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Simulation in Neurosurgery: Proposal for Skills Training Curriculum

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Introduction

There has been major concern for neurosurgical educators to define a curriculum that can identify resident's technical and conceptual limitations, and can address to improve surgical competence. The present study analyses development of neurosurgery skills training curriculum highlighting formulation and standardisation of structured low and high-fidelity simulation modules, and evaluation of efficacy in training neurosurgeons with formative and summative assessment tools.

Methods

A structured modular neurosurgery skills training curriculum has been proposed which includes microsurgery, high speed drilling and neuroendoscopy comprising basic=7, intermediate=7 and advanced=14 simulation modules. 85 regular residents and 179 short-term visiting trainees were trained over 8586 skills training sessions; 419 residents attended 25 week-end demo-sessions, and 248 graduate neurosurgeons trained in 16 workshops.

Conclusions

We suggest structured modular validated skills training curriculum to supplement the existing neurosurgery training, which would help in improving learning curve outside operation-rooms, at convenience and individualized needs of trainees under supervision, and help in skills translation without endangering patients.

Results

Summative assessment was done on 71 board certified neurosurgeons, of which majority had average competence in all three modules (microsurgery=43%, drilling=40%, neuro-endoscopy=32%). Young neurosurgeons <33 years scored better in microsuturing(p=0.03) and drilling(p=0.006). Freshly certified neurosurgeons performed better in microsuturing(p=0.003) and drilling(p=0.001). Similar was the finding from neurosurgeons trained at central institutes, though it was significant in microsuturing(p=0.01). Difference in performance in neuro-endoscopy in all groups did not reach significant levels. Formative asssessments were done in trainees who attended short-term repititive training in each module (49, 31 and 30 trainees in microsurgery, drilling and neuro-endoscopy respectively) to assess their degree of improvement with practice. Training improved performance in microsuturing, drilling and neuro-endoscopy by 44.2%, 12.73%, 17.26% respectively(p=0.001). Interval-based feedback analysis was taken from trainees (61.6% response rate) in which more than 70% reported good to excellent benefit from the training in their real surgical practice.

Learning Objectives

The present study analyses development of neurosurgery skills training curriculum highlighting formulation and standardisation of structured low and high-fidelity simulation modules, and evaluation of efficacy in training neurosurgeons with formative and summative assessment tools.

Learning Objectives (Continued)

The structured modular simulation curriculum includes microsurgery, high speed drilling and neuroendoscopy comprising basic=7, intermediate=7 and advanced=14 simulation modules. Trained neurosurgeons – Summative assessment: Young neurosurgeons, freshly certified neurosurgeons and neurosurgeons trained at central institutes scored better in microsuturing and drilling. Difference in performance in neuro-endoscopy in all groups did not reach significant levels. Trainee neurosurgeons or residents – Formative assessment: Training improved performance in residents in microsuturing, drilling and neuro-endoscopy by 44.2%, 12.73%, 17.26% respectively (p=0.001)

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