ΛΟΙΜΩΞΕΙΣ ΣΧΕΤΙΖΌΜΕΝΕΣ ΜΕ ΤΗΝ ΧΡΗΣΗ ΙΥ ΚΑΘΕΤΗΡΩΝ

ΦΑΝΗ ΒΕΪΝΗ ΜSc Νοσηλεύτρια Επιτήρησης Λοιμώξεων Γ.Ν.Α «Ο ΕΥΑΓΓΕΛΙΣΜΟΣ»



Κεντρικοί ενδαγγειακοί καθετήρες (CVC)



ΠΡΟΣΦΕΡΟΥΝ ΔΥΝΑΤΟΤΗΤΑ

Αιμοδυναμικής παρακολούθησης του αρρώστου

Χορήγησης υγρών, φαρμάκων, αίματος, ολικής παρεντερικής διατροφής

Αιμοδιΰλισης



ΚΑΤΗΓΟΡΙΕΣ CVC ΚΑΘΕΤΗΡΩΝ

Σχετικά με το σημείο εισαγωγής

Σχετικά με τη χρονική διάρκεια παραμονή τους

Σχετικά με το αγγείο που τοποθετούνται

Ειδικές κατηγορίες



ΕΠΙΠΛΟΚΕΣ ΑΠΟ ΤΗ ΧΡΗΣΗ ΙV ΚΑΘΕΤΗΡΩΝ

Μηχανικές επιπλοκές (πχ πνευμοθώρακα)

Λοιμώξεις

Catheter Related Bloodstream Infection

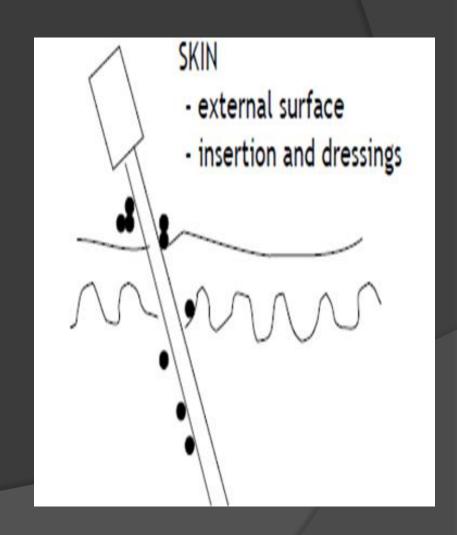
Ασθενής με ΙV καθετήρα

Μία τουλάχιστον (+) αιμοκαλλιέργεια

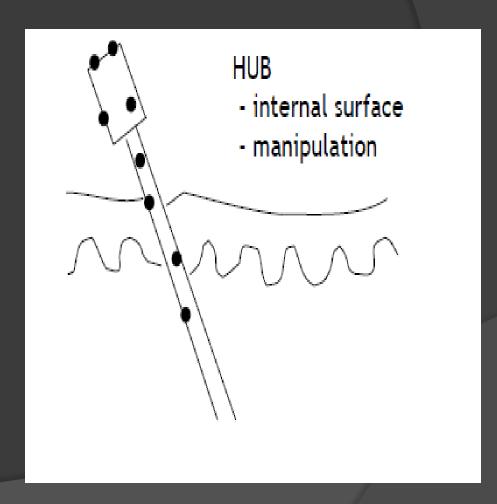
Με κλινικές εκδηλώσεις λοίμωξης (πυρετό, ρίγη, υπόταση)

Παθογόνο δεν σχετίζεται με λοίμωξη σε άλλο σημείο

Κατά την εισαγωγή του καθετήρα ή αμέσως μετά γίνεται αποικισμός της περιοχής και της εξωτερικής επιφάνειας αυτού

