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Health-related quality of life and fatigue in children with Duchenne muscular dystrophy: A three-year longitudinal study

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Background: Longitudinal data on health-related quality of life (HRQOL) and fatigue in paediatric Duchenne muscular dystrophy (DMD) are limited. Recently, fatigue was reported to be the greatest predictor of poor HRQOL in paediatric DMD. Understanding the trajectory of HRQOL and its relationship with fatigue may facilitate the development of improved therapeutic strategies. Our objective was to describe three-year changes in HRQOL and fatigue in children with DMD. **Methods:** Patients identified via the Canadian Neuromuscular Disease Registry received mailed questionnaires (2013–2016). HRQOL was assessed using the PedsQL™ GCS and NMM domains, and fatigue was assessed using the MFS domain (patient- and parent-report). Mean three-year change in scores were computed. Pearson correlations were computed between three-year change in HRQOL and fatigue. **Results:** Mean decline in MFS scores for patient- and parent-reports were 1.03 and 1.19, respectively. Mean decline in GCS scores for patient- and parent-report were 1.75 and 4.13, respectively. Mean change in NMM scores for patient- and parent-report were 0.72 and -8.36, respectively. Change in MFS score was associated with changes in GCS (r=0.72, p<0.001) and NMM scores (r=0.84, p<0.001) by patient-report. **Conclusions:** Children with DMD experience worse fatigue and HRQOL over time. Parents perceive a greater decline in HRQOL over time compared to patients.

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Development of a performance model for virtual reality tumor resections

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Background: This work proposes a hypothetical model that integrates human factors (e.g. inherent ability and acquired expertise) and task factors (e.g. pre-procedural data, visual and haptic information) to better understand the hand ergonomics adaptation needed for optimal safety and efficiency during simulated brain tumor resections. **Methods:** Hand ergonomics of neurosurgeons, residents and medical students were assessed during simulated brain tumors resection on the NeuroVR virtual reality neurosurgical simulation platform. Spatial distribution of time expended, force applied, and tumor volume removed, and other metrics were analyzed in each tumor quadrant (Q1 to Q4). **Results:** Significant differences were observed between the most favorable hand ergonomics condition (Q2) and the unfavorable hand ergonomics condition (Q4). Neurosurgeons applied more total force, more mean force, and removed less tumor per unit of force applied in Q4. However, total volume removed was not significant between the two quadrants indicating hand ergonomics adaptation in order to maximize tumor removal. In comparison, hand ergonomics of medical students remained unchanged in all quadrants, indicating a learning phenomenon. **Conclusions:** Neurosurgeons are more capable of adapting their hand ergonomics during simulated brain tumor resections. Our proposed hypothetical model integrates our findings with the literature and highlights the importance of experience in the acquisition of adaptive hand ergonomics.

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Neurosurgery Residency Program at the Faculty of Medicine, Universitas Gadjah Mada, Indonesia: a unique approach and strategy for an archipelago country

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Background: Indonesia is a vast archipelago country with over 17,000 islands. Many of the islands are in underdeveloped provinces with no neurosurgeon. Neurosurgery is often considered an expensive and sophisticated field to fund. Our neurosurgery department used the vision and mission of the medical faculty, which is "globally respected and locally rooted" to make a difference in many of the islands. **Methods:** Careful selection of provinces and candidates that involve local governments and hospitals within the province. This includes resident recruitment, planning and developing neurosurgical infrastructure in the province. Our program uses innovative neurosurgical techniques that are standardized to be applicable in underdeveloped areas. The residents are exposed to their province and hospital during the training. We optimize IT interaction, including teleconference, videoconference and telemedicine **Results:** At the fifth year of our program, we have sixteen residents from 8 underdeveloped provinces and have established MoU with 4 local hospitals around Indonesia. We have also sent residents to rural areas. We routinely participate in international teleconferences and videoconferences, including those with the Saskatchewan team. **Conclusions:** A well planned and structured neurosurgical program, with standardized processes and involvement of local officials, combined with extensive use of IT, is effective in preparing neurosurgeons who can provide quality care in underdeveloped regions.

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Popularity of online multimedia educational resources in neurosurgery: Insights from The Neurosurgical Atlas project

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Background: *The Neurosurgical Atlas* is a neurosurgical website with informative chapters and videos to promote excellence and safety in neurosurgical techniques. Here, we present our analysis of this website's viewing data and describe how online neurosurgical resources are being utilized. We hope this will be a useful guide for neurosurgeons interested in online multimedia education. **Methods:** We analyzed Google Analytics data from *The Neurosurgical Atlas* between June 2016 and August 2017 which tracked