

INTRODUCTION

Vascular access devices (VADs) are the most used invasive device in clinical practice, contributing to millions of insertions every year around the world (1). **Vascular access specialist teams (VASTs) are multidisciplinary groups of professionals** with specific competencies aimed at **facilitating clinical processes and avoiding catheter-related adverse events** (2, 3).

In recent years, studies have described the implementation of VASTs in various settings, reporting significant differences in terms of their operation and constitution (4-6). However, **few studies have focused on the efficacy of this approach.**

OBJECTIVE

The objective was to **analyze the effectiveness of these teams versus the standard practice** in terms of cannulation success and management of VADs in adult inpatients.

METHOD

Systematic review of published studies carried out according to a previously registered protocol (PROSPERO 2021 CRD42021231259). We conducted structured searches in PubMed, Web of Science, Scopus and EBSCOhost, and direct searches in the Journal of Vascular Access, in May 2023. We included observational and intervention studies comparing a VAST with regular clinical practice, without limits on publication date. Study screening and selection is pictured in Figure 1. We analysed first time insertion success rates and the incidence of catheter-related complications.

The assessment of potential risk of bias (Figure 2) was carried out with the Mixed Methods Appraisal Tool (MMAT).

	Randomised trial					Non-randomised trial					Observational						
	Random isation	Baseline evaluation	Outcom e data	Blin ding	Intervention adherence	Representa tiveness	Outcome evaluation	Outcom e data	Confusing factors	Expo sition	Sam pling	Representa tiveness	Outcome evaluation	Non-response bias	Statistical analysis		
Bell 2021						○	○	○	○	○							
Bellesi 2013						○	○	○	○	○							
Bosma 2002							○	○	○	○		○	○	○	○	○	○
Carr 2010												○	○	○	○	○	○
Corcuera-Martínez 2020												○	○	○	○	○	○
Da Silva 2010												○	○	○	○	○	○
Martillo 2019												○	○	○	○	○	○
Meier 1998						○	○	○	○	○							
Savage 2019						○	○	○	○	○							
Scalley 1992												○	○	○	○	○	○
Soifer 1998	○	○	○	○	○							○	○	○	○	○	○
Tomford 1984	○	○	○	○	○												

○ Low risk of bias
○ Uncertain / doubtful
○ High risk of bias

Figure 2 - Risk of bias of selected studies

A systematic review on the effectiveness of vascular access specialist teams (VAST) versus standard practice for catheter insertion and care

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RESULTS

We **identified 3.053 manuscripts** by electronic and direct searches, of which 12 resulted to be selected for the analysis (Table 1), published **between 1984 and 2020**. VAST description varied between studies, frequently centered on VAD insertions. Some teams also focused on a specific catheter type (i.e., PICC insertions), a certain patient profile (i.e., DIVA) or a concrete activity (i.e., VAD audits).

Table 1 - Characteristics of selected studies

Author, year	Design	Setting / population	Aim	Sample size (patients)	Sample size (catheters)	Primary outcome
Bell & Spencer (2021)	Non-randomised trial	Emergency department	To evaluate the implementation of an emergency department VAST	NR	3351	First time insertion success
Bellesi et al. (2013)	Non-randomised trial	Blood stem cell transplantation for onco-haematological patients	To evaluate the feasibility and the safety of the use of PICCs during autologous peripheral blood stem cell transplantation	57	60	Catheter-related complications
Bosma & Jewesson (2002)	Retrospective observational	General hospital	To assess the characteristics of the service provided by infusion nurses under an infusion programme	250	NR	Consultation rates
Carr et al. (2010)	Prospective observational	General hospital	Pilot evaluation of cannulation team	NR	5130	First time insertion success
Corcuera-Martínez et al. (2020)	Prospective observational	General hospital	To analyse the performance of PICC devices inserted by the VAT	275	275	-Reason for PICC removal. - Catheter-related complications rate (combined)
Da Silva et al. (2010)	Non-randomised trial	General hospital	To review the benefits of establishing an IV cannulation team	3131	3552	Number of catheters required
Martillo et al. (2019)	Retrospective observational	General hospital	To analyse the implementation of a vascular access service	NR	9806	Cather-related bloodstream infection rate
Meier et al. (1998)	Non-randomised trial	Military medical centre	To examine the benefits of an IV therapy team	NR	NR	Cather-related bloodstream infection rate
Savage et al. (2019)	Non-randomised trial	General hospital	To examine whether the establishment of a vascular access team decreased the incidence of central line usage and CRBI	NR	NR	-Cather-related bloodstream infection rate -Central line insertion rate
Scalley et al. (1992)	Prospective observational	Acute-care hospital	To evaluate the benefits of creating an IV cannulation team	NR	31115	Phlebitis rate
Soifer et al. (1998)	Randomised trial	General hospital	To determine whether the use of an IV therapy team decreases catheter-related complications	441	875	Catheter-related complications rate (combined)
Tomford et al. (1984)	Randomised trial	General hospital (medical inpatient units only)	To evaluate the effectiveness of an IV therapy team	1059	863	Peripheral intravenous catheter-related complications rate

