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Review

Reassessing the need for scheduled replacement of short term central venous catheters: A narrative comprehensive review

Regev Cohen [a,b,*]

[a] *Infection Control and Infectious Diseases Units, Hillel Yaffe Medical Centre, Hadera, Israel*
[b] *Rappaport Faculty of Medicine, Technion-Israel Institute of Technology, Haifa, Israel*

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S U M M A R Y

Central venous catheters (CVCs) are essential in modern healthcare but are associated with significant risks, particularly catheter-related bloodstream infections (CRBSIs). Current guidelines do not recommend routine replacement of CVCs based on time alone. However, recent evidence challenges this recommendation. A comprehensive literature review was conducted, focusing on studies exploring the risk-factors of short-term, non-hemodialysis CVCs, that were published in the last two decades while including seminal older works for context. The guidelines regarding scheduled CVC-replacement are not based on sufficiently convincing data. Current literature establishes the significance of CVC-duration as a major risk-factor for CRBSI occurrence, especially after 9–14 days of catheter-dwelling. The daily CRBSI risk is probably not constant, and the cumulative risk may reach high rates after 9–14 days, especially for femoral and jugular insertions compared to the subclavian site, suggesting potential benefits of scheduled CVC replacement, especially for non-subclavian catheters.

Introduction

Central venous catheters (CVCs) play a crucial role in the management of critically ill patients, providing reliable vascular access for the administration of medications, fluids, and blood products, as well as for hemodynamic monitoring [1]. Despite their clinical utility, CVCs are associated with significant risks, including mechanical complications during insertion and catheter-related bloodstream infections (CRBSIs) [2]. CRBSIs, in particular, are a major concern in healthcare settings, contributing to increased morbidity, mortality, and healthcare costs [3].

The management of CVCs, particularly regarding their duration of use and replacement strategies, has been a subject of ongoing debate in the medical community. Although current guidelines, including those from the Centers for Disease Control and Prevention (CDC) and the Society for Healthcare Epidemiology of America (SHEA), do not recommend the routine replacement of CVCs based on time alone [4–6], for years

* Corresponding author. Address: Infection control and infectious diseases units, Hillel-Yaffe medical center, Hadera, Israel. Tel.: +972 50 2172175.
E-mail addresses: regevc@hymc.gov.il, regevco@gmail.com.

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many practitioners continued this practice [7,8] as the basis for these recommendations was questionable [9]. Most studies identify catheter dwell time as a significant risk factor for line infection or colonization, and a recent research has suggested that the risk of CRBSIs increases significantly after 10—14 days of catheter dwell time, providing compelling evidence for reassessing current practices [10].

This narrative review critically examined the current available evidence regarding the time-dependent risks associated with short-term, non-hemodialysis CVCs. Tunneled, implanted, and peripherally inserted central catheters, were not included. I explored the database on which the current guideline relies upon, the issue of cumulative risk, the risks and benefits of scheduled replacement strategies, and the implications for updating current guidelines and clinical practices.

A comprehensive literature search was conducted using PubMed, Embase, and Cochrane Library databases. Search terms included combinations of "central venous catheter," "CVC", "catheter-related bloodstream infection", "CRBSI", "CLABSI (central-line associated bloodstream infection)", "dwell time", "duration", "replacement", "short-term", "risk factors", "routine" and "guidelines". I focused on studies published in the last twenty years but included seminal older works for context. Priority was given to randomized controlled trials, large observational studies, systematic reviews, and meta-analyses. The search was limited to English-language publications. Additional relevant articles were identified through manual searching of reference lists from identified studies and from review articles.

