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Arterial catheter-related bloodstream infection: incidence, pathogenesis, risk factors and prevention☆

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SUMMARY

Background: Arterial catheters are essential in critical care for haemodynamic and blood gas monitoring. The risk of infection remains ill defined.

Aims: To delineate the incidence, pathogenesis and risk factors for arterial catheter-related bloodstream infection (BSI).

Methods: Arterial catheters in two randomized trials in 1998–2000 were studied prospectively. One trial studied the effect of a 1% chlorhexidine–75% alcohol solution for cutaneous antisepsis for intravascular catheters, and the other trial studied the efficacy of a chlorhexidine-impregnated sponge dressing, both for prevention of catheter-related BSI. At catheter removal, skin of the insertion site, catheter segments, hub and infusate were cultured quantitatively in all cases. Catheter-related BSI was confirmed by concordance between isolates from the catheter and from blood cultures by restriction-fragment DNA subtyping. Risk factors for arterial catheter-related BSI were determined using univariate analysis.

Findings: Of 834 arterial catheters studied (3273 catheter-days), 109 (13%) were colonized and 11 caused bacteraemia (1.3%, 3.4 per 1000 catheter-days). The majority of catheter-related BSIs were acquired extraluminally from skin of the insertion site (63%). The risk of arterial catheter-related BSI was comparable with that for short-term non-cuffed central venous catheters (2.7%, 5.9 per 1000 CVC-days).

Conclusion: In patients in intensive care with cryptogenic sepsis or bacteraemia, arterial catheter-related BSI must also be suspected and excluded. The most common route of infection is extraluminal; as such, novel technologies shown to prevent bloodstream infection with CVCs, such as chlorhexidine for cutaneous antisepsis and chlorhexidine-impregnated dressings, may also be of benefit with arterial catheters.

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Introduction

Arterial catheters are widely used in critically ill patients for haemodynamic monitoring and frequent blood gas sampling. Approximately eight million arterial catheters are placed annually in centres across the USA.[3,4] One of the most common serious complications of all intravascular devices is catheter-related bloodstream infection (BSI).[5] Arterial line BSIs are known to be associated with site pseudoaneurysms,[6] septic

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thromboarteritis[7] and arterial rupture,[8] and are associated with considerable morbidity and risk of death; they often mandate surgical intervention. While outbreaks of nosocomial bacteraemia associated with indwelling arterial catheters deriving from contamination of infusions have been reported,[9] the risk of endemic arterial catheter-related BSI is unclear and has ranged from 0 to 4% in published studies.[10,11] A meta-analysis of six prospective studies in adults found that the incidence of arterial catheter-related BSI was 2.9 per 1000 catheter-days, a rate close to that seen with short-term non-cuffed central venous catheters (CVCs) found in the meta-analysis (2.5 per 1000 CVC-days).[12] However, rigorous criteria for diagnosis of arterial catheter-related BSI such as DNA subtyping were not employed in the included studies.

This article reports a prospective study using pulsed-field gel electrophoresis (PFGE) for diagnosis of arterial catheter-related BSI to determine the incidence, pathogenesis and risk factors for arterial catheter-related BSI in a university hospital.

Methods

Patients participating in two prospective randomized trials between 1998 and 2000[13,14] formed the study population. One trial studied the effect of a 1% chlorhexidine–75% alcohol solution for cutaneous antisepsis for intravascular catheters,[14] and the other trial evaluated the efficacy of a novel chlorhexidine-impregnated sponge dressing, both for prevention of catheter-related BSI.[13] The two trials were very similar in overall design and studied common patient populations. Data were collected prospectively on study patients with newly inserted arterial catheters, including demographic features, underlying diseases, severity of illness according to Acute Physiology and Chronic Health Evaluation II (APACHE II) score recorded at the time of catheter insertion, reason for placement of the catheter, service, antibiotic use, length of hospital stay, number of days the catheter remained in place, presence of other invasive devices (urinary catheters and endotracheal tubes), and all clinical and laboratory data pertaining to infection. Blood cultures were drawn from the catheter and percutaneously when BSI was suspected. Both studies were approved by the Institutional Review Board, and written informed consent was obtained from all subjects prior to enrolment. Catheters were inserted by house staff using the Seldinger technique with Arrow brand catheter kits. Catheters were not changed routinely. No formal educational programme for insertion and maintenance of intravascular devices was in place at the time when the studies were conducted. Povidone-iodine was used as the agent for cutaneous antisepsis in the control arm of both trials.

