

TABLE 1. Survey Responses

Survey Question	Yes (%)	No (%)	Other (%)
1. Is your facility part of a hospital system?	21 (95)	1 (5)	0
2. Are hospital level infection control activities coordinated across your healthcare system?	17 (81)	3 (14)	1 (5)
3. If the answer to question 2 is Yes, who has ultimate authority for infection control issues across the healthcare system?	Hospital Epidemiologist	8 (47)	
	Hospital Epidemiologist & Infection Preventionist	6 (35)	
	Infection Preventionist	1 (6)	
	Other	2 (12)	
4. If the answer to question 2 is Yes, who does the hospital epidemiologist and/or infection preventionist report to for such activities?	Chief Medical Officer	7 (39)	
	Chief Quality Officer	6 (33)	
	Nursing Officer	0	
	Other	5 (28)	
	Yes (%)	No (%)	Other (%)
5. If you have a system-wide infection control program, does each hospital have their own infection control manager and/or hospital epidemiologist?	14 (70)	4 (20)	2 (10)
6. If the answer to question 2 is Yes, are infection control policies and procedures standardized for the healthcare system?	13 (76)	2 (12)	2 (12)
7. If the answer to question 6 is Yes, have some infection control policies remained hospital-specific?	16 (94)	1 (6)	0
8. Does your healthcare system have a system-wide infection control committee/council with representatives from all hospitals?	13 (65)	7 (35)	0
9. How many hospitals do you have in your healthcare system?	1–5 hospitals	6 (29)	
	6–10 hospitals	11 (52)	
	>10 hospitals	4 (19)	
	Yes (%)	No (%)	Other (%)
10. May we contact you about your healthcare system infection control program?	7 (33)	1 (5)	2 (10)

Adherence to Central-Line Insertion Practices (CLIP) with Peripherally Inserted Central Catheters (PICC) and Central Venous Catheters (CVC): A Prospective Study of 50 Hospitals in China

To the Editor—Two types of common central venous central lines (CL), peripherally inserted central catheters (PICC) and central venous catheters (CVC), are widely applied in the care of patients with severe diseases treated in surgical, intensive care, oncological and hematological units.^{1,2}

In addition, invasive procedure for PICC and CVC could result in central-line-associated bloodstream infections (CLAB-SIs), leading to significant morbidity, mortality, and cost among hospitalized patients.³ Strict compliance with central-line insertion practices (CLIP), including hand hygiene, proper use of a skin antiseptic prior to insertion, skin preparation agent completely dried before insertion, and application of maximal sterile barriers (MSB) during insertion,⁴ would significantly decrease

the risk of subsequent CLABSIs.⁵ However, CLIP adherence in China has not been reported. In this study, we first performed a prospective multicenter study using a cell-phone app (cf, software application) to assess CLIP adherence for PICC and CVC insertions in Jiangsu Province in China from March 1 through March 31, 2017. During the study period, 12 of 13 cities (92.3%) and 50 general hospitals were included in this study. WeChat (www.Tencent.com) and contact groups were applied to train all the investigators online to achieve homogeneity. All investigators observed all PICC and CVC procedures and uploaded the data to the terminal database via an app installed in a cell phone.

This study included 1,377 PICC insertions (tertiary general hospitals, 1,148 insertions, 83.4%; secondary general hospitals, 229 insertions, 16.6%) and 2,304 CVC insertions (tertiary general hospitals, 1,980 insertions, 85.9%; secondary general hospitals, 324 insertions, 14.1%). Compared to CVC insertions, adherence to hand hygiene and complete drying of the skin disinfectant before insertion were significantly greater with PICC insertions ($P < .001$) (Table 1). In addition, CVCs were always placed by doctors, while PICCS were mainly

TABLE 1. Adherence to Central Line Insertion Practices (CLIP) Between PICC and CVC

Variable	PICC		CVC		Statistics	P Value
	No. (N = 1,377)	Adherence, %	No. (N = 2,304)	Adherence, %		
Hand hygiene performed before insertion	1,374	99.8	1,880	81.6	277.945	<.001
Appropriate skin prep before insertion	1,377	100.0	2,304	100.0	NA	NA
Skin prep agent completely dried before insertion	1,368	99.4	1,836	79.7	295.318	<.001
Maximal sterile barriers (MSB) used before insertion	1,267	92.0	1,161	50.4	664.978	<.001
Sterile gloves	1,364	99.1	2,278	98.9	0.28	.597
Sterile gown	1,297	94.2	1,267	55.0	626.556	<.001
Cap	1,349	98.0	2,244	97.4	1.203	.273
Mask	1,357	98.7	2,259	98.1	1.246	.264
Large sterile drape	1,360	98.8	1,768	76.7	327.637	<.001

NOTE. CLIP, central-line insertion practices; PICC, peripherally inserted central catheter; CVC, central venous catheter; NA, not available; Statistics, Pearson Chi-square test.

placed by nurses. Our results suggest better adherence with CLIP by nurses than by doctors.

It has been reported that the application of maximal sterile barriers (MSBs) used before CVC insertion could lower medical costs and decrease the incidence of catheter colonization, catheter-related bloodstream infections, and death,⁶ which reflects the importance of MSBs in the prevention of CLABSI. However, compliance with MSB protocols for CVC insertions was only 50.4% in this investigation, especially for sterile gowns (55.0%) and large sterile drapes (76.7%). This finding suggests that enough and timely access to adequate supplies and personal protective equipment (PPE) for CLABSI prevention would greatly affect compliance with CLIP, and these costs should be fully supported in departmental budgets. In stratified analyses by department, the worst compliance with MSB use in CVC insertion occurred for anesthesia and operating rooms (1.6%), radiotherapy units (40%), and neurosurgery units (47.6%), which strongly suggests the need to improve supervision, to strengthen training, and to increase feedback in the use of MSBs.

In conclusion, our data indicate that compared to PICC insertions, there was significantly less adherence with hand hygiene, complete drying of the skin disinfectant, and poor adherence with MSBs with CVC insertions. CLIP adherence should also be monitored daily to optimize patient safety.

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