Current guidelines and their historical basis

Current guidelines from major health organizations consistently recommend against the routine replacement of CVCs based solely on catheter duration. The 2011 CDC Guidelines for the Prevention of Intravascular Catheter-Related Infections state: "Do not routinely replace CVCs, peripherally inserted central catheters, hemodialysis catheters, or pulmonary artery catheters to prevent catheter-related infections" [6]. This recommendation is echoed in the 2014 SHEA Strategies to Prevent Central Line-Associated Bloodstream Infections in Acute Care Hospitals [5] and has been reinforced in a recent 2022 update [4]. The quality of evidence is classified as "high" referencing to a literature review and analysis of 12 randomized trials, published in 1997 [11]. In this review Cook *et al*. reported that scheduled, early (usually 3 days), guidewire CVC-exchange was associated with higher rates of catheter colonization, exit-site infection, and catheter-related bacteremia compared to as-needed, new-site replacement. These 12 studies, published between 1981-1995, have several characterizations that limit their applicability to the current era, besides the fact that these studies included relatively small number of patients (19—160) and the randomization method was frequently not indicated. Table I describes studies that compared scheduled line replacements with replacement as clinically needed. The first 12 studies are reviewed by Cook *et al*. and were divided into 3 groups: (a) Two studies [12,13] that investigated the approach to already suspected catheter infections; (b) Seven studies [14—20] evaluated early (typically day 3) prophylactic CVC exchanges (by either guidewire or new-site replacement). Four of them [14,16,19,20] included also arterial catheters and pulmonary artery (Swan-Ganz) catheters; (c) three studies [21—23] evaluated exchange by day 7 vs. exchange when clinically needed or vs. guidewire exchange. Two of them [21,23] included pulmonary artery catheters, arterial catheters and hemodialysis catheters.

The overall conclusions from the studies in group (b) are that guidewire exchange is associated with increased rates of catheter colonization and CRBSI, albeit with lower mechanical complications, and that early (every 2—3 days) replacements of CVCs do not prevent CRBSI, whether new-site or guidewire exchanges are used. An important note to consider is that exchanging the catheter early, typically on days 2—3, may not be beneficial in preventing time-dependent CRBSI, since it may not reach the threshold of 7—14 days, generally considered as the time of increased risk for CRBSI [24]. Regarding the studies in group (c), Eyer *et al*. [21] studied 112 patients and 294 catheters, including pulmonary artery and arterial catheters. CRBSI rates were 0.17 per patient for weekly guidewire changes, 0.22 for weekly new-site replacements, and 0.16 for as-needed changes. They concluded that changing catheters as needed was associated with less line colonization than weekly changes, despite longer catheter use. This study was underpowered [9]; the groups were unblinded (which could lead to bias of the classification of catheter infections), while strict definitions of catheter-related bacteremia were not employed; and 25% of catheter cultures were missed. In this study (as in most of the others in this review), povidone-iodine was used for skin preparation, exit site dressing and patient-bathing, as compared with chlorhexidine, as accustomed nowadays [4]. Importantly, the timing of the infection after guidewire exchange was not reported, and this is relevant since the guidewire exchange technique may by itself be associated with increased infection rates due to skin contamination of the new catheter during the exchange process [25]. Other studies have also reported early BSI after guidewire exchange [16]. The second study exploring weekly replacement was focused on short-term hemodialysis patients and did not include short-term CVCs at all [23]. The third study investigated nineteen burn patients and compared early (day 3) with CVC exchange on day 7 and found no benefit for the early guidewire exchange in terms of CRBSI prevention [22]. Taken together, the data on which the current guidelines broadly recommend not to routinely exchange short-term CVCs is based on limited studies that were not focused specifically on short-term CVCs and were performed before the 'bundle era'.

Regarding more recent studies, Panse *et al*. conduced a retrospective simulation for scheduled CVC removal within a multicenter registry of hematological patients, and found no difference in CRBSI incidence between scheduled removal at day 14 vs. removal as clinically needed, although a significant difference was evident for prophylactic CVC removal at day 7 (0.86 vs. 4.86/1000 CVC days, $P<0.001$) [27]. Similarly, increased risk for CRBSI after >7 days of CVC dwelling was reported in a recent prospective observational study [26]. A randomized controlled study comparing new-site replacement of pulmonary artery catheters every 4 vs. 7 days showed no difference in CRBSI incidences [28].