Microbiological methods

At catheter removal, skin of the insertion site was cultured quantitatively as described previously.[15] For each catheter, the implanted portion of the catheter from the skin interface to the tip (transported in a sterile container) was cultured semi-quantitatively; the hub and fluid aspirated aseptically from the most distal injection port of the line were cultured quantitatively, as described previously.[15]

Micro-organisms were identified according to standard criteria.[16] When catheter-associated BSI occurred, isolates recovered from the insertion site, catheter segments, infusate or hubs, and blood cultures that appeared to be similar phenotypically were subtyped by PFGE after digestion of genomic DNA with restriction endonucleases,[17] using an automated computerized system and criteria of the Centers for Disease Control and Prevention (CDC)[18] for determining the relatedness of isolates (Gel Doc 2000, Bio Rad Laboratories, Hercules, CA, USA).

Definitions

Antibiotic use: antimicrobial therapy was being given at the time of catheter insertion.

Maximal sterile barrier precautions: use of face mask, sterile cap, gown, gloves and full-body barrier drape.

Cutaneous colonization at insertion site: positive quantitative culture of catheter insertion site.

Difficult insertion: more than three attempts at insertion.

Outcome

Catheter tip colonization: a positive semiquantitative culture of an intravascular catheter segment (more than 15 colony-forming units), considered synonymous with local infection of the catheter.[15]

Catheter-related BSI: isolation of the same strain from the catheter segment, hub or infusate, and from one or more blood cultures, as proven by restriction-fragment subtyping, with no other identifiable source for BSI.[15]

Extraluminally acquired BSI: concordance by DNA typing in a catheter-related BSI between isolates from skin, catheter segments and blood cultures, but not the catheter hub.

Intraluminally-acquired BSI: concordance between isolates from the hub or infusate and blood cultures, but not skin or the catheter.

Indeterminate route of catheter-related BSI: findings suggested that both or neither routes of infection might be operative.

Statistical analysis

Univariate analysis of potential risk factors was undertaken using the pooled control groups of the two randomized trials, using Chi-squared or Fisher's exact test for categorical variables and Student's *t*-test for means. Due to the limited number of catheter-related BSIs ($N = 11$), a robust multi-variable model could not be constructed. *P*-values <0.05 were considered significant. All statistical analyses were performed using SAS Version 8.1 (SAS Institute, Cary, NC, USA). Data from two trials were pooled because they were conducted in the same intensive care unit (ICU) of a single hospital with very similar patient populations. Regarding the results of the two trials, the chlorhexidine-impregnated sponge dressing was found to be efficacious in reducing catheter-related BSI, and chlorhexidine for cutaneous antisepsis was found to be superior to povidone-iodine for prevention of catheter-related BSI including arterial catheters.

The following variables were analysed as potential predictors of arterial catheter-related BSI: catheter location, duration of catheter placement, underlying diseases (diabetes, transplantation), APACHE II score, cutaneous colonization at

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insertion site, use of maximal sterile barrier precautions at insertion, gender, and order of catheter insertion.

In both studies, most patients had both CVCs and arterial catheters at the time of development of infection. To differentiate between CVC-associated and arterial line-associated infections, whenever infection was suspected and the catheter was removed, segments of both catheters were cultured and organisms were correlated with the results of blood cultures. Subjects positive at both CVC and arterial catheters were excluded, as no definitive attribution to a particular catheter was possible.

Results

In total, 834 arterial catheters inserted in 542 patients were studied prospectively. The majority were placed in the radial artery ($N = 694$) or the femoral artery ($N = 128$), with a small number placed in the axillary ($N = 5$), brachial ($N = 4$) and dorsalis pedis ($N = 3$) arteries. Catheters had been in place for a mean of 3.9 days (total 3273 arterial catheter-days). The patient population was highly susceptible to nosocomial infection with multiple comorbidities, including critical illness (mean APACHE II score = 23.0), multiple invasive devices and procedures, and hypoalbuminaemia (Table I). All patients were cared for in a 24-bed medical-surgical ICU.