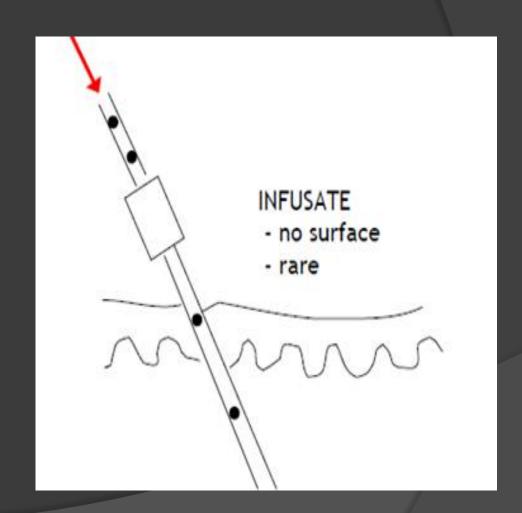


Κατά τον χειρισμό των συνδέσεων του καθετήρα



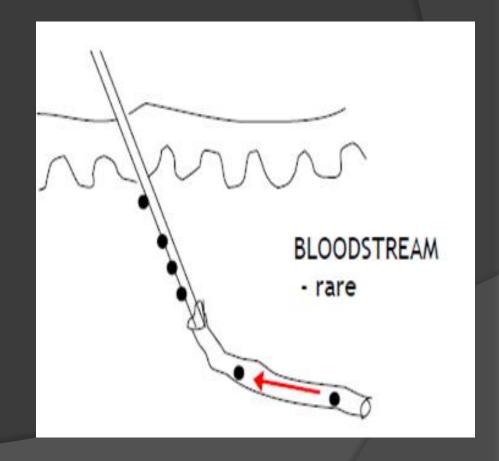
Επιμολυσμένα ΙV υγρά (οροί ή φάρμακα) που χορηγούνται

Συνήθως ευθύνονται για επιδημίες



Αιματογενής διασπορά

Προέλευση του παθογόνου από άλλη πηγή





Catheter Related Bloodstream Infections

- NNIS (CDC): 1.8-5.2 λοιμώξεις / 1000 ημέρες καθετηριασμού
- Σε ΜΕΘ (Η.Π.Α) 80.000 λοιμώξεις σχετίζονται με τη χρήση κεντρικού καθετήρα ανά έτος
- 28.000 θάνατοι κάθε χρόνο
- Μία εβδομάδα παράταση της νοσηλείας τους
- Οικονομικό κόστος από κάθε CR-BSI's: περίπου 45.000 \$
- Ετησίως 2.300.000.000 \$

Chittick et al., Crit Care Med 2010; 38 Suppl.



Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011



Σύστημα κατηγοριοποίησης

Category IA. Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.

Category IB. Strongly recommended for implementation and supported by some experimental, clinical, or epidemiologic studies and a strong theoretical rationale; or an accepted practice (e.g., aseptic technique) supported by limited evidence.

Category IC. Required by state or federal regulations, rules, or standards.

<u>Category II.</u> Suggested for implementation and supported by suggestive clinical or epidemiologic studies or a theoretical rationale.

<u>Unresolved issue</u>. Represents an unresolved issue for which evidence is insufficient or no consensus regarding efficacy exists.

Education Training and Staffing (1)

Education, Training and Staffing

- Educate healthcare personnel regarding the indications for intravascular catheter use, proper procedures for the insertion and maintenance of intravascular catheters, and appropriate infection control measures to prevent intravascular catheter-related infections [7–15]. Category IA
- Periodically assess knowledge of and adherence to guidelines for all personnel involved in the insertion and maintenance of intravascular catheters [7–15]. Category IA

Education Training and Staffing (2)

- 3. Designate only trained personnel who demonstrate competence for the insertion and
 - maintenance of peripheral and central intravascular catheters. [14–28]. Category IA
- 4. Ensure appropriate nursing staff levels in ICUs. Observational studies suggest that a
 - higher proportion of "pool nurses" or an elevated patient-to-nurse ratio is associated
 - with CRBSI in ICUs where nurses are managing patients with CVCs [29-31]. Category IB

Selection of catheters and Sites (1)

Peripheral Catheters and Midline Catheters

- In adults, use an upper-extremity site for catheter insertion. Replace a catheter inserted in a lower extremity site to an upper extremity site as soon as possible. Category II
- In pediatric patients, the upper or lower extremities or the scalp (in neonates or young infants) can be used as the catheter insertion site [32, 33]. Category II
- Select catheters on the basis of the intended purpose and duration of use, known infectious and non-infectious complications (e.g., phlebitis and infiltration), and experience of individual catheter operators [33–35]. Category IB
- Avoid the use of steel needles for the administration of fluids and medication that might cause tissue necrosis if extravasation occurs [33, 34]. Category IA
- Use a midline catheter or peripherally inserted central catheter (PICC), instead of a short peripheral catheter, when the duration of IV therapy will likely exceed six days. Category
- 6. Evaluate the catheter insertion site daily by palpation through the dressing to discern tenderness and by inspection if a transparent dressing is in use. Gauze and opaque dressings should not be removed if the patient has no clinical signs of infection. If the patient has local tenderness or other signs of possible CRBSI, an opaque dressing should be removed and the site inspected visually. Category II
- Remove peripheral venous catheters if the patients develops signs of phlebitis (warmth, tenderness, erythema or palpable venous cord), infection, or a malfunctioning catheter
 [36]. Category IB

