Epidural 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

医疗技能应该灵活且 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
    - even 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
  - what 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, Dickison & 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

PRESENT TRAINING IS NOT OPTIMAL

- 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-obscurative nurse"

Instructions
- List condition
  - 34 steps in chronological, strict order
- Context condition
  - steps arranged in sets
  - set within set was not important
  - post-condition ("before")
  - description of the actions to be performed within the set

CONCLUSIONS & RECOMMENDATIONS

- Complex medical skills involve many steps and induce a high memory load to learn them
- Providing context when teaching a procedure may therefore not necessarily lead to better skill acquisition than learning the steps
- but the resulting skill may be more flexible and robust after context-learning
- Further research is needed to test whether it may be advantageous to first study the steps in a procedure until all steps are remembered before performing the skill
- separating studying the declarative knowledge from training the procedural skill
- we can then also test the flexibility and robustness of the skill
- Further research is needed to test whether teaching sterility concepts separately from the procedure itself is needed

REFERENCES


Teaching sterile skills in anesthesia

Is providing context helpful for robust skill acquisition?

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