



<b>Title</b>	<b>The Effect of Fatigue on Surgeon Performance and Surgical Outcomes</b>
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## Aim

To investigate the effect of fatigue on surgeons and surgical outcomes, and to investigate the impact of fatigue on the cost of surgery and surgical training.

## Conclusions and results

Results were grouped into four areas of performance: clinical, academic, cognitive, and psychomotor skills. There is a paucity of evidence investigating the effects of sleep loss and fatigue on the performance of surgeons and subsequent clinical outcomes. The overall weight of (poor) evidence shows that performance is not proven to be affected by sleep deprivation or fatigue and that psychomotor performance may or may not be. Variations in results were, in some cases, attributable to the level of training of participants and between-subject differences. Many studies used surrogate markers to measure performance, although the relationship between these markers to actual clinical performance is unclear. It appears that fatigue can be compensated for in the acute operating room setting, but the impact it has on normal functions is unclear. The search strategy did not identify any economic evaluations, resulting in an inability to comment on the financial effect of fatigue on surgery and surgical training.

## Recommendations

None.

## Methods

We systematically reviewed the literature. Studies were identified by searching EMBASE, CINAHL, PubMed, The Cochrane Library and Current Contents from inception to June 2008. Additional articles were identified through reference sections of the retrieved studies. Data from the included studies were extracted by an ASERNIP-S researcher using standardized data extraction tables developed *a priori* and checked by a second researcher. Statistical pooling was not appropriate due to the study and result heterogeneity. Twenty studies were included for review: 2 RCTs, 7 nonrandomized

comparative studies, and 11 case series (pretest/posttest outcomes). Studies were of variable quality and differed in study design.

## Further research/reviews required

Further research is recommended to identify surrogate markers, if any, to actual clinical performance and the relationship with actual clinical performance; to develop a clearer definition of fatigue and its relationship to sleep deprivation; to identify the effects of acute sleep deprivation with and without chronic partial sleep loss on performance; to compare performance at difference times of day to assess outcomes at different circadian points; to compare performance of inexperienced surgeons with experienced surgeons with respect to fatigue and sleep loss; and to determine the impact of fatigue on the cost of surgery and surgical training.