



VENOUS HERITAGE: THE CULTURE OF PRESERVATION

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LITERATURE



G.I.P.E

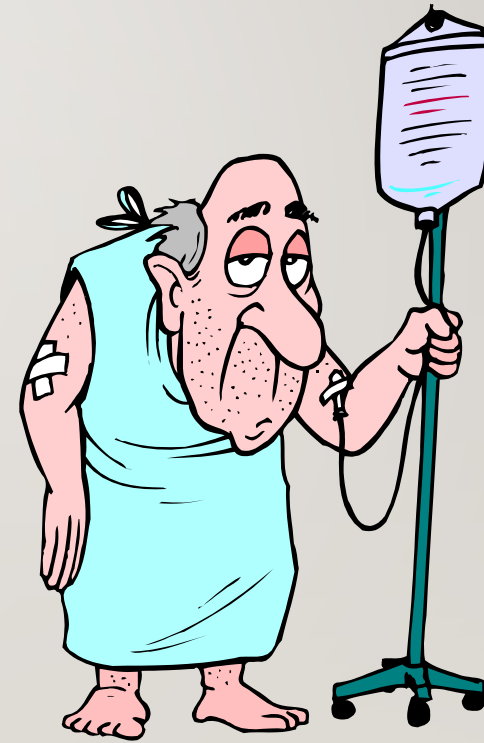
RECOMMENDATION

Is it justified today in medicine to make decisions that are not supported by a rationale based on guidelines, EBP and, in any case, an assessment of the reality of the clinical picture, and therefore in a non-critical manner?

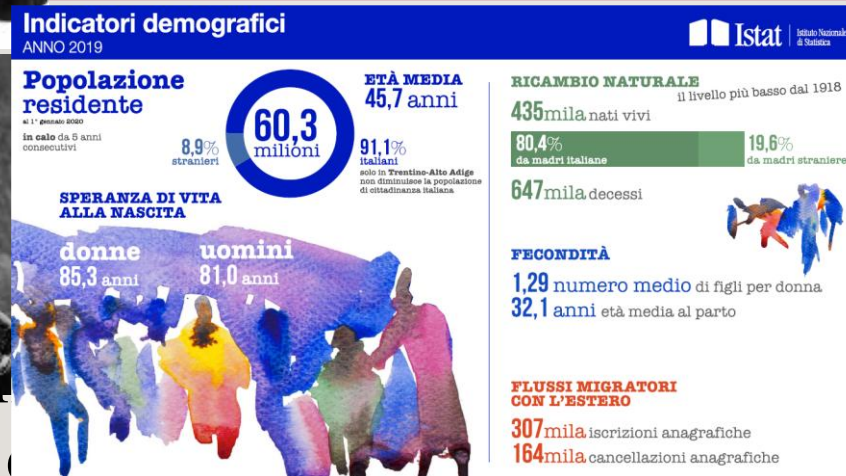
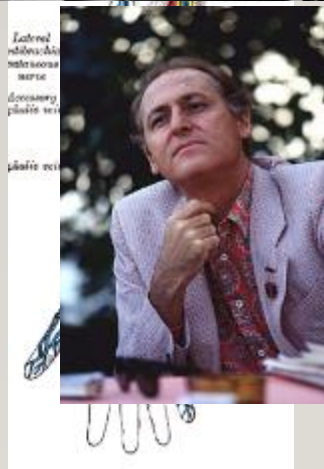


RECOMMENDATION

For intravenous therapy, this still happens very often today, as peripheral cannulas are always used, *almost unconditionally*, to start therapy and continue it for as long as possible. Then, after exhausting the patient's peripheral venous resources, a central vein is used.



DO WE HAVE ENOUGH VEINS TO LAST OUR WHOLE LIVES?



in future medical treatments.

90% OF HOSPITALISED PATIENTS REQUIRE INTRAVENOUS THERAPY, AND CHOOSING AN INAPPROPRIATE VENOUS ACCESS CAN HAVE DEVASTATING RESULTS.



