Safe Neuromonitoring Needle Electrodes
Intraoperative Neuromonitoring

• Used during surgery in or near the central or peripheral nervous system
• Provides a valuable tool for assessing the integrity of certain neurologic pathways/tracts of a patient during surgery
• Helps in early identification of adverse events intraoperatively
• Typically requires placement of 16-32 subdermal needle electrodes for every case
Needle sticks, a general problem

• Up to 3.5 million needlesticks worldwide annually
  – Cost for each needlestick injury = ~$2,500
  – HBV 22-31% transmission (66,000 cases annually)
  – HCV 1.8% transmission (16,000 cases annually)
  – HIV 0.3% transmission (1,000 cases annually)

• Needlestick Safety Act was signed in 2000 and Bloodborne Pathogens Standard in 2001.
  – These regulations mandate the use of safety devices and needle-removers with any sharps or needles

• Prevention is key!
Neuromonitoring Needle Sticks

• Numerous needlestick injuries reported from neuro-monitoring needle electrodes
• Neuromonitoring needle sticks occur:
  – At the time of patient transfer between the stretcher and the OR table, and
  – During the removal of the needles after the surgery
• At Upstate, a pregnant neuromonitoring tech had a needle stick injury from unprotected needle electrode, while monitoring HIV+ patient
Neuromonitoring needle sticks

• Neuromonitoring subdermal needle electrodes are shallowly placed
• Needles remain in place during surgery and are removed after the operation
• Patients often repositioned for transport or other reasons while needles are still in place
• Needle tips can re-emerge during moving, repositioning, and handling of the patient
Gap in Needle Stick Prevention

• Current IONM needle safety devices only protect against needle sticks before placement and after the removal of needles

• No safety devices protect against needle sticks while IONM needles are in place
  – Only known IONM needle electrode protection device – a retraction chamber
Safe needle electrode

Plugging the needle stick prevention gap

Protective flap
Removable needle cover
Retraction chamber
Safe needle electrode

*Plugging the needle stick prevention gap*

- Needle with an adhesive protective flap and retraction chamber
  - Robust polymer flap provides impenetrable barrier between needle tip and medical personnel
    - Flap is clear so needle entry site is visible
  - Adhesive layer on flap facing needle secures the flap and needle in place (peel away cover to expose)
  - Withdraw needle from skin directly into retraction chamber by pulling on wire, then peel flap off patient
    - Tip never exposed during withdrawal
Safety IONM Needle in Action

Current *bare* IONM needles

Upstate *safety* IONM needle
Advantages

Protects from needle sticks before use, during placement, during and after removal, AND while in place in the patient during transfers

— Easy to use
  • Protective flap can be folded back to operate during placement as the ‘wings’ of a butterfly needle

— Adhesive flap maintains needle position throughout the surgical case
  • Adhesive flap prevents needle from being pulled out
  • Eliminates need to secure and use separate tape
    — Anchors needle without levering needle up as does tape over the exposed portion of the needle
Opportunity

• Currently no safety device being widely used with neuromonitoring needle electrodes
  – Hundreds of thousands of cases with neuromonitoring performed annually
• Hospitals can be expected to opt for a safety device attached to the needle if available
• Integrated adhesive anchoring flap may be an attractive addition to many other needle types
  – Venous blood collection needles
  – IVs