CVC dwell time is a cumulative risk factor for CRBSI

Multiple studies found catheter dwell time to be a significant risk factor for CRBSI or CLABSI [10,24,25,27,29—45]. A non-exhaustive list of selected, more recent studies is

Table I
A summary studies comparing scheduled and as needed exchange of central catheters, including studies evaluated by Cook *et al.* [11] and newer non included studies

	Author, year (Reference)	Study type	Population	Patients/CVCs (n)	Catheter types	Intervention	Interval	Contamination/ infection rates between groups	Study conclusions
Group A — Studies comparing different approaches to suspected infected CVCs — GWE vs. NSR									
1	Pettigrew, 1985 [13]	Prospective	Medical/ surgical patients in need of TPN	38/38	CVC	GWE vs. NSR	When CRBSI suspected	No difference	GWE may not be appropriate for suspected CRBSI
2	Michel, 1988 [12]	Prospective randomized	Surgical patients	41/54	CVC	GWE vs. NSR	When CRBSI suspected	No difference	GWE is safer than NSR
Group B - Studies comparing prophylactic exchange - short interval (<7 days)									
3	Snyder, 1988 [20]	Prospective randomized	Surgical ICU	30/303 (CVCs only)	CVC and AL	GWE vs. NSR	q3 days	No difference	GWE q3 days is safer than NSR q3 days
4	Kealey, 1995 [17]	Prospective randomized	Burn patients	42/264	CVC	GWE vs. NSR	q2 days	No difference (high rates of CRBSI in both groups ~9/1000 CVC days)	No advantage for frequent NSR over frequent GWE
5	Powell, 1988 [18]	Prospective randomized	Medical/ surgical patients, in need of TPN	126/126	CVC	GWE q3 days vs. GWE as needed*	q3 days or as needed	No differences (high rates of CRBSI in both groups 7—9/1000 CVC days)	No advantage for frequent GWE over as needed GWE
6	Bock, 1990 [15]	Prospective randomized	Cancer patients receiving IL-2 and or immune cells (short term CVC dwelling <7days, mean 3.8 ±1.1 days)	81/107	CVC	NSR q3 days vs. NSR as needed	q3 days or as needed	No differences (7.6% vs. 12%). Low rates in another arm of Oxacillin prophylaxis	Frequent NSR does not prevent CRBSI. Oxacillin prophylaxis recommended for short term CRBSI prevention
7	Cobb, 1992 [16]	Prospective randomized	Medical/ surgical ICU	160/523	CVC and PA	NSR q3 days vs. GWE q3 days vs. NSR as needed vs. GWE as needed	q3 days or as needed	Higher risk for (early) CRBSI in GWE group	Frequent exchange does not decrease CRBSI, GWE may increase CRBSI rates
8	Senagore, 1987 [19]	Prospective randomized	Surgical ICU	25/25	PA	GWE q3 days vs. NSR q3 days	q3 days	No difference	GWE q3 days is safer than NSR q3 days
9	Bach, 1992 [14]	Prospective randomized	Surgical ICU	148/148	PA exchanged to CVC	GWE q1-3 days vs. NSR q1-3 days	q1-3 days	No difference when exchanged <2 days. Higher rates of colonization and infection in GWE vs. NSR group when exchanged >2 days	GWE >q2 increased risk for CVC infection/ colonization as compared with NSR

(*continued on next page*)

Table I (*continued*)