Evident complexity of the system



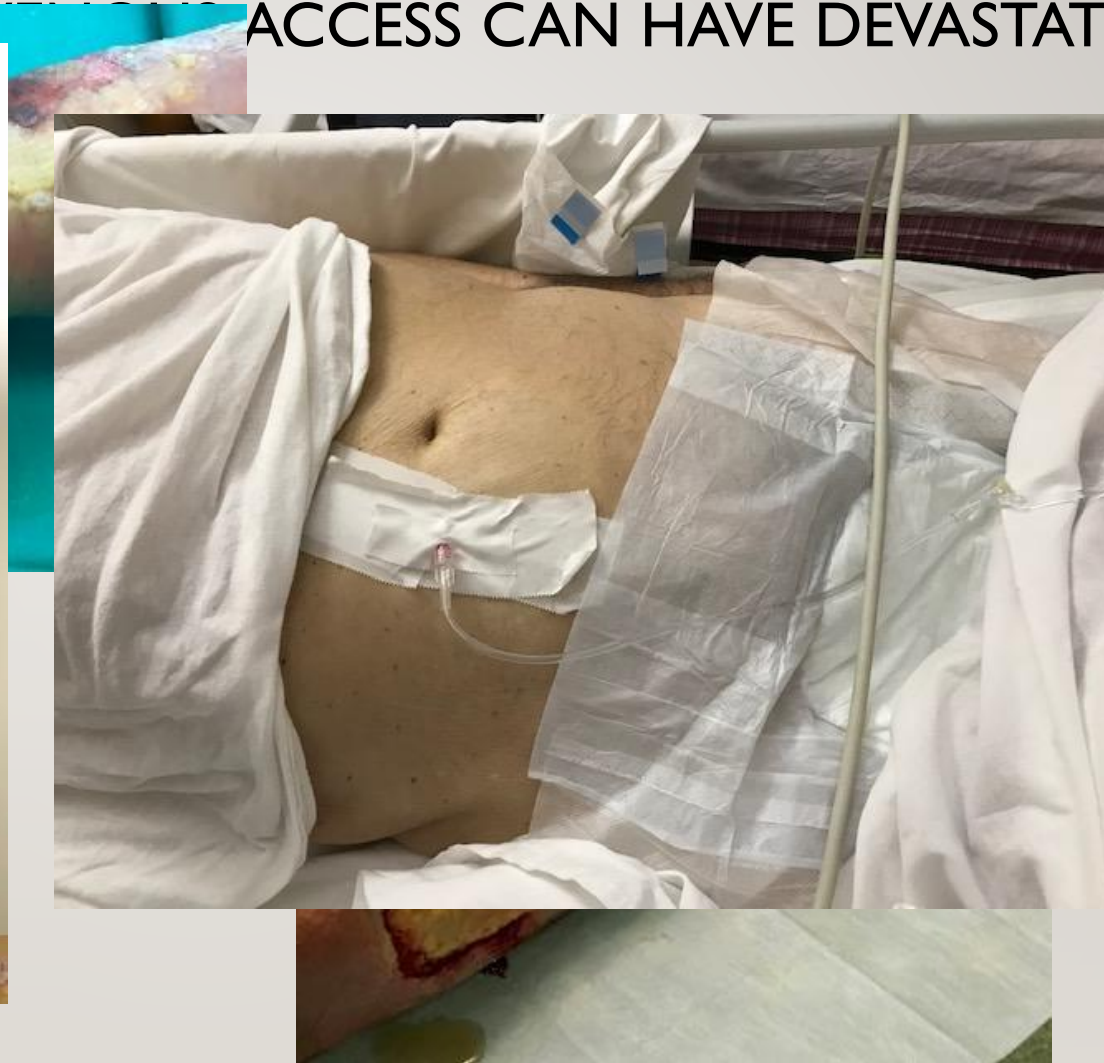
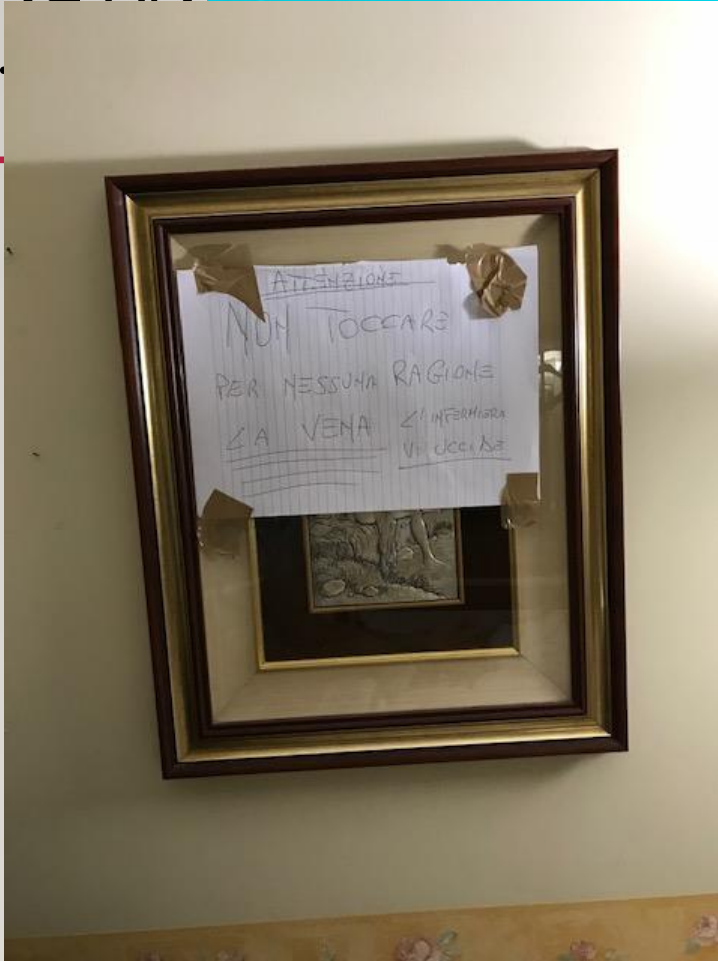
DO WE HAVE ENOUGH VEINS TO LAST A LIFETIME?