Selection of catheters and Sites (2)

Central Venous Catheters

- Weigh the risks and benefits of placing a central venous device at a recommended site
 to reduce infectious complications against the risk for mechanical complications (e.g.,
 pneumothorax, subclavian artery puncture, subclavian vein laceration, subclavian vein
 stenosis, hemothorax, thrombosis, air embolism, and catheter misplacement) [37–53].
 Category IA
- Avoid using the femoral vein for central venous access in adult patients [38, 50, 51, 54].
 Category 1A
- Use a subclavian site, rather than a jugular or a femoral site, in adult patients to minimize infection risk for nontunneled CVC placement [50–52]. Category IB
- No recommendation can be made for a preferred site of insertion to minimize infection risk for a tunneled CVC. Unresolved issue

Selection of catheters and Sites (3)

- Avoid the subclavian site in hemodialysis patients and patients with advanced kidney disease, to avoid subclavian vein stenosis [53,55–58]. Category IA
- Use a fistula or graft in patients with chronic renal failure instead of a CVC for permanent access for dialysis [59]. Category 1A
- 7. Use ultrasound guidance to place central venous catheters (if this technology is available) to reduce the number of cannulation attempts and mechanical complications. Ultrasound guidance should only be used by those fully trained in its technique. [60–64].
 Category 1B
- Use a CVC with the minimum number of ports or lumens essential for the management of the patient [65–68]. Category IB

Selection of catheters and Sites (4)

- No recommendation can be made regarding the use of a designated lumen for parenteral nutrition. Unresolved issue
- Promptly remove any intravascular catheter that is no longer essential [69–72].
 Category IA
- 11. When adherence to aseptic technique cannot be ensured (i.e catheters inserted during a medical emergency), replace the catheter as soon as possible, i.e, within 48 hours [37,73–76]. Category IB

Hand Hygiene and Aseptic Technique

Recommendations

- Perform hand hygiene procedures, either by washing hands with conventional soap and
 water or with alcohol-based hand rubs (ABHR). Hand hygiene should be performed
 before and after palpating catheter insertion sites as well as before and after inserting,
 - insertion site should not be performed after the application of antiseptic, unless aseptic technique is maintained [12, 77–79]. Category IB

replacing, accessing, repairing, or dressing an intravascular catheter. Palpation of the

- Maintain aseptic technique for the insertion and care of intravascular catheters [37, 73, 74, 76]. Category IB
- Wear clean gloves, rather than sterile gloves, for the insertion of peripheral intravascular catheters, if the access site is not touched after the application of skin antiseptics. Category IC

Hand Hygiene and Aseptic Technique

- 4. Sterile gloves should be worn for the insertion of arterial, central, and midline catheters
 - [37, 73, 74, 76]. Category IA
- Use new sterile gloves before handling the new catheter when guidewire exchanges are performed. Category II
- 6. Wear either clean or sterile gloves when changing the dressing on intravascular

catheters. Category IC

Maximal Sterile Barrier Precautions

"similar to the drapes used in the operating room"

1. Use maximal sterile barrier precautions, including the use of a cap, mask, sterile gown,

sterile gloves, and a sterile full body drape, for the insertion of CVCs, PICCs, or guidewire

exchange [14, 75, 76, 80]. Category IB

2. Use a sterile sleeve to protect pulmonary artery catheters during insertion [81].

Category IB

Skin Preparation (1)

 Prepare clean skin with an antiseptic (70% alcohol, tincture of iodine, or alcoholic chlorhexidine gluconate solution) before peripheral venous catheter insertion [82].