	Author, year (Reference)	Study type	Population	Patients/CVCs (n)	Catheter types	Intervention	Interval	Contamination/ infection rates between groups	Study conclusions
Group C - Studies comparing prophylactic exchange - long interval (7 days)									
10	Kowalewska -Grochowska, 1991 [22]	Prospective restricted randomized	Burn patients	19/31	CVC	NSR q7 days vs. GWE at 3 days and then NSR q7 days	q7 days vs. q3 days	No difference in CRBSI rates	GWE on day 3 has no benefit for CRBSI prevention
11	Uldall, 1981 [23]	Prospective randomized	Temporary hemodialysis patients	92/?	Short term hemodialysis catheters	GWE q7 days vs. NSR or GWE as needed	q7 days vs. as needed	No difference in CRBSI	No need to routinely GWE hemodialysis catheters q7 days for CRBSI prevention
12	Eyer, 1990 [21]	Prospective randomized	Surgical ICU	112/294	CVC, PA and arterial catheters	NSR q7 days vs. GWE q7 days vs. NSR as needed	q7 days vs. as needed	No difference in CRBSI	Do not routinely replace lines; GWE is an option for line replacement; insert in a new site when infected skin.
Newer studies (not included in Cook *et al*. systematic review)									
13	Chen, 2003 [28]	Prospective randomized controlled	Medical/ surgical ICU	258/331	PA	NSR q4 days vs. q7 days	q4 vs. q7 days	No difference in CRBSI, slight increase in catheter tip infection in the q7 vs. q4 group	Do not exchange PA catheter routinely before 7 days
14	Panse, 2022 [27]	Simulation on retrospective database	Hemato-oncological patients	2984 cases	CVC	Simulation of replacement	q7, q14, q21 days and control group (as needed)	No difference in CRBSI for q14 vs. control, but CRBSI risk lower for q7 (0.86) vs. control (4.15/1000 CVC days), $P<0.001$ (Not a primary endpoint of the study)	Scheduled replacement not recommended q14 to prevent CRBSI
15	Castelli, 2007 [26]	Prospective observational	ICU patients	707/898	CVC	None, observation of CRBSI rates among NSR and GWE	Comparing 0 −7, 8−14, 15−21, >21 days	For CRBSI: 1−7=0; 8 −14=2.36; 15 −21=1.98; >21=1.44/1000 CVC days. For CVC-infection: 1−7=2.23; 8−14=7.56; 15 −21=3.95; >21=3.25/1000 CVC days	Increased CVC dwelling time was associated with infection, GWE was not associated with increased risk

CVC − central venous catheter, AL − arterial line, PA − pulmonary artery catheter (Swan-Ganz), GWE − guidewire exchange, NSR − new site replacement, n − number, ICU − intensive care unit, q − every, CRBSI − catheter related bloodstream infection, TPN − total parenteral nutrition, IL-2 − interleukin 2, *As needed − CVC mechanical/septic complication.

Table II
A non-exhaustive list of studies identifying CVC duration as a risk factor for bloodstream infections

