Anesthesia Practices and the Prevention of Line Infections

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Impact of Line Infections

- Increases cost by $25,000 per episode
- Extends length of stay by > 7 days per episode
- Attributable mortality 12-25%
- 28,000 excess deaths a year in the US alone
Medical ICU BSI rates

No. CVC-related BSI/1000 pts days

benchmark 25th percentile

Goal Achieved
Surgical ICUs BSI rates

benchmark 25th percentile
Cardiothoracic ICU BSI rates: BWH and MGH
Pathogenesis

- Subcutaneous skin tract colonization (85%)
- Contamination of catheter hub or stopcock
- Contamination of infusate (rare)
- Seeding via the blood from a remote site (rare)
Proven to make a difference:

- Hand hygiene
- Chlorhexidine skin prep
- Full barrier precautions (including gown)
- Full body draping
- Subclavian placement when possible
- Strict maintenance of sterile field during insertion
So why are line infection rates increasing here and elsewhere?

The human dimension -- failure to consistently apply best practices 100% of the time
A success story: Johns Hopkins

- Provider education
- Line insertion cart
- Asking daily if lines can be removed
- Line insertion check list
- Nurses empowered to stop the procedure if a violation occurs
The results....

- Baseline rate of CR-BSI 11.3/1000 line days
- Decreased to 0.54/1000 line days over 16 months
- Subsequent further decrease to 0/1000 line days over the next 9 months
- Line infections can be eliminated!!
Aseptic technique: central lines

- Hand washing with Purell Gel
- Site preparation (chlorhexidine)
- Maximum sterile barrier technique: hat and mask, sterile gloves and gown, **full body draping** (*Infect Control Hosp Epidemiol* 1994;15:231-238)
- All equipment kept sterile and replaced if contaminated
Aseptic technique: arterial lines

- Hand washing with Purell Gel
- Site preparation (10% povidone iodine, chlorhexadine preferred)
- Maximum sterile barrier technique: hat and mask, sterile gloves, sterile drape
- All equipment kept sterile and replaced if contaminated
LINE INSERTION CHECKLIST

- Please complete for each line insertion.
- Do not place in patient’s medical record.

Please check the appropriate box.

LINE TYPE
☐ CVL number of lumens ______ ☐ PA

LINE SITE
☐ SUBCLAVIAN ☐ J ☐ FEMORAL

GARB WORN BY ALL OPERATORS CONTACTING FIELD
STERILE GLOVES STERILE GOWN SURGICAL MASK
Yes No Yes No Yes No

LINE SITE PREPARATION
HANDS WASHED WITH ANTISEPTIC (alcohol gel is acceptable)
Yes No
BETADINE USED BETADINE ALLOWED TO DRY
Yes No Yes No

CHLORAPREP USED
Yes No

LARGE STERILE DRAPE USED (to level of knees or below)
Yes No

Please print
Operator name________________________
Attending/fellow supervising placement_____________________
Nurse____________________ Date of insertion______________
Required Changes in OUR Practice
Central Lines -- Time of Placement

- Hand hygiene for everyone that contacts field
- Gowns for all operators contacting field
- Full body drape to level of knees (half sheet) – draping not to be violated to allow performance of other tasks (e.g. foley)
- Separate Mayo or table to place kit on
Central Lines -- Time of Placement

- Claves in place before drapes removed
- Sterile flush before drapes removed
- Tegaderm on field and applied before drapes removed
Subsequent Care of lines

- Sterile dressing kept intact
- Ports to be capped at all times
- Syringes to be capped
- Alcohol claves prior to access
- Minimize disconnects and reconnects of lines (e.g. breakdown for transport)
- Maximize aseptic technique as lines are set up
Art Lines

- Infection rate only slightly lower than central lines
- Consequence to patient of line sepsis the same
- Strict sterile technique (per CDC guidelines) should be followed for every art line
Art Lines

- Wide prep of skin (no unprepped skin visible through hole in drape)
- Drape used in all cases
- Sterile gloves used in all cases
- Mask worn in all cases
- Equipment set up and maintained on sterile field
Conclusion

- Line infections can be prevented as proven by Johns Hopkins
- Interventions are simple and relatively inexpensive
- Team work, diligence and systems modification needed to make sure each patient receives best practice every time