Category IB

2 % alcohol chlorhexidine gluconate

2. Prepare clean skin with a >0.5% chlorhexidine preparation with alcohol before central venous catheter and peripheral arterial catheter insertion and during dressing changes.
If there is a contraindication to chlorhexidine, tincture of iodine, an iodophor, or 70%

alcohol can be used as alternatives [82, 83]. Category IA

Skin Preparation (2)

- 3. No comparison has been made between using chlorhexidine preparations with alcohol and povidone-iodine in alcohol to prepare clean skin. Unresolved issue.
- 4. No recommendation can be made for the safety or efficacy of chlorhexidine in infants aged <2 months. Unresolved issue



5. Antiseptics should be allowed to dry according to the manufacturer's recommendation

prior to placing the catheter [82, 83]. Category IB

Τεχνική

- 3 εφαρμογές του αντισηπτικού
- Κίνηση κυκλοτερής ή ακτινωτά
- Χρόνος στεγνώματος: 2 λεπτά



Catheter Site Dressing Regimens (1)

Recommendations

- 1. Use either sterile gauze or sterile, transparent, semipermeable dressing to cover the catheter site [84–87]. Category IA
- 2. If the patient is diaphoretic or if the site is bleeding or oozing, use gauze dressing until this is resolved [84–87]. Category II
- 3. Replace catheter site dressing if the dressing becomes damp, loosened, or visibly soiled [84, 85]. Category IB

Catheter Site Dressing Regimens (2)

- Do not use topical antibiotic ointment or creams on insertion sites, except for dialysis catheters, because of their potential to promote fungal infections and antimicrobial resistance [88, 89]. Category IB
- 5. Do not submerge the catheter or catheter site in water. Showering should be permitted if precautions can be taken to reduce the likelihood of introducing organisms into the catheter (e.g., if the catheter and connecting device are protected with an impermeable cover during the shower) [90–92]. Category IB
- Replace dressings used on short-term CVC sites every 2 days for gauze dressings.
 Category II
- Replace dressings used on short-term CVC sites at least every 7 days for transparent dressings, except in those pediatric patients in which the risk for dislodging the catheter may outweigh the benefit of changing the dressing [87, 93]. Category IB

Catheter Site Dressing Regimens (3)

- 7. Replace dressings used on short-term CVC sites at least every 7 days for transparent dressings, except in those pediatric patients in which the risk for dislodging the catheter may outweigh the benefit of changing the dressing [87, 93]. Category IB
- Replace transparent dressings used on tunneled or implanted CVC sites no more than
 once per week (unless the dressing is soiled or loose), until the insertion site has healed.
 Category II
- No recommendation can be made regarding the necessity for any dressing on wellhealed exit sites of long-term cuffed and tunneled CVCs. Unresolved issue
- Ensure that catheter site care is compatible with the catheter material [94, 95].

Category IB

Catheter Site Dressing Regimens



- 11. Use a sterile sleeve for all pulmonary artery catheters [80]. Category IB
- 12. Use a chlorhexidine-impregnated sponge dressing for temporary short-term catheters in patients older than 2 months of age the CLABSI rate is not decreasing despite adherence to basic prevention measures, including education and training, appropriate use of chlorhexidine for skin antisepsis, and MSB [93, 96–98]. Category 1B
- No recommendation is made for other types of chlorhexidine dressings. Unresolved issue
- 14. Monitor the catheter sites visually when changing the dressing or by palpation through an intact dressing on a regular basis, depending on the clinical situation of the individual patient. If patients have tenderness at the insertion site, fever without obvious source,

Patient Cleansing

Recommendation

Use a 2% chlorhexidine wash for daily skin cleansing to reduce CRBSI [102–104].

Category II

Daily bathing, 836 patients	
2% CHG	Soap and Water
4.1 infections/1000 cath. days	10.4 infections/1000 cath. days

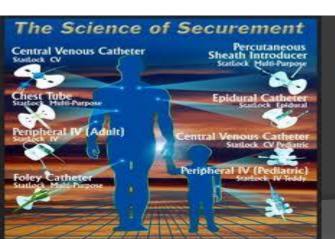
Catheter Securement Devices



Recommendation

Use a sutureless securement device to reduce the risk of infection for intravascular

catheters [105]. Category II



Migration of skin flora around the entry site.....