- Peripheral veins are not the only other.
- It must be a vein that is not used for the inability to use the vein.





CHOOSING AN **INTRAVENOUS** ACCESS CAN HAVE DEVASTATING RESULTS..





PREVENTION



CODE OF ETHICS



Art. 19

- Aggiornamento e formazione professionale permanente -

Il medico, nel corso di tutta la sua vita professionale, persegue l'aggiornamento costante e la formazione continua per lo sviluppo delle conoscenze e delle competenze professionali tecniche e non tecniche, favorendone la diffusione ai discenti e ai collaboratori.

Il medico assolve agli obblighi formativi.

L'Ordine certifica agli iscritti ai propri Albi i crediti acquisiti nei percorsi formativi e ne valuta le eventuali inadempienze.

Art. 21

- Competenza professionale -

Il medico garantisce impegno e competenze nelle attività riservate alla professione di appartenenza, non assumendo compiti che non sia in grado di soddisfare o che non sia legittimato a svolgere.

CODICE DEONTOLOGICO DELLE PROFESSIONI INFERMIERISTICHE



ART. 10 - CONOSCENZA, FORMAZIONE E AGGIORNAMENTO

L'Infermiere fonda il proprio operato su conoscenze validate dalla comunità scientifica e aggiorna le competenze attraverso lo studio e la ricerca, il pensiero critico, la riflessione fondata sull'esperienza e le buone pratiche, al fine di garantire la qualità e la sicurezza delle attività. Pianifica, svolge e partecipa ad attività di formazione e adempie agli obblighi derivanti dal programma di Educazione Continua in Medicina.

ART. 40 - LINEE GUIDA E BUONE PRATICHE ASSISTENZIALI

L'infermiere, in ragione del suo elevato livello di responsabilità professionale, si attiene alle pertinenti linee guida e buone pratiche clinico assistenziali e vigila sulla loro corretta applicazione, promuovendone il continuo aggiornamento.



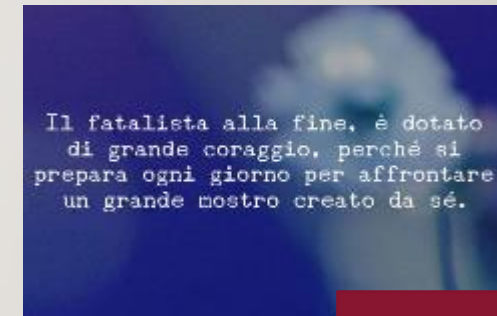
**All those who select, implant, use and
manage venous accesses must be trained.**

PROACTIVE VS. REACTIVE IV THERAPY

Proactivity is a behavioural attitude that involves acting in advance for a future situation, rather than reacting to a present situation. It therefore means **taking control and making things happen**, rather than adapting to a situation or waiting for something to happen...

Proactive: Infusion therapy through a single vascular device

Reactive: Placement of a central venous catheter after exhaustion of peripheral resources due to excessive use of cannula needles



WHAT TYPE OF VASCULAR ACCESS?

Sharing the diagnostic-therapeutic pathway among all parties involved
(doctor, implantologist, patient)



PROACTIVE ASSESSMENT

Factors related to therapy

- **Type of treatment**
 - Type of medication
 - Flow/speed
- **Length and interval between treatments**



Patient-related factors

- **Anatomy**
- **Concomitant conditions** (coagulation status, infections, etc.)
- **Patient acceptance**
- **Lifestyle**
- **Needle phobia**
- **Degree of immunosuppression**



Device-related factors

- **Fewer complications**
- **Concurrent administration and/or incompatible drugs**
- **Nursing required**
- **Total costs**
- **Centre's experience with various devices**



PROFESSIONAL PROFILE

- Doctor: Diagnosis and prescription of treatment
- Nurse: The person who administers treatment, manages exit sites, medication and infusion lines