Catheter-related adverse events appear to be lower in samples attended by a VAST compared to those under usual practice (Table 2). However, the heterogeneity of the included studies and their limited quality prevented from conducting any meta-analysis.

Table 2 - Outcomes associated with VASTs

Author, year	Cannulation success	1 st attempt success	Catheter failure	Phlebitis	Infiltration or extravasatio n	Occlusion	Thrombosis	Infection
Bell & Spencer (2021)	●80% (mean team) ●90% (experienced members)	88%	NS	NS	NS	NS	NS	NS
Bellesi et al. (2013)	NS	95%	30% (n=18)	NS	0%	1.6% (n=1)	5% (n=3) 2.3/1000 PICC days	3.3% bacteraemia (n=2) 1.5/ 1000 PICC days
Bosma & Jewesson (2002)	96%	NS	NS	31% (n=78)	NS	NS	NS	NS
Carr et al. (2010)	100%	98%	NS	NS	47.1% (49)	NS	NS	8% painful infection
Corcuera-Martínez et al. (2020)	NS	88.6%	13.6% (n=37)	0.4% (n=1)	NS	NS	2.5% (n=7)	1.1% (n=3) bacteraemia
Da Silva et al. (2010)	NS	NS	1.7% (n=51)	- 0.47% (Pre) - 0.35% (Post)	2.69 % Post (n=25)	0.44% post (n=4)	NS	NS
Martillo et al. (2019)	NS	NS	NS	NS	NS	NS	NS	1.037 infections/100 0 catheter days
Meier et al. (1998)	NS	NS	NS	NS	NS	NS	NS	- 1.1 infections/100 0 catheter days (Pre) - Post 0.7 infections/100 0 catheter days (Post)
Savage et al. (2019)	NS	NS	NS	NS	NS	NS	NS	- 1.6 infections/100 0 catheter days (Pre) - 0.32 infections/100 0 catheter days (Post)
Scalley et al. (1992)	NS	NS	NS	- 8-10% VAST - 10-15% UP	NS	NS	NS	NS
Soifer et al. (1998)	NS	81% VAST	- 7.9% VAST (n=58) - 21.7% CG (n=30)	- 0.1% VAST (n=1) - 1.4% CG (n=2)	- 0.5% VAST (n=4) - 5.1% CG (n=7)	NS	NS	- 0 cases VAST - 2.2% CG (n=3)
Tomford et al. (1984)	NS	NS	NS	- 13% VAST - 25% CG	- 6% CG - 5% VAST	NS	NS	0%

Note. CG: Control Group; UP: Usual Practice; NS: Not studied (outcome).