Antimicrobial/Antiseptic Impregnated Catheters and Cuffs

Recommendation

Use a chlorhexidine/silver sulfadiazine or minocycline/ rifampin -impregnated CVC in

patients whose catheter is expected to remain in place >5 days if, after successful

implementation of a comprehensive strategy to reduce rates of CLABSI, the CLABSI rate

is not decreasing. The comprehensive strategy should include at least the following

three components: educating persons who insert and maintain catheters, use of

maximal sterile barrier precautions, and a >0.5% chlorhexidine preparation with alcohol

for skin antisepsis during CVC insertion [106–113]. Category IA

Chlorhexidine/Silver Sulfadiazine

- First generation: External surface
- Second generation:
 - Internal surface= Chlorhexidine
 - External surface=Chlorhexidine(x3 the amount) /Silver
 Sulfadiazine
- Reduction in catheter colonization, but they where underpowered to show a difference in CRBSI.....
- More expensive but cost savings: 68-391 \$
 - 15-20 €
 - 75-110 €

"Use of these catheters might be cost effective in patient population in which the rate of infection exceeds 3.3 per 1000 catheter days"

Systemic Antibiotic Prophylaxis

Recommendation

Do not administer systemic antimicrobial prophylaxis routinely before insertion or

during use of an intravascular catheter to prevent catheter colonization or CRBSI [114].

Category IB

Antibiotic/ Antiseptic Ointments

Recommendation

Use povidone iodine antiseptic ointment or bacitracin/ gramicidin/polymyxin B

ointment at the hemodialysis catheter exit site after catheter insertion and at the end of

each dialysis session only if this ointment does not interact with the material of the

hemodialysis catheter per manufacturer's recommendation [59, 115–119]. Category IB

Antibiotic Lock Prophylaxis, Antimicrobial Catheter Flash and Catheter Lock Prophylaxis

Recommendation

Use prophylactic antimicrobial lock solution in patients with long term catheters who

have a history of multiple CRBSI despite optimal maximal adherence to aseptic

technique [120-138]. Category II

Antibiotic Lock Prophylaxis

- Flush or lock catheter lumens
- For a period of time while the catheter is idle
- Alone or in combination
 - Vancomycin, gentamicin, ciprofloxacin, minocycline, amikacin, cefazolin
- No FDA approved
- Formulations prepared in hospital
- Balance: toxicity, allergic reactions, resistance

Anticoagulants

Recommendation

Do not routinely use anticoagulant therapy to reduce the risk of catheter-related

infection in general patient populations [139]. Category II

Replacement of Peripheral and Midline Catheters

Recommendations

2002: 'Replace peripheral venous catheter <u>at least</u> every 72-96 hours'

- There is no need to replace peripheral catheters more frequently than every 72–96
 hours to reduce risk of infection and phlebitis in adults [36, 140, 141]. Category 1B
- 2. No recommendation is made regarding replacement of peripheral catheters in adults only when clinically indicated [142–144]. Unresolved issue
- Replace peripheral catheters in children only when clinically indicated [32, 33]. Category
 1B
- 4. Replace midline catheters only when there is a specific indication. Category II

Replacement of CVC's including PICC's and Hemodialysis Catheters

- Do not routinely replace CVCs, PICCs, hemodialysis catheters, or pulmonary artery catheters to prevent catheter-related infections. Category IB
- Do not remove CVCs or PICCs on the basis of fever alone. Use clinical judgment regarding the appropriateness of removing the catheter if infection is evidenced elsewhere or if a noninfectious cause of fever is suspected. Category II
- Do not use guidewire exchanges routinely for non-tunneled catheters to prevent infection. Category IB
- Do not use guidewire exchanges to replace a non-tunneled catheter suspected of infection. Category IB
- Use a guidewire exchange to replace a malfunctioning non-tunneled catheter if no evidence of infection is present. Category IB
- Use new sterile gloves before handling the new catheter when guidewire exchanges are performed. Category II

Peripheral Arterial Catheters and Pressure Monitoring Devices

- In adults, use of the radial, brachial or dorsalis pedis sites is preferred over the femoral or axillary sites of insertion to reduce the risk of infection [46, 47, 157, 158]. Category IB
- In children, the brachial site should not be used. The radial, dorsalis pedis, and posterior tibial sites are preferred over the femoral or axillary sites of insertion [46]. Category II
- A minimum of a cap, mask, sterile gloves and a small sterile fenestrated drape should be used during peripheral arterial catheter insertion [47, 158, 159]. Category IB
- During axillary or femoral artery catheter insertion, maximal sterile barriers precautions should be used. Category II
- Replace arterial catheters only when there is a clinical indication. Category II
- Remove the arterial catheter as soon as it is no longer needed. Category II