CHARACTERISTICS OF MEDICINES

Representative pH values	
Substance	pH
Hydrochloric acid 1 M	0
Gastric juice	1.0 – 2.0
Coca Cola and lemon juice	2.5
Vinegar	2.9
Orange juice	3.7
Beer	4.5
Acid rain	4.5 - 4.8
Coffee	5
Tea and healthy skin	5.5
Deionised water at 25 °C	5.5 - 6.0
Hydrogen peroxide	6.2
Well-preserved milk	6.5 - 6.7
Distilled water at 25 °C	7
Normal human saliva	6.5 – 7.5
Blood	7.35 – 7.45
Regular swimming pool water	7.2 - 7.8
Sea water	7.7 – 8.3
Sodium bicarbonate	8.3
Alkaline soaps	9.0 - 10.0
Ammonia	11.5
Bleach	12.5
Lye	13.5
Sodium hydroxide 1 M	14

pH is a scale used to measure the acidity or alkalinity of liquids

Blood pH ranges between 7.35 and 7.45

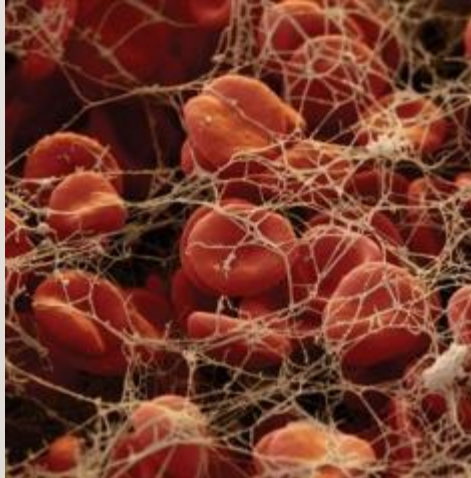
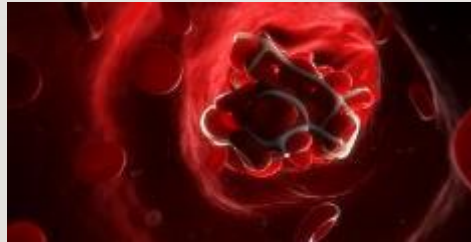
Commercially available intravenous solutions vary between 2.0 and 11.0

IV drugs can have an even wider range



CHARACTERISTICS OF MEDICINES

- Acidic solutions "burn" the inner wall of the vessel, triggering inflammatory reactions and activating the cascade of coagulation factors.

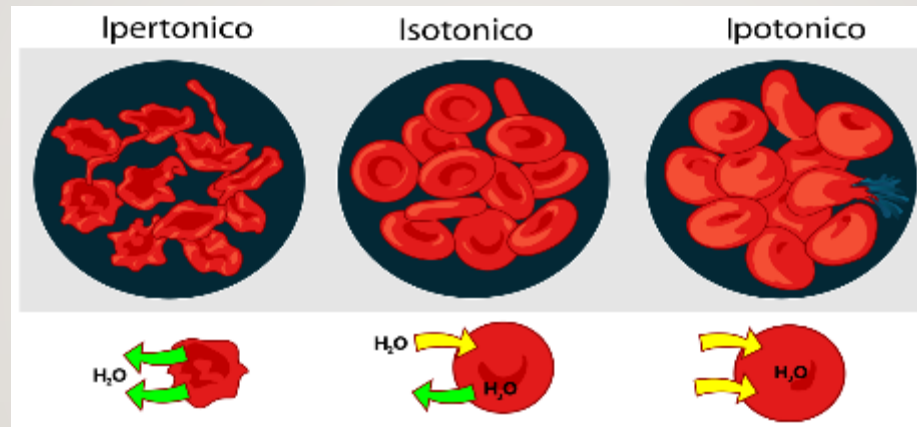


- The venoconstriction caused by irritation of the endothelium
- release of serotonin, bradykinin and histamine, which are inflammatory agents that can cause vasodilation, thus increasing vascular permeability and promoting the extravasation of proteins and blood plasma
- Increased platelet aggregation, stimulated by histamine, leads to thrombus formation along the venous wall extending to the lumen, characterised by localised erythema and a palpable vascular cord up to 3.5 cm.
- Leukocytes begin to migrate to the site where the inflammation is now visible (7.5-15 cm) and localised heat becomes perceptible on palpation.

OSMOLARITY

The concentration of a solution, emphasising the number of particles dissolved in it

Blood 280-295 mOsm/l



Hypertonic > 350 mOsm/l

The components of the solution are not in equilibrium

Fluids move from the endothelial cells into the circulatory system, the cells shrink and expose the basement membrane

Isotonic 250-350 mOsm/l

The components of the solution are in equilibrium

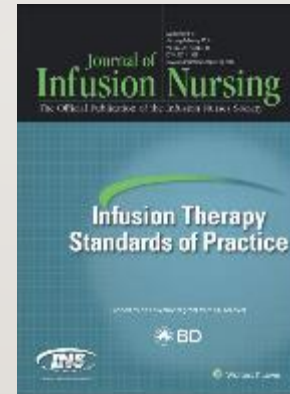
Hypotonic < 250 mOsm/l

The components of the solution are not in equilibrium

Fluids move from the hypotonic solution into the endothelial cells, causing the innermost endothelial layer cells to swell and burst

DRUGS WITH TISSUE DAMAGE

There are drugs that, despite having a neutral pH and osmolarity, can cause damage even in the absence of extravasation.