One hundred and nine arterial catheters (13%) were colonized at removal. Eleven arterial catheter-related BSIs (1.3%, 3.4 per 1000 catheter-days) were confirmed by showing concordance between cultures obtained from an infected catheter and one or more blood cultures. This is comparable with the pooled CVC-related BSI rate found in these two trials (2.7%, 5.9 per 1000 CVC-days).

Arterial catheter-related BSIs were caused by coagulase-negative staphylococci ($N = 8$), *Staphylococcus aureus* ($N = 1$), enterococci ($N = 1$) and *Burkholderia cepacia* ($N = 1$). Ten BSIs occurred with radial arterial catheters (694 catheters, 2619 catheter-days, 1.4%, 3.8 per 1000 catheter-days) and one with a femoral catheter (128 catheters, 605 catheter-days, 0.8%, 1.65 per 1000 catheter-days). Both trials showed a strong trend affirming benefits for the novel strategies (chlorhexidine-impregnated sponge dressing and 1% chlorhexidine—75% alcohol for cutaneous antisepsis) studied for prevention of arterial catheter-related BSI, and the pooled data show a substantial risk reduction in catheter colonization [6.9% vs 18.4%, relative risk (RR) 0.37, 95% confidence interval (CI) 0.24—0.56] and arterial catheter-related BSI (0.5% vs 2.0%, RR 0.25, 95% CI 0.06—1.02).

Sixty-three percent of the arterial catheter-related BSIs were acquired extraluminally, 27% appear to have had an intraluminal origin, and the mechanism of infection was indeterminate in one case (Table II). In a separate analysis of BSIs from the pooled data of the treatment and control groups (Table III), it can be seen that the extraluminal route was most important (78%) for the catheters in the control groups of the two trials, but with more effective suppression of cutaneous colonization by the two strategies studied, both arterial catheter-related BSIs that occurred in the treatment groups were intraluminal. A representative PFGE gel showing the pathogenesis of an arterial catheter-related BSI is shown in Figure 1.

Recognizing that the database is comprised of patients who were participating in two randomized trials of novel strategies for prevention of CVC and arterial catheter-related BSI, and that both strategies were found to reduce the incidence of catheter colonization and CVC- and arterial catheter-related BSI,[13,14] the rate of arterial catheter-related BSI was calculated for the pooled control groups of both trials (453 arterial catheters, 1796 catheter-days). Eighty-two (18.1%) of the control catheters were colonized and nine (1.9%, 5.0 per 1000 catheter-days) caused arterial catheter-related BSI.

Risk factors for catheter colonization and arterial catheter-related BSI were determined using the pooled control group population of both trials (444 catheters). The mean duration of

Table I
Features of the study population

Patients, *N*	542
Arterial catheters, *N*	834
Arterial catheter-days, *N*	3273
Age, years, mean ± SD	60 ± 18
Gender, *N* (%)	
Male	355 (65)
Female	187 (35)
Host risk factors, %	
Surgery	10
Hyperglycaemia	86
Malignancy	20
Transplant	13
Trauma	8
Therapeutic risk factors, %	
Urinary catheters	97
Mechanical ventilation	90
Prior antibiotics	40
Mean laboratory values, mean ± SD	
Albumin (g/L)	26.0 ± 2.0
APACHE II score, mean ± SD	23.0 ± 7.5
Duration of catheterization, days, mean ± SD	3.91 ± 3.63
Location of catheter, *N* (%)	
Radial artery	694 (83)
Femoral artery	128 (13)
Axillary artery	5 (0.6)
Brachial artery	4 (0.5)
Dorsalis pedis artery	3 (0.4)
Difficult insertion, *N* (%)	385 (46)
Reason for removal, %	
No longer needed	77
Patient died	19
Suspected catheter-related BSI	0
Not stated	4

BSI, bloodstream infection; SD, standard deviation.