Study, year (Reference)	Study details	CRBSI* or CLABSI** rates	Cutoffs for comparisons between short vs. longer CVC dwelling	Odds Ratio, 95% CI, (*P* value)
McLaws, 2005 [24]	Retrospective study on short term CVCs in several ICUs in Australia	CLABSI rates changed according to dwell time: 1–5 days – 2.1/1000 CVC days 6–15 days – 4.5/1000 CVC days 16–30 days – 10.2/1000 CVC days	15 days	Not reported. Rate for 16–30 days was 4.8 times the rate for 1–5 days.
Van der Kooi, 2007 [40]	Prospective surveillance, 19 ICUs in The Netherlands	CLABSI rate of 3%, (4/1000 CVC days)	5–9 days and 10 days	OR=4.3, CI=1.7–10.7 ($P<0.05$) for 5–9 days vs. 1–4 days; and OR=8.4, CI=3.4–20.4, ($P<0.05$) for >10 days vs. 1–4 days
Garnacho-Montero, 2008 [25]	Prospective, multi-center of 9 ICUs in Spain	CRBSI rate of 3.73/1000 CVC days	Not mentioned. CVC duration was 12(8–17) days for CRBSI and 8(5–13) for non-CRBSI ($P<0.0001$)	OR=1.029, CI=1.005–1.053, ($P=0.017$)
Yoshida, 2008 [42]	Prospective, single center study of CLABSI risk factors in Japan	CLABSI rate of 2.26/1000 CVC days	30 days	OR=7.529, CI=4.2–13.2, ($P<0.001$)
Tarpatzi, 2012 [39]	Prospective, single center study of CRBSI risk factors in Greece	CRBSI rate of 11.47/1000 CVC days	Not mentioned. Mean±SD of CVC duration was 17.9±6.2 days for CRBSI and 10.4±9 for non-CRBSI ($P<0.001$)	OR=1.16, CI=1.09–1.23, ($P<0.001$)
Hajjej, 2014 [32]	Prospective, single ICU study of CRBSI risk factors in Tunis	CRBSI rate of 2.4/1000 CVC days	Not mentioned. Mean±SD of CVC duration was 22±7 days for CRBSI and 12±8 for non-CRBSI ($P<0.001$)	OR=1.95, CI=1.21–2.13, ($P<0.001$)
Wong, 2016 [54]	Retrospective, single center study of CLABSI risk factors in Australia	CLABSI rate of 1.12/1000 CVC days	7 days	OR=2.07, CI=1.06–4.04, ($P=0.03$)
Wu, 2017 [41]	Patients undergoing gastrointestinal surgery in China	CRBSI/CLABSI rate of 8% (5.6/1000 CVC days)	14 days	OR=1.08, CI=1.04–1.13, ($P<0.01$)
Pitiriga, 2022 [38]	Retrospective, studying CLABSI risk among hospitalized patients after implementation of prevention bundle, in Greece	CLABSI rates change according to dwell time: 2–10 days – 4.8/1000 CVC days 11–20 days – 5.92/1000 CVC days >20 days–8.64/1000 CVC days	10 days and 20 days	ANOVA, F=7.61, ($P=0.007$)
Bea, 2022 [29]	Retrospective, observational, quasi-experimental study in a single ICU in Korea	CLABSI rates of 3.1 to 1.2/1000 CVC days	>10 days	OR=6.27, CI=3.36–12.48, ($P<0.001$)
Moriyama, 2022 [36]	Retrospective, observational study from a single ICU in Japan	CLABSI rates fluctuate between <1 to 11/1000 CVC days	Not mentioned. Mean±SD of CVC duration was 29.9±45.6 days for CLABSI and 7.8±8 for non-CLABSI ($P<0.01$)	OR=1.041, CI=1.015–1.066, ($P=0.001$)
Maqbool, 2023 [35]	Prospective study in a single trauma ICU in northern India	CLABSI rate of 16.4/1000 CVC days 2–4 days: 14.8% 5–10 days: 28.4% >11 days: 56.8%	5 and 10 days	OR not reported

CVC – central venous catheter, CRBSI – catheter-related bloodstream infections, ICU – intensive care unit, CLABSI – central line associated bloodstream infection, SD – standard deviation, CI – confidence interval, ANOVA – analysis of variance. *CRBSI diagnosed according to clinical practice guidelines for the diagnosis and management of intravascular catheter-related infection: 2009 Update [55] or previous similar reports [56]. **CLABSI diagnosed according to the National Healthcare Safety Network surveillance guidelines.

described in Table II. In many studies the risk for CRBSI or CVC-colonization increases around days 7—14. When not studying specific cut-offs, time was found as an independent risk factor in multivariate analyses. Not all studies concur with this finding [46,47].

It has not been decided whether the daily CRBSI risk is constant or not. Several studies have reported the daily risk to increase after days 7—9 [48], day 10 [10,29] or days 14—15 [24,49]. McLaws *et al*. have shown the non-linear increase is CRBSI incidence for different exposure periods (2.1, 4.5 and 10.2/1000 CVC days, for 1—5, 6—15 and 16—30 days, respectively) [24]. In a more recent study, McLaws *et al*. have found that CLABSI rates were very low (<1%) during the early catheter days (7 and 9, according to the bundles adherence), and after 12 dwell days the risk increased to 3% [48]. Buetti *et al*. [10] performed a post-hoc analysis using prospectively collected data from 24 ICUs and of over 15,000 catheters. Using Cox regressions, they found that the risk of catheter infection for CVCs and dialysis catheters started to increase 10 days after insertion (P=0.008 and P<0.001, respectively). Others claim that the daily risk is constant [16,50—52], only that in two of the studies, CRBSI or colonization rates were higher in the first days, suggesting that the infection was related to the insertion procedure [16,52], hence reducing the significance of prolonged CVC duration on infection rates. Interestingly, Lucet *et al*. [53] had found that the instantaneous risk was constant for CVCs while it increased exponentially for arterial lines.