IRRITANT DRUGS

Medications that can cause inflammation, pain, or irritation at the site of extravasation, without blistering. The term irritant is also used to refer to medications that can cause a burning sensation in the vein during administration:



Bendamustine

Bleomycin

Carboplatin

Dexrazoxane

Etoposide

Teniposide

Topotecan



EXFOLIATING MEDICATIONS

(May have low blistering potential): Drugs that can cause inflammation and removal of skin without causing death of underlying tissue.

The drugs may cause superficial tissue damage, blistering and peeling.

Aclacinomycin

Cisplatin

Docetaxel Liposomal

Doxorubicin

Mitoxantrone

Oxaliplatin

Paclitaxel



INFLAMMATORY DRUGS

Medications that cause mild to moderate inflammation, painless skin erythema, and elevation at the site of extravasation

Bortezomib

5-fluorouracil

Methotrexate

Raltitrexed



BLADDER IRRITANTS

Medications that can cause tissue necrosis or blistering when accidentally infused into the tissue surrounding a vein

Actinomycin D

Dactinomycin

Daunorubicin

Doxorubicin

Epirubicin

Idarubicin

Mitomycin C

Vinblastine

Vindesine

Vincristine

Vinorelbine





Standardization and Chemical Characterization of Intravenous Therapy in Adult Patients: A Step Further in Medication Safety

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DRUG	CONCENTRATION	DILUENT	MEAN OSMOLALITY ^a	DENSITY ^b	MEAN OSMOLARITY ^c	pH	VESICANT
ACYCLOVIR (amp 25 mg/ml 10 ml) TEDEC-MELJI FARMA, S.A.	5 mg/mL (500 mg/100 mL)	D5W	287±0.58	1.043	300	10.46±0.02	YES
		NS	279±2.08	1.032	288	11.04±0.03	YES
ALBUMIN HUMAN (5% vial 250 mL, 20% ALBUNORM® vial 100 mL) OCTAPHARMA	5%	-	274±1.53	1.042	286	7.12±0.02	NO
	20%	-	274±0.58	1.059	290	7.04±0.01	NO
AMIKACIN (vial 500 mg/2 mL) B.BRAUN MEDICAL, S.A.	5 mg/mL (500 mg/100 mL)	D5W	308±1.00	1.047	322	4.42±0.01	NO
		NS	283±1.53	1.034	293	4.87±0.01	NO
	10 mg/ml	-	304±2.31	1.037	316	4.55±0.03	NO
AMIODARONE (TRANGOREX® amp 150 mg/3 mL) SANOFI-AVENTIS, S.A.	2.4 mg/mL (600 mg/250 mL)	D5W	298±1.53	1.020	304	3.84±0.01	YES
	3.6 mg/mL (900 mg/250 mL)	D5W	298±1.53	1.020	304	3.80±0.01	YES
AMOXICILLIN SODIUM-CLAVULANATE (vial 1 g) SANDOZ FARMACEUTICA, S.A.	10 mg/mL (500 mg/50 mL)	NS	350±1.53	1.036	363	8.91±0.01	NO
	20 mg/mL (2 g/100 mL)	NS	425±0.58	1.040	442	8.90±0.03	NO
AMPICILLIN (GOBEMICINA® vial 500 mg, vial 1 g) LABORATORIOS NORMON	10 mg/mL (1 g/100 mL)	NS	309±0.58	1.034	320	9.03±0.01	NO
	20 mg/mL (2 g/100 mL)	NS	347±2.08	1.038	360	9.04±0.03	NO

Irritants...

fluorouracil pH 9.2; cyclophosphamide; carboplatin; gemcitabine pH 2.7; folinic acid pH 11; bleomycin pH 4.5; cyclophosphamide; ifosfamide; camptothecin; etc.