Table II
Microbiology and presumed pathogenesis of 11 arterial catheter-related bloodstream infections, based on DNA subtyping

Organism	Extraluminal	Intraluminal	Indeterminate
CNS	6	2	
Staphylococcus aureus			1
Burkholderia cepacia	1		
Total	7 (63%)	3 (27%)	1 (9%)

CNS, Coagulase-negative staphylococci.

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Table III
Contrasts in the pathogenesis of arterial catheter-related bloodstream infections in the control and treatment groups of the study population

	Extraluminal *N* (%)	Intraluminal *N* (%)	Indeterminate *N* (%)
Control groups	7 (78)	1 (11)	1 (11)
Treatment groups[a]	0	2 (100)	0

The pathogenetic mechanisms between catheters in the control and treatment groups did not differ significantly ($P = 0.10$ by Fisher's exact test).

[a] 1% chlorhexidine–75% alcohol solution for cutaneous antisepsis for intravascular catheters,[14] or a chlorhexidine-impregnated sponge dressing applied to the insertion site.[32]

catheterization for catheters associated with BSI was 6.5 days compared with 3.5 days for catheters not associated with BSI ($P < 0.05$) (Table IV). Prior antimicrobial use was associated with increased risk of colonization (odds ratio 2.4, 95% CI 1.4–5.3), but did not reach statistical significance for BSI.

Discussion

Arterial catheters are essential in critical care. However, catheter-related BSI is a major, and often underappreciated, complication of these devices. In this large prospective study of 834 largely peripheral arterial catheters, the rate of arterial catheter-related BSI was 3.4 per 1000 catheter-days. With every study catheter cultured and using PFGE to link bloodstream isolates conclusively with catheter isolates, the rate of arterial catheter-related BSI was considerably higher than most intensivists might expect.

This contrasts with lower rates of arterial catheter-related BSI in other studies, although most did not culture all catheters at removal and thus may have underestimated the true risk of arterial catheter-related BSI. In a large, early prospective study, Gardner *et al.* cultured 200 consecutive radial artery catheters and found that eight were positive for growth in broth; none of these catheters were considered to have caused bacteraemia.[19] Most of the catheters had been inserted and cared for by a single person, most had been in place for less than four days, and all had been used for monitoring patients undergoing cardiovascular surgery (i.e. lower rate of ICU-acquired infection).[20,21] Significantly, none of the 38 catheters from patients who died were cultured.

In comparison, a more recent trial with prospective catheter culture found a rate of arterial catheter-related BSI of 3.53 per 1000 catheter-days, concordant with the results of the present study.[22]

It is believed that arterial catheters are not fully appreciated as a source of nosocomial BSI. Both the CDC and the Joint Commission on Accreditation of Healthcare Organizations only recommend surveillance of CVC-associated BSIs. Moreover, the recent CDC/Hospital Infection Control Practices Advisory Committee (HICPAC) guideline for management of intravascular device-related BSI makes little mention of arterial catheters as a cause of nosocomial BSI.[23] In the authors' experience, most intensivists consider arterial catheters to pose negligible risk of catheter-related BSI, in contrast to CVCs, and do not regularly