Peripheral Arterial Catheters and Pressure Monitoring Devices

- 7. Use disposable, rather than reusable, transducer assemblies when possible [160–164]. Category IB
- Do not routinely replace arterial catheters to prevent catheter-related infections [165, 166, 167, 168]. Category II
- 9. Replace disposable or reusable transducers at 96-hour intervals. Replace other components of the system (including the tubing, continuous-flush device, and flush solution) at the time the transducer is replaced [37, 161]. Category IB
- 10. Keep all components of the pressure monitoring system (including calibration devices and flush solution) sterile [160, 169–171]. Category IA

Peripheral Arterial Catheters and Pressure Monitoring Devices



- 11. Minimize the number of manipulations of and entries into the pressure monitoring system. Use a closed flush system (i.e, continuous flush), rather than an open system (i.e, one that requires a syringe and stopcock), to maintain the patency of the pressure monitoring catheters [163, 172]. Category II
- 12. When the pressure monitoring system is accessed through a diaphragm, rather than a stopcock, scrub the diaphragm with an appropriate antiseptic before accessing the system [163]. Category IA
- 13 Do not administer dextrose-containing solutions or parenteral nutrition fluids through the pressure monitoring circuit [163, 173, 174]. Category IA
- 14. Sterilize reusable transducers according to the manufacturers' instructions if the use of disposable transducers is not feasible [163, 173–176]. Category IA

Replacement of Administration Sets

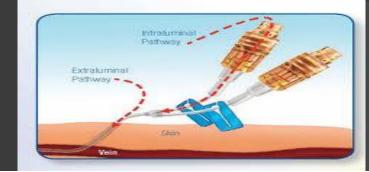
- In patients not receiving blood, blood products or fat emulsions, replace administration sets that are continuously used, including secondary sets and add-on devices, no more frequently than at 96-hour intervals, [177] but at least every 7 days [178–181]. Category
- No recommendation can be made regarding the frequency for replacing intermittently
 used administration sets. Unresolved issue
- 3. No recommendation can be made regarding the frequency for replacing needles to access implantable ports. Unresolved issue

Replacement of Administration Sets

- 4. Replace tubing used to administer blood, blood products, or fat emulsions (those combined with amino acids and glucose in a 3-in-1 admixture or infused separately) within 24 hours of initiating the infusion [182–185]. Category IB
- 5. Replace tubing used to administer propofol infusions every 6 or 12 hours, when the vial is changed, per the manufacturer's recommendation (FDA website Medwatch) [186].

 Category IA
- 6. No recommendation can be made regarding the length of time a needle used to access implanted ports can remain in place. Unresolved issue

Needless Intravascular Catheter Systems



- 1. Change the needleless components at least as frequently as the administration set.

 There is no benefit to changing these more frequently than every 72 hours. [39, 187–
 - 193]. Category II
- Change needleless connectors no more frequently than every 72 hours or according to manufacturers' recommendations for the purpose of reducing infection rates [187, 189, 192, 193]. Category II
- 3. Ensure that all components of the system are compatible to minimize leaks and breaks in the system [194]. Category II

Needless Intravascular Catheter Systems

4. Minimize contamination risk by scrubbing the access port with an appropriate antiseptic

(chlorhexidine, povidone iodine, an iodophor, or 70% alcohol) and accessing the port

- only with sterile devices [189, 192, 194–196]. Category IA
- 5. Use a needleless system to access IV tubing. Category IC
- 6. When needleless systems are used, a split septum valve may be preferred over some mechanical valves due to increased risk of infection with the mechanical valves [197–200]. Category II

Performance Improvement

Recommendation

Use hospital-specific or collaborative-based performance improvement initiatives in

which multifaceted strategies are "bundled" together to improve compliance with

evidence-based recommended practices [15, 69, 70, 201–205]. Category IB



Key components of the Central Line Bundle

- Hand Hygiene
- Maximal Barrier Precautions Upon Insertion
- Chlorhexidine Skin Antisepsis
- Optimal Catheter Site Selection, with Avoidance of the Femoral Vein for Central Venous Access in Adult Patients
- Daily Review of Line Necessity with Prompt Removal of Unnecessary Lines