Vesicants/Necrotising agents

mitoxantrone pH 4.3; taxanes pH 4.4; cisplatin pH 3.5; etoposide pH 2.9; dacarbazine pH 3; carmustine; anthracyclines (epirubicin pH 4, doxorubicin pH 3.8); vinca alkaloids (vinflunine...jaylor); mitomycin C

Commonly used drugs

ondansetron pH 3.3; furosemide pH 9.3 ; ciprofloxacin pH 3.5; dopamine pH 2.5; dobutamine pH 2.5; ampicillin-sulbactam pH 11; amikacin pH 3; levofloxacin pH 3.8; amiodarone pH 3.5; vancomycin pH 2.5; K pH 4.0 800 mOsm;



SAFE ANTIBIOTICS FOR PERIPHERAL USE

- Azithromycin
- Aztreonam
- Caspofungin
- Cefotaxime
- Ceftazidime
- Ceftazidime/Avibactam
- Ceftozolan/Tazobactam
- Ceftriaxone
- Clarithromycin
- Clindamycin
- Fluconazole
- Levofloxacin
- Metronidazole
- Penicillin
- Teicoplanin
- Tigecycline
- Voriconazole

ANTIBIOTICS THAT PREFERABLY REQUIRE CENTRAL ADMINISTRATION

- Amoxicillin/Clavulanate
- Ampicillin
- Anidulafungin
- Cefazolin
- Cefepime
- Ciprofloxacin
- Colistin
- Cotrimoxazole
- Daptomycin
- Ertapenem
- Fosfomycin
- Gentamicin
- Imipenem
- Linezolid
- Meropenem
- Micafungin
- Moxifloxacin
- Oxacillin
- Pentamidine
- Piperacillin/tazobactam
- Rifampicin

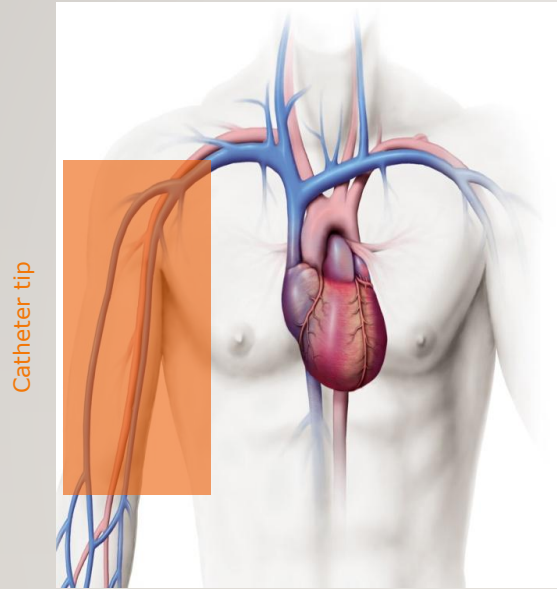
ANTIBIOTICS THAT REQUIRE CENTRAL ADMINISTRATION

- Acyclovir
- Amphotericin
- Ganciclovir
- Vancomycin

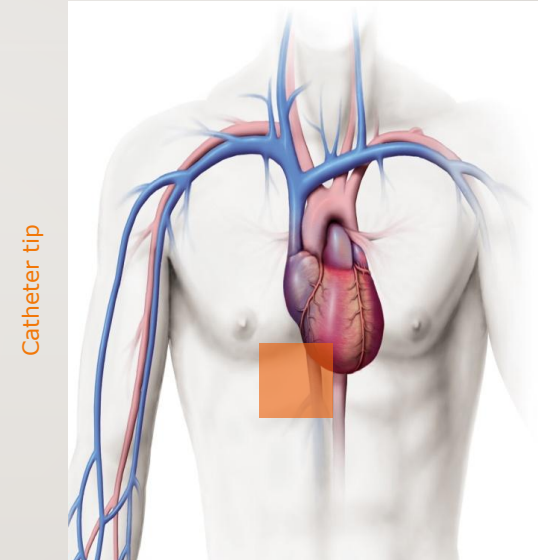
INAPPROPRIATENESS OF ADMINISTRATION



The position of the catheter tip determines whether it is a peripheral or central catheter



**Peripheral catheters: the tip must
end
at or below the axillary line**



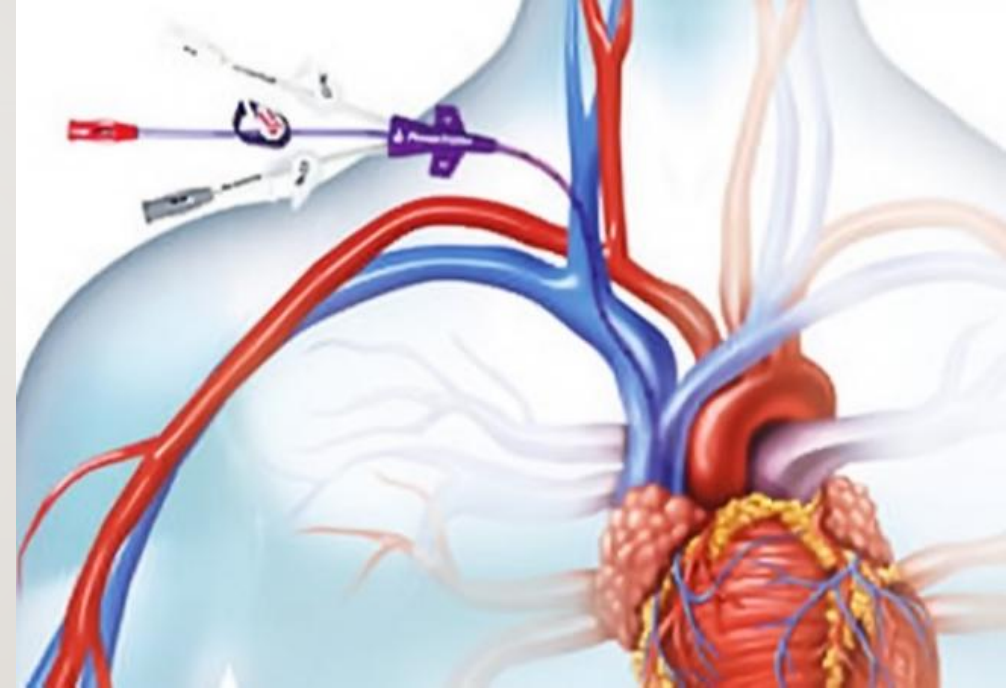
**Central catheters: the tip
must end
in the lower third of the CV**