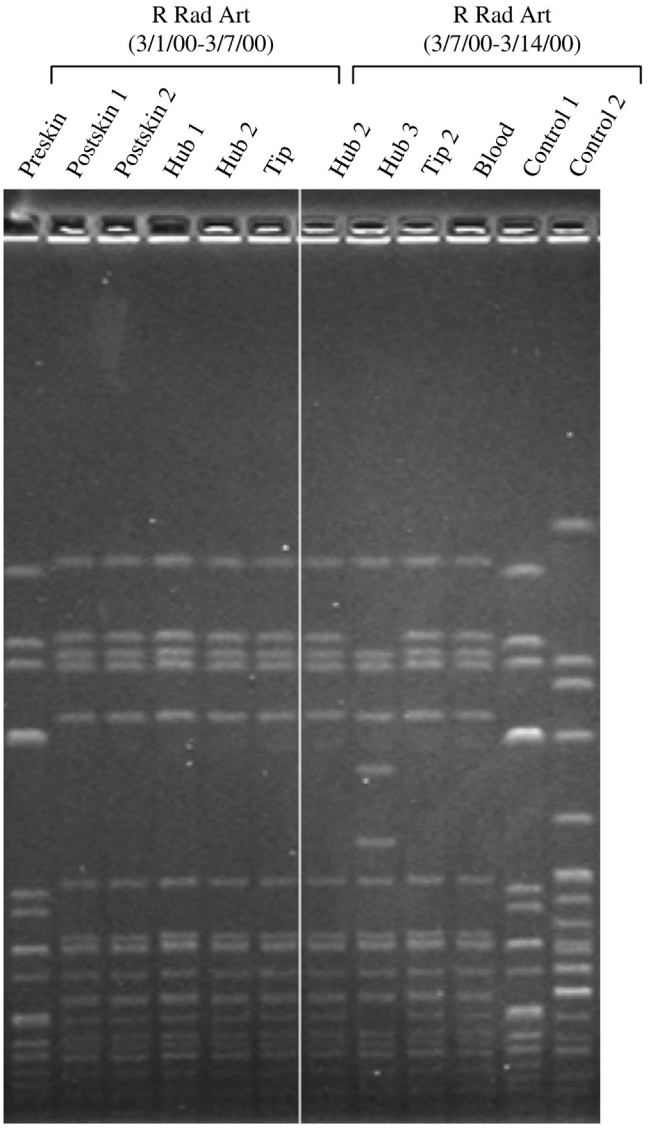

Figure 1. Pulsed-field gel electrophoresis image showing the probable pathogenesis of an arterial catheter-related bacteraemia. Catheter 1 in the right radial artery became heavily colonized from the skin of the insertion site by a distinct strain of *Staphylococcus aureus*. Catheter 1 was removed and a new catheter (Catheter 2) was placed in the same site over a guidewire. The original colonizing strain of *S. aureus* subsequently colonized Catheter 2, leading to an arterial catheter-related bacteraemia. The pathogenesis was indeterminate because both catheter tip and hub were positive for *S. aureus*.

culture arterial catheters in patients suspected of line sepsis. The present study suggests that this practice is not justified; arterial catheters are the most heavily manipulated intravascular devices in the ICU or the operating theatre, and the risk of catheter-related BSI per 1000 intravascular-device-days for arterial catheters used for haemodynamic monitoring (RR 2.9–3.3)[12] is comparable with that for short-term non-cuffed CVCs of all types (RR 2.3–5.0 per 1000 CVC-days).[12]

Few studies have prospectively evaluated risk factors for arterial catheters.[10,24] This study found that the duration of catheter placement was the single most important risk factor

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Table IV
Univariate analysis of risk factors for arterial catheter colonization and bloodstream infection in the combined control groups of the two trials

Risk factor	Colonization			Bloodstream infection		
	Cases	Controls	RR (95% CI)	Cases	Controls	RR (95% CI)
Gender (male)	51	290	0.97 (0.57–1.67)[a]	5	290	0.73 (0.12–4.32)[a]
Catheter location (radial vs other)	82	362	0.81 (0.51–1.30)[a]	9	362	0.28 (0.07–1.03)[a]
Order of catheter insertion (first catheter vs not)	82	362	0.57 (0.38–0.87)[b]	9	362	0.79 (0.21–2.91)[a]
Diabetes	29	179	1.76 (0.84–3.66)[a]	3	179	2.53 (0.23–27.05)[a]
Transplantation	44	252	0.72 (0.27–1.89)[a]	9	252	3.22 (0.84–12.32)[a]
APACHE II score for cases and controls, mean ± SD	81	362	24.09 ± 7.94, 23.66 ± 8.46[a]	9	362	2 4.09 ± 7.94, 25.88 ± 6.82[a]
Local inflammation	62	361	0.76 (0.12–4.77)[a]	9	361	6.48 (0.93–45.08)
Duration of catheter placement >6 days	82	364	2.11 (1.42–3.14)[c]	9	362	4.31 (1.19–15.59)[b]
Use of maximal sterile barrier precautions at insertion	76	315	0.82 (0.54–1.23)[a]	8	315	0.61(0.15–2.54)[a]
Cutaneous colonization at catheter insertion site	82	358	0.98 (0.61–1.57)[a]	9	358	0.99 (0.21–4.68)[a]
Prior antimicrobial therapy	29	178	2.08 (1.07–4.06)[b]	3	178	5.70 (0.52–61.44)[a]
Difficult insertion	65	294	0.68 (0.29–1.59)	7	294	2.94 (0.59–14.61)