Central line Care Bundles



- Dr. Peter Pronovost: εντατικολόγος σε Νοσοκομείο του Michigan (ΗΠΑ)
- Είναι ο εμπνευστής της 1^{ης} Care Bundle για την εισαγωγή και φροντίδα κεντρικού φλεβικού καθετήρα

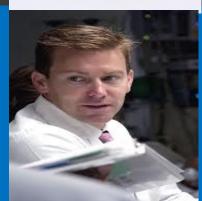


 Ανέπτυξε ένα checklist για να εξασφαλίσει ότι κάθε φορά που τοποθετείται ένας κεντρικός καθετήρας εφαρμόζονται οι οδηγίες του CDC (Category IA)

Central line Care Bundles



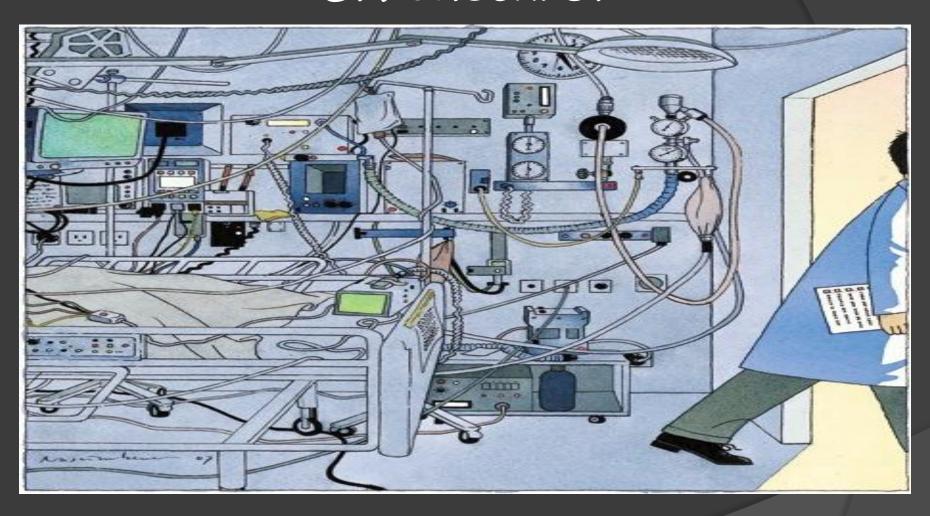
Εκπαίδευση του προσωπικού



 Διατήρηση όλου του εξοπλισμού σε ένα τροχήλατο για τη διευκόλυνση της διαδικασίας

 Εφαρμογή checklist και άδεια σε προσωπικό να σταματήσει άμεσα τη διαδικασία !!!

Dr. Checklist



If a new drug were as effective at saving lives as Peter Pronovost's checklist, there would be a nationwide marketing campaign urging doctors to use it.

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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.





Ongoing care actions

Hand hygiene

- Decontaminate hands before and after each patient contact.
- Use correct hand hygiene procedure.

Catheter site inspection

Observation at least daily for signs of infection. If there is evidence of infection remove line if possible.

Dressing

Use an adherent transparent dressing and ensure it is dry and intact.

Catheter injection ports

Injection ports should be covered by caps or valved connectors.

Catheter access

- Use aseptic technique for any access to the line.
- Apply 2% chlorhexidine gluconate in 70% isopropyl alcohol to catheter ports or hubs prior to accessing the line for administering fluids or injections.

Administration set replacement

- Following administration of blood, blood products immediately.
- Following total parenteral nutrition after 24 hours (if contains lipids).
- With other fluid sets after a maximum of 72 hours.

Avoid routine catheter replacement



Ας συνοψίσουμε...

Novel strategies for the prevention of CRBSIs

Avoid routine replacement as a strategy to prevent a CRBSI

Full body drape (MSB)

Cutaneous antisepsis (CHG)

Chlorhexidine dressings

Antimicrobial / antiseptic impregnated catheters

Πιστή εφαρμογή των μέτρων

ΠΡΟΣΟΧΗ στο χειρισμό

Να είμαστε ευγενικοί !!! Να ξεχνάμε τον καθετήρα!!! Εμπόδια είναι όλα εκείνα που βλέπουμε μπροστά μας όταν απομακρύνουμε τα μάτια μας από το στόχο