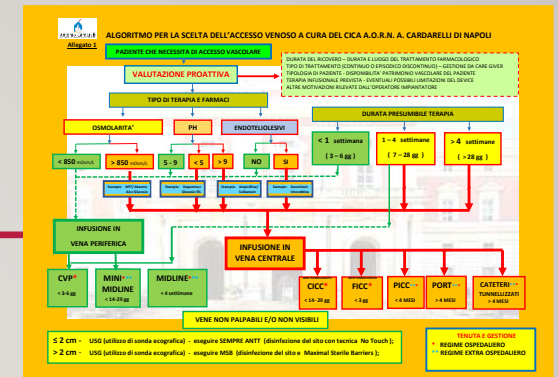
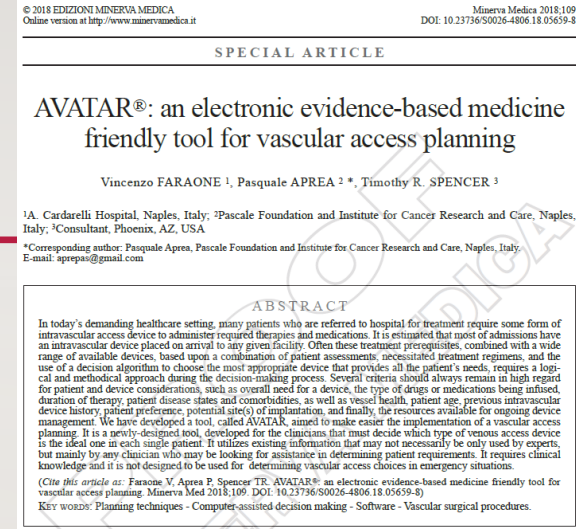
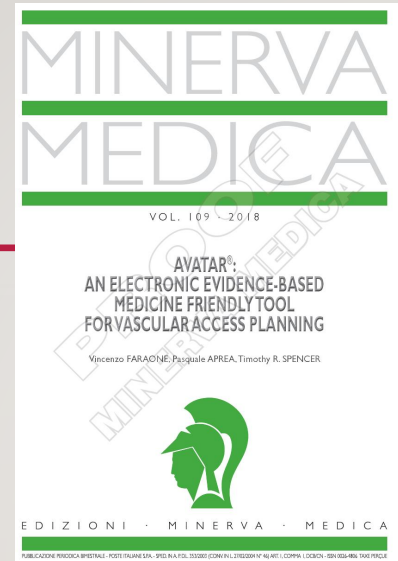
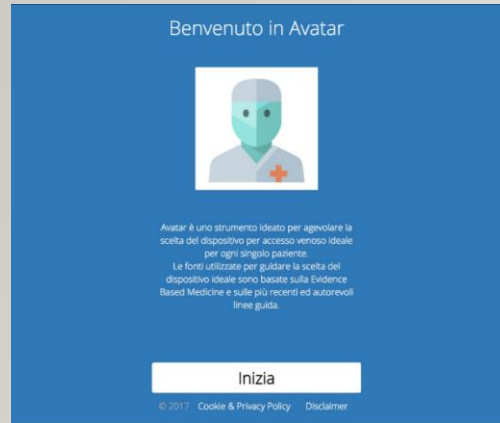
CLASSIFICATION

Classification of venous accesses

- CICC: central catheter inserted centrally (cervical-thoracic area)
- PICC: peripherally inserted central catheter
- FICC: central catheter inserted via the femoral route
- PORT: instead of emerging externally, these are connected to a *reservoir* implanted subcutaneously
- High-flow tunnelled-capped CICC or FICC
- SPC: short peripheral catheters
- LPC: long peripheral catheters
- MIDLINE: peripherally inserted catheter that remains at the level of the axillary or subclavian vein



ALGORITHMS



Valutazione delle linee guida "Michigan Appropriateness Guide for Intravenous Catheters (MAGIC) 2015" alla luce delle evidenze in evoluzione sull'uso di cateteri centrali a inserzione periferica (PICC) nelle unità di terapia intensiva (UTI)



Benvenuto in Avatar



Avatar è uno strumento ideato per agevolare la scelta del dispositivo per accesso venoso ideale per ogni singolo paziente.