Whether the catheter gets contaminated upon insertion or later during catheter manipulations, there is a time-lag until the infection becomes clinically evident, hence it is biologically plausible that over time, the risk will not remain constant and will eventually increase non-linearly. Removal of the catheter before this risk materializes may probably reduce CRBSI incidence. Removal of a catheter over a guidewire will not reset this risk and potentially may even increase it.

CRBSI risk associated with anatomic site

Studies consistently have found the subclavian vein to be preferable for short-term CVCs, over the jugular and femoral veins, in terms of CRBSI risk. Parienti *et al*. conducted a meta-analysis of 10 studies and found that the CRBSI density ratio for the subclavian site was 0.46 (95% confidence interval 0.3—0.7) and 0.27 (95% confidence interval 0.15—0.48) vs. jugular and femoral sites, respectively [57]. A more recent meta-analysis of 20 studies, has found the risk to be comparable for subclavian and jugular sites, both better than the femoral site [58]. Timsit *et al*. evaluated femoral vs jugular sites and found no difference in CRBSI risks [59]. Overall, it seems that, in terms of CRBSI prevention, the preferred site for non-tunneled CVC is the subclavian vein, while data differentiating between the other two sites are still conflicting.

Other factors affecting CRBSI risk

A recent systematic review and meta-analysis evaluated 9 other risk factors for CRBSI and found total parenteral nutrition, multi-lumen devices, chemotherapy treatment, immunosuppression as well as the number of catheterization days, to be important factors [60]. Other repeatedly reported risk factors include prolonged hospitalization, concurrent catheters, body mass index >40, reduced nurse-patient-ratio in the intensive care unit (ICU) and substandard catheter care [4].

Should short-term CVCs be replaced routinely?

Advocators against scheduled CVC replacement claim that [50]:

1. *CRBSI daily risk is constant, hence routine catheter replacement would not be expected to reduce the incidence of catheter-related infections*. As shown, there is no consensus regarding the linearity of the risk over time, and studies repeatedly show that the daily risk is increased after several days of catheter dwelling (Table II).
2. *Replacement may be associated with higher risk of CRBSI, especially in the early days after replacement*. This is true, when the replacement is performed without adherence to the prevention bundles (which was probably more common in earlier studies), or when the replacement was performed over a guidewire, which may (by itself) be a risk factor and will not actually reset the cumulative risk of the catheter. According to one study, in current, modern ICUs, a CVC replacement in a new site should facilitate a near zero risk for ~9 days, until risk starts to raise again [48].
3. *Most catheters are removed by day 14, making scheduled replacement redundant*. In real life, CVCs that are left for more than 14 days are not rare, and exactly these CVCs are the ones that contribute most to CRBSI cases. In one study, 7% of the patients contributed 40% of catheter-days with their CVCs remaining in situ from 16-320 days [24]. Since current guidelines do not set an upper limit for short-term CVC duration, CVCs may be still deemed necessary on day 14 and beyond, even though their infection risk increases.
4. *Catheter replacement is dangerous*. CVC replacement in a new site may carry risks for placement failure, arterial cannulation and puncture, pneumothorax, pleural effusion, venous thrombosis and nerve injury. One or more of the 4 major complications (arterial puncture, pneumothorax, CRBSI or deep vein thrombosis) is expected in 3% of patients with a CVC duration of more than 3 days, as found in a recent review [61]. This non-negligible risk should be weighed against the cumulative risk for infection. It is important to state that some of these complications are mitigated by ultrasonography use, which is part of the current guideline's bundle of CVC insertions [4].
5. *Controlled studies have failed to reduce CRBSI by routine CVC replacements*. Critical review of this subject was discussed above.
6. *Routine catheter replacement has resource implications* [62]. CRBSI is considered the most costly healthcare associated infection [3], and is associated with increased length of hospital stay, patient morbidity and mortality [4]. CRBSI is also associated with antimicrobial use, additional diagnostic tests, need for catheter removal and ICU admission of severe cases. Healthcare facilities with high CRBSI rates may endure potential penalties or reduced reimbursements [63].

