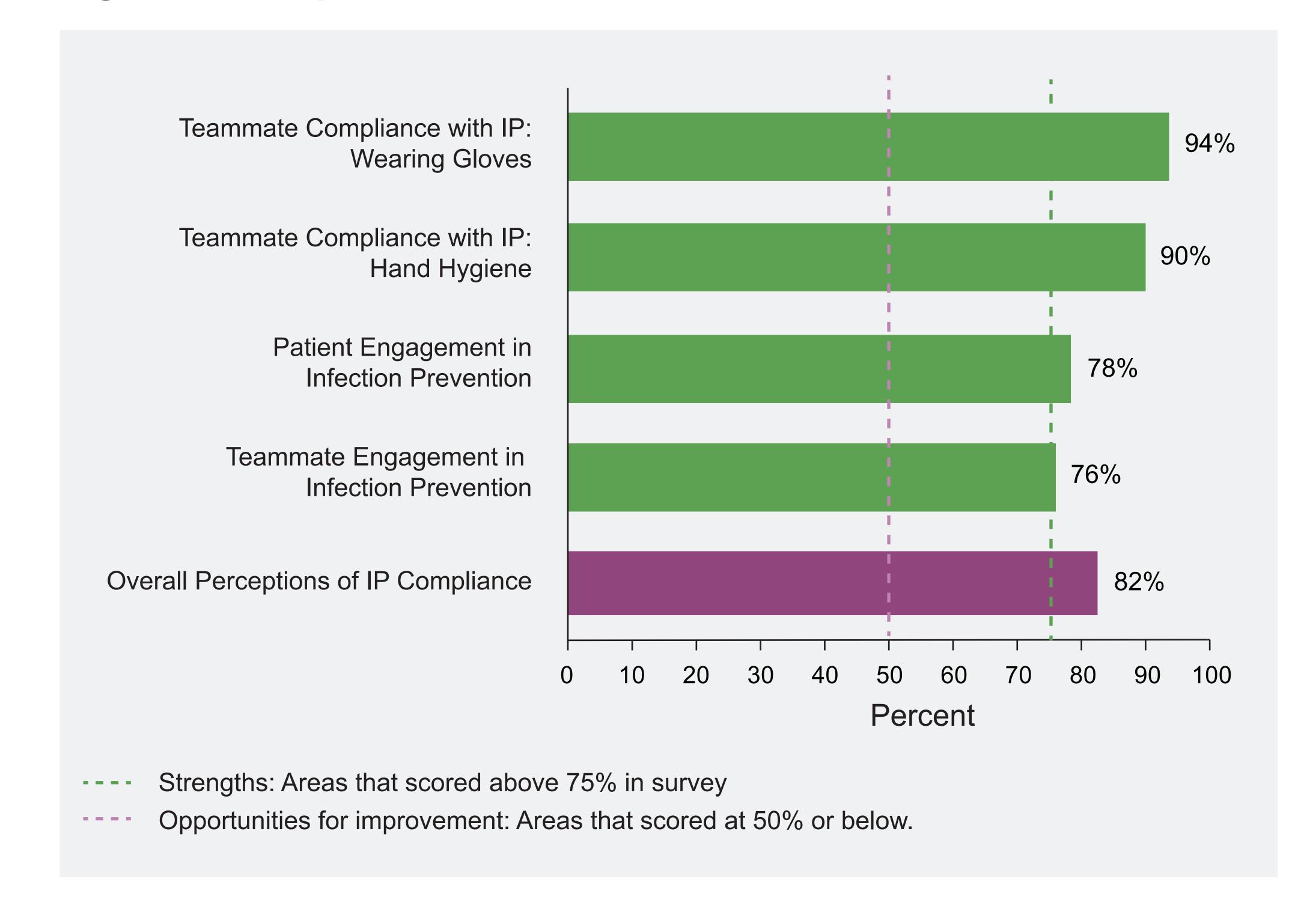


Figure 3. Catheter-Related Bloodstream Infection Rates in Project and Nonproject Facilities



#### Conclusions

The chronic outpatient environment varies greatly from the in-center acute care environment. With modification to adjust for the chronic outpatient setting, the application of the CUSP and TRIP tools and interventional approaches that reduce catheter-related bloodstream infections in hospitals can be successfully applied to reduce catheter-related bloodstream infections in chronic dialysis facilities.

#### References

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