APACHE, Acute Physiology and Chronic Health Evaluation; RR, relative risk; CI, confidence interval.
[a] $P > 0.05$.
[b] $P < 0.05$.
[c] $P < 0.001$.

in the prediction of catheter colonization and catheter-related BSI. In a prospective study of 130 arterial catheters in an ICU population, Band and Maki found that catheter placement for more than four days, the presence of local inflammation and catheter insertion by surgical cutdown, rather than via the percutaneous route, were significantly associated with catheter colonization and BSI in a univariate analysis.[10] Similar results were reported by Raad *et al*. in a prospective study of 71 peripheral arterial catheters placed in cancer patients in an ICU;[24] the investigators identified four cases of catheter-related BSI, all occurring four or more days after catheter placement. A retrospective study by Pirrachio *et al*. comparing rates of BSI before and after implementation of a programme of routinely changing arterial catheters that had been in place for more than five days decreased BSI rates significantly (3.13/1000 catheter-days before implementation vs 1.01/1000 catheter-days after implementation; $P < 0.001$).[25]

Most vascular catheter-related BSIs with short-term catheters begin as local infection of the insertion wound caused by skin micro-organisms that invade the intracutaneous tract during insertion of the catheter or in the following days. The longer a catheter is in place, the greater the likelihood of micro-organisms reaching the vessel and producing BSI.[26–28] The CDC/HICPAC guideline for prevention of intravascular-catheter-related infection does not recommend routine replacement of arterial catheters after a specified interval.[28] The study data suggest that arterial catheters should only be used when absolutely necessary, and efforts should be made to remove the catheter as soon as possible, ideally within six days.

To the authors' knowledge, this is the first study to use DNA subtyping to delineate the pathogenesis of arterial catheter-related BSI. Sixty-three percent of arterial catheter-related BSIs appeared to have been derived extraluminally, with migration of cutaneous organisms along the external catheter surface to the bloodstream, which may explain why rates of arterial catheter-related BSI in this study approach those seen with short-term non-cuffed CVCs. Moreover, as can be seen in Table III, preventive strategies that reduce cutaneous colonization more effectively decreased the risk of arterial catheter-related BSIs and shifted the pathogenesis of those arterial catheter-related BSIs that still occurred in treated patients to the intraluminal route.

Recommendations from the recent CDC/HICPAC guideline for prevention of intravascular-catheter-related infection[29] are summarized in Table V. Arterial catheters should be placed by trained personnel, using an aseptic technique and cutaneous antisepsis, preferably with >0.5% chlorhexidine. Sterile gloves and a sterile fenestrated drape are recommended for insertion of peripheral arterial catheters, and maximal barrier precautions for central (femoral or axilillary) arterial catheters; a prospective randomized trial failed to show benefit with the use of maximal barrier precautions for insertion of peripheral arterial catheters, but was underpowered to extend this finding to central arterial catheters.[30] Either sterile gauze or a semipermeable transparent dressing may be used to cover the insertion site; gauze is preferred if there is oozing or if the patient is diaphoretic. The site should be monitored regularly for inflammation and purulence at the insertion site. Manipulation of the system should be minimized, and all components of the pressure monitoring system should be sterile. Transducers and tubing should be changed every 96 h. The guideline does not recommend routine replacement of arterial catheters, and catheter tips should not be cultured routinely at removal but only if arterial catheter-related BSI is suspected clinically. If arterial catheter-related infection is suspected, guidewire exchange should not be used to replace the catheter in the same site.