Routine replacement of CVC in order to avoid CRBSI remained a debatable issue [9,62], but in practice, many practitioners continued to routinely replace CVC based on CVC-duration, despite clear guidelines [7,44], and a survey of 10

ICUs in academic tertiary-care US hospitals, performed in 2006, has found that 25% of the units continued this practice [8].

In light of the current literature, it seems that the guidelines regarding timely replacement of short-term, non-tunneled CVCs should be reevaluated. Short-term CVCs should indeed be short-termed, *i.e.* their dwell time should not exceed 9—14 days. Considering the diversity of the cutoffs reported by methodologically different studies, the cut-off at which short-term CVCs should be prophylactically replaced is probably not identical for all facilities and settings. Hence, it is reasonable that each facility studies the CVC duration when CRBSI or CLABSI rates increase and set its own individual cutoff. As CRBSI risk starts to increase after 9—14 days, catheter necessity should be evaluated thoroughly and other risk factors, such as the patients' and catheter characteristics, the CVC-anatomic location and the complication risks of a new-site CVC, should be weighed against that risk, and a new-site CVC should be considered. Midlines may pose a lower risk for CRBSI compared to CVCs [64], however, further randomized control studies are necessary to validate this finding. When a duration limit is set, in some cases, the ICU team may be driven to remove the prolonged CVC and replace it with a peripheral venous catheter. This could be achieved only if policymakers acknowledge the increased cumulative CRBSI risk after certain CVC-dwell days.

Future directions

To definitively address the question of scheduled CVC replacement, large, multicenter randomized controlled trials are needed [65]. These trials should compare different replacement strategies (*e.g.*, replacement at 10 days vs. clinically indicated) across various patient populations and catheter types, with particular attention to insertion sites. Research into novel catheter materials and anti-infective coatings that could extend the safe duration of catheter use without increasing infection risk should be pursued. Some promising avenues include catheters impregnated with antimicrobials, chlorhexidine-silver sulfadiazine, as well as with inorganic nanoparticles such as AgNPs and Fe3O4-NPs [66]. Similarly, surface modifications techniques to inhibit bacterial biofilms and bacterial metabolic activity could be further explored [67].

Conclusion

The accumulated evidences, particularly the recent study by Buetti *et al.* [10] suggest that the risk of CVC-related complications, particularly CRBSIs, increases significantly after 10 days of catheterization. This time-dependent risk is especially notable for non-subclavian insertions, challenging the current guideline recommendations against routine replacement. While the ideal approach remains to be definitively established, there is a growing case for considering scheduled replacement of short-term CVCs, as the cumulative risk becomes unacceptably high after 9—14 days, and replacing the CVC in a new site, could potentially reset this risk and reduce overall CRBSI rates. However, any change in practice must carefully balance the potential benefits against the risks and resource implications of more frequent catheter replacements. Future guidelines should consider incorporating more nuanced, time-based recommendations for CVC management, potentially stratified by patient risk factors, catheter characteristics, and insertion site. As we await more definitive evidence from large-scale trials, clinicians should remain vigilant about CVC necessity and duration, considering early removal or replacement in high-risk situations, particularly as catheter dwell time extends beyond 9—14 days. The field of CVC management is evolving, and ongoing research into prevention strategies, novel materials, and antimicrobial technologies may further inform best practices in the future.

Ethics

Not required.

Credit author statement

As a sole author, Regev Cohen was responsible for all aspects of conceptualization, data curation, data analysis, writing, editing and reviewing this paper.

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None.

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