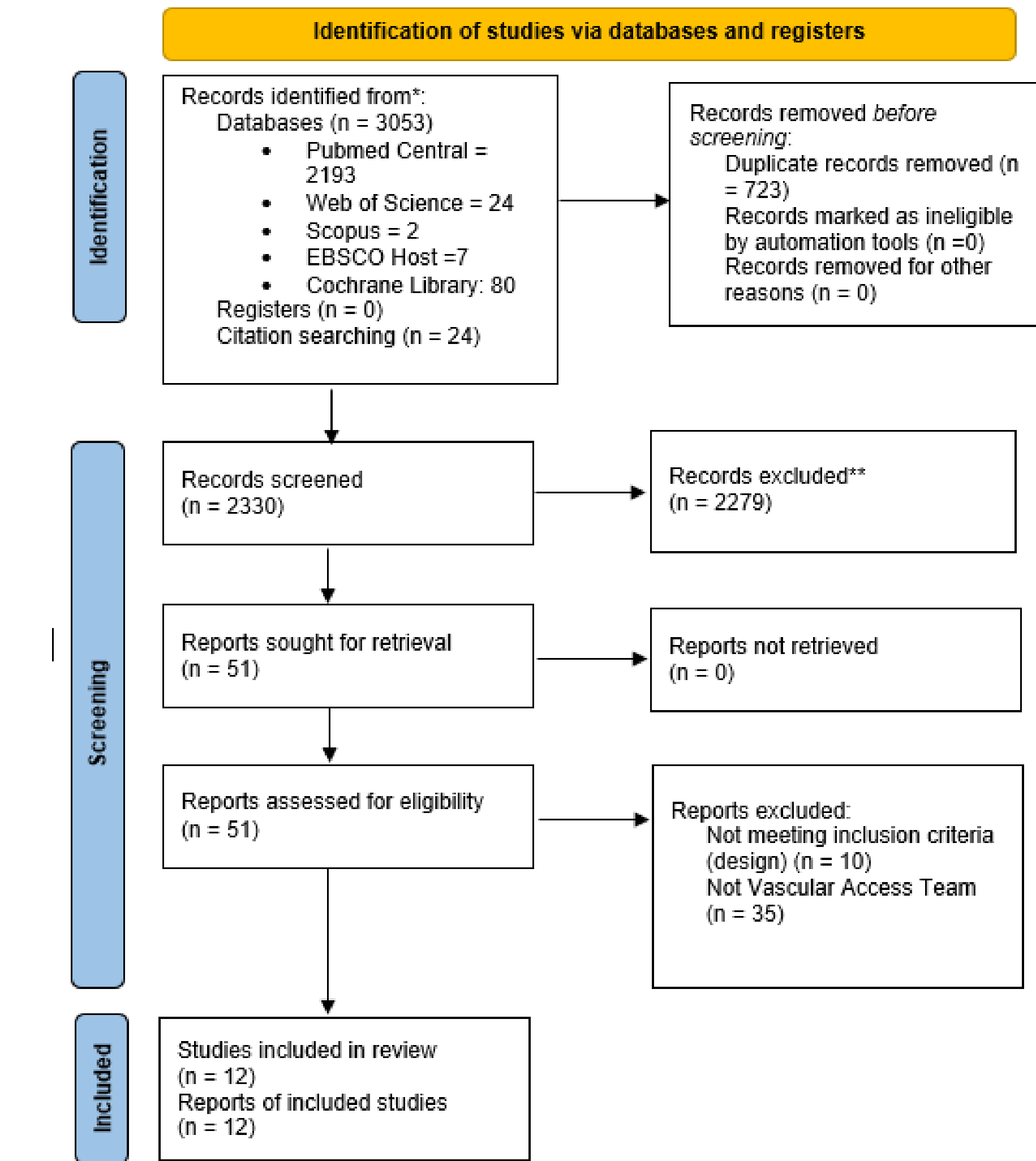


Figure 1 - Study selection process.

CONCLUSIONS

This review is the first to incorporate and critically appraise both experimental and observational designs that examine the impact of VASTs on the health of hospitalized adults.

In our study **VASTs are heterogeneous in their constitution** and responsibilities.

We found published studies to be of limited quality.

However, we show that **VASTs can improve the effectiveness of VAD outcomes**, improving insertion rates and reducing catheter-related adverse events.

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The authors declare no conflict of interest.