Le fonti utilizzate per guidare la scelta del dispositivo ideale sono basate sulla Evidence Based Medicine e sulle più recenti ed autorevoli linee guida.

Inizia

AVATAR®: AN ELECTRONIC EVIDENCE-BASED MEDICINE FRIENDLY TOOL FOR VASCULAR ACCESS PLANNING

Vincenzo FARAONE, Pasquale APREA, Timothy R. SPENCER



SPECIAL ARTICLE

AVATAR®: an electronic evidence-based medicine friendly tool for vascular access planning

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ABSTRACT

In today's demanding healthcare setting, many patients who are referred to hospital for treatment require some form of intravascular access device to administer required therapies and medications. It is estimated that most of admissions have an intravascular device placed on arrival to any given facility. Often these treatment prerequisites, combined with a wide range of available devices, based upon a combination of patient assessments, necessitated treatment regimens, and the use of a decision algorithm to choose the most appropriate device that provides all the patient's needs, requires a logical and methodical approach during the decision-making process. Several criteria should always remain in high regard for patient and device considerations, such as overall need for a device, the type of drugs or medications being infused, duration of therapy, patient disease states and comorbidities, as well as vessel health, patient age, previous intravascular device history, patient preference, potential site(s) of implantation, and finally, the resources available for ongoing device management. We have developed a tool, called AVATAR, aimed to make easier the implementation of a vascular access planning. It is a newly-designed tool, developed for the clinicians that must decide which type of venous access device is the ideal one in each single patient. It utilizes existing information that may not necessarily be only used by experts, but mainly by any clinician who may be looking for assistance in determining patient requirements. It requires clinical knowledge and it is not designed to be used for determining vascular access choices in emergency situations.

(Cite this article as: Faraone V, Aprea P, Spencer TR. AVATAR®: an electronic evidence-based medicine friendly tool for vascular access planning. Minerva Med 2018;109. DOI: 10.23736/S0026-4806.18.05659-8)

KEY WORDS: Planning techniques - Computer-assisted decision making - Software - Vascular surgical procedures.

<http://avatar.frame.technology/step1>



THE REAL PROBLEM





HUMAN FACTOR



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An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU

Peter Pronovost, M.D., Ph.D., Dale Needham, M.D., Ph.D., Sean Berenholtz, M.D., David Sinopoli, M.P.H., M.B.A., Haitao Chu, M.D., Ph.D., Sara Cosgrove, M.D., Bryan Sexton, Ph.D., Robert Hyzy, M.D., Robert Welsh, M.D., Gary Roth, M.D., Joseph Bander, M.D., John Kepros, M.D., and Christine Goeschel, R.N., M.P.A.



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GOOD PRACTICES



bundle

1. **Maximum Barrier Precautions (MSB)**
2. **Eco-driving**
3. **Choice of Device and Implantation Site**
4. **Inspection and Palpation**
5. **Knowledge of Key Parts**
6. **Hand Washing**
7. **Assessment of Lumen Patency**
8. **Catheter Stabilisation**
9. **Dating the Dressing**
10. **Scrubbing the Catheter Hub**
11. **Scrubbing the Needlefree Connector (NFC)**



12. **Flushing the Catheter**
13. **Flushing Syringes**
14. **Pre-filled Syringes or Single-Use Vials**
15. **Dislocated Catheter**
16. **Catheter Removal**
17. **Catheter Removal for Suspected CR-BSI**
18. **Catheter Removal for Thrombosis**
19. **Malfunctioning catheter**
20. **Central venous catheter sampling**
21. **Additional Devices**
22. **Use of Unfamiliar Devices**



Italian Vascular Access
Society



GAVeCeLT 2025

Bologna, 2-3 dicembre

***XVIII PICC Day
Convegno Nazionale Annuale su PICC e Midline***



***Evento organizzato da GAVeCeLT
Gruppo Aperto di Studio
'Gli Accessi Venosi Centrali a Lungo Termine'
www.gavecelt.it***

Sede dell'evento
Palazzo dei Congressi, Bologna

Coordinamento Scientifico
Mauro Pittiruti - mauropittiruti@me.com

Segreteria Organizzativa
Millennium Events s.r.l. - info@millenniumevents.it

WoCova

9th World Congress on Vascular Access

15-17 APRIL 2026
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GRAZIE

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