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Table V
Guidelines for prevention of arterial catheter-related bloodstream infections[a]

Recommendation	Evidence grade[b]
Education, staffing and training	
Educate healthcare personnel regarding the indications for intravascular catheter use, proper precautions for insertion and maintenance of intravascular catheters, and appropriate infection control measures to prevent catheter-related infections	IA
Periodically assess knowledge and adherence to guidelines for all personnel involved in insertion and maintenance of intravascular catheters	IA
Designate only trained personnel who demonstrate competence for the insertion and maintenance of peripheral and central intravascular catheters	IA
Ensure appropriate nursing staff levels in intensive care units	IB
Site selection	
Radial, dorsalis pedis and brachial sites are to be used preferentially over femoral site	IB
Insertion technique	
Hand hygiene is to be performed before insertion or manipulation of arterial catheter	IA
Mask, cap, sterile gloves and fenestrated drape are to be used as minimum for insertion of a peripheral arterial catheter	IB
Maximum sterile barrier precautions should be used for axillary or femoral arterial catheter placement	IB
Maintenance	
Monitor catheter sites regularly	IB
Use either sterile gauze or sterile, transparent, semipermeable dressing to cover the catheter site	IA
If the patient is diaphoretic or if the site is bleeding or oozing, use gauze dressing until this is resolved	II
Replace catheter site dressing if the dressing becomes damp, loosened or visible soiled	IB
Do not use topical antibiotic ointment or cream at insertion site because of their potential to promote fungal infections and antimicrobial resistance	IB
Do not submerge catheter site in water	IB
Replace arterial catheters only when there is a clinical indication; do not routinely replace arterial catheters to prevent catheter-related infections	II
Remove the arterial catheter when it is no longer needed	II
Use disposable, rather than re-usable, transducer assemblies	IB
Sterilize re-usable transducers according to manufacturer's instruction if disposable transducers are not available	IA
Replace disposable or re-usable transducers and other components of the systems (tubing, flush device and flush solution) at 96-h intervals	IB
Keep all components of the monitoring system sterile	IA
Minimize number of manipulations and entries into pressure monitoring system. Use closed flush system to maintain patency of pressure monitoring catheters	II
When accessing through a diaphragm rather than a stopcock, scrub the diaphragm with antiseptic before accessing system	IA
Do not administer dextrose-containing or parenteral nutrition fluids through the pressure monitoring circuit	IA

[a] Adapted from the Hospital Infection Control Practice Advisory Committee (HICPAC) guideline for the prevention of intravascular-device-related infection.[28]

[b] Taken from Centers for Disease Control and Prevention/HICPAC system of weighting recommendations based on scientific evidence. IA, strongly recommended for implementation and supported by well-designed experimental, clinical or epidemiological studies; IB, strongly recommended for implementation and supported by some experimental, clinical or epidemiological studies and a strong theoretical rationale; IC, required by state or federal regulations, rules or standards; II, suggested for implementation and supported by suggestive clinical or epidemiological trials or a theoretical rationale; unresolved issue, an unresolved issue for which evidence is insufficient or no consensus regarding efficacy exists; NR, no recommendation for or against at this time.

Several novel technologies for the prevention of intravascular device-related infection that have shown efficacy with short-term non-cuffed CVCs are clearly of benefit with arterial catheters. In this study, benefit was found with chlorhexidine for cutaneous antisepsis[2,12,15] and the chlorhexidine-impregnated sponge dressing; based on the growing evidence that arterial catheters pose a risk of catheter-related BSI comparable with CVCs in ICU patients, this should be adopted in clinical practice. Three prospective randomized controlled trials that included arterial catheters showed chlorhexidine to be superior to 10% povidone-iodine for cutaneous antisepsis for catheter insertion and site care.[14,31,32] In a large randomized trial that also included arterial catheters, a novel chlorhexidine-impregnated sponge dressing reduced the risk of catheter-related BSI by 65% with all types of short-term catheters, including arterial catheters.[33] To the authors' knowledge, there have been no clinical trials of arterial catheters with antiseptic coatings to date.[28]

In conclusion, arterial catheters pose a substantial risk of catheter-related BSI, comparable with that seen with short-term non-cuffed CVCs. Duration of catheter placement is the strongest predictor of catheter colonization and infection. Most arterial catheter-related BSIs are acquired extraluminally, and

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novel technologies to enhance cutaneous antisepsis should also be applied to arterial catheters.

Conflict of interest statement
None declared.

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