Teaching sterile skills in anesthesia
Is providing context helpful for robust skill acquisition?

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EPI DURAL ANESTHESIA
• Pan relief method during childbirth and during and after operations
• As it is an invasive technique, it carries the risk of contamination
• Residents basically learn the procedure in the clinic
• Even after 4 years of training, residents still make sterility errors (Friedman et al, 2008)
• Sterility is a complex concept
• Sterility is not visible

PRESENT TRAINING IS NOT OPTIMAL
• Medical skills should be flexible and robust (Cnossen, 2015)
• Flexible: applicable outside context in which it was learned
• Robust: resistant to stress and workload
• Present training of complex procedures often focuses on the order of the steps of the procedure
• This makes learning vulnerable
• steps may be forgotten and skipped
• steps may be performed in the wrong order
• In practice there is no fixed order of steps
• different procedures have different steps, equipment, medication
• not all steps have to be performed in a strict order
• in practice, every supervisor has their own preferred order and method
• Focus on the steps in the procedure during learning
• does not lead to flexibility in the skill
• if a step cannot be performed
• does not lead to robustness of the skill
• in stress situation memory errors can happen

DIFFERENT APPROACH: FOCUS ON THE CONTEXT
• Taatgen, Huss, Dickson & Anderson (2005) showed that in teaching flexible cognitive skills teaching materials should draw attention to
  • the pre-conditions of actions (knowing when)
  • the post-conditions of actions (knowing the effects of actions in the environment)
• They found that Boeing pilots were more flexible and the skill was more robust after learning with a focus on these environmental cues
• learners can then rely on environmental cues rather than keeping track of all the executed steps in their mind
• We applied this approach to training preparing and executing epidural anesthesia

METHOD
• 37 medical students participated in simulation study
• Skill preparation of epidural anesthesia
  • 14 steps
  • 10-15 minutes

Procedure
• Video instruction of procedure
• Studying description of steps on paper
• Non-sterile actions were written in red
• Sterile actions were written in green
• 15 minutes practice with materials and instruction sheets
• Test: perform the procedure with an “non-obsructive nurse”

Instructions
• List condition
  • 34 steps in chronological, strict order
• Context condition
  • steps arranged in sets
  • order within set was not important
  • photographs
  • pre-conditions of a set of actions (“before”)
  • post-condition (“after”)
  • description of the actions to be performed within the set

CONTEXT CONDITION
Ervaring
Wanneer: Als je zelf steriel bent
Endoautomaat:
Naalden in blauwe bak
Plastic bakje boven epiduranaaldem
Grote bak voor roze chloorhexide in andere bovenhoek

Ernaar: Grote bak voor roze chloorhexide in andere bovenhoek

MAIN RESULTS

DIFFERENCE NOT SIGNIFICANT

REFERENCE