

Effects of Increased Heart Rate Variability and Psychomotor Vigilance Performance on Surgical Performance at High Seas

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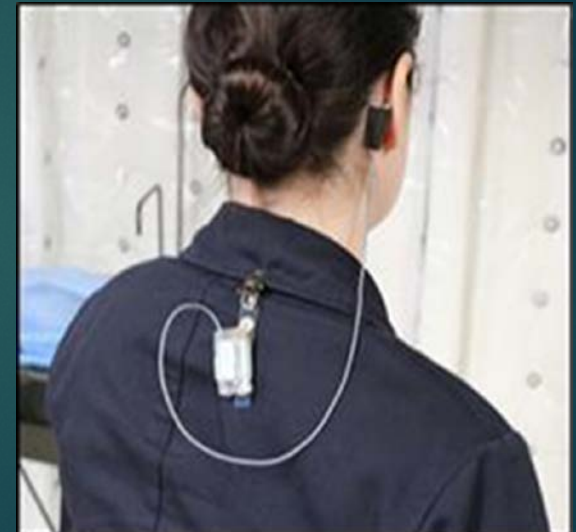
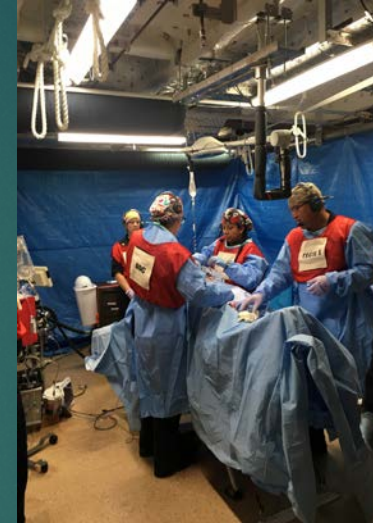
Introduction

- ▶ “Golden Hour”
- ▶ Hospital ships- U.S.N.S. Comfort & U.S.N.S Mercy
- ▶ 3 phase project simulating Sea State 4 (SS4)
 - ▶ I – 1 person on a simulator
 - ▶ II- 4 person team on a simulator
 - ▶ III- 6 person team on a ship at sea
- ▶ Heart Rate Variability (HRV) and Psychomotor Vigilance Performance (PVP) impact on surgical performance
- ▶ Does increased sea states cause an increase in a surgeon’s workload and fatigue and does that effect surgical performance?

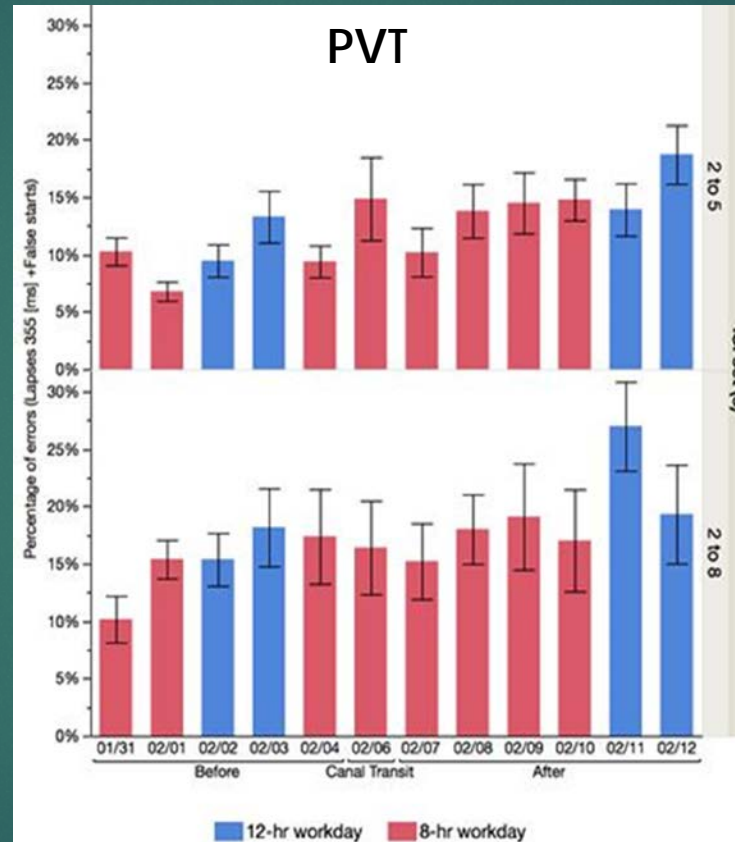
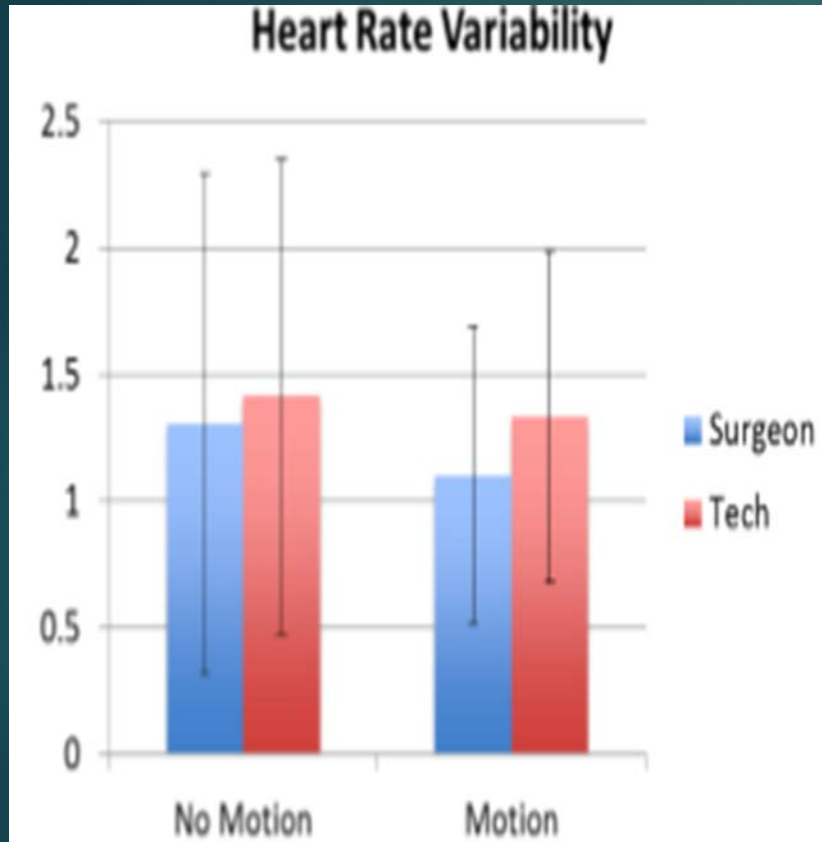


Methods

- ▶ 4 surgeries performed on “cut suit” manikin
 - ▶ Abdominal Injury
 - ▶ Multiple fractures of pelvis
 - ▶ Transverse fracture of femur
 - ▶ Partial traumatic amputation of lower leg
- ▶ Team of surgical experts judged the success of each procedure
- ▶ Participants wore heart rate monitors (Phase I/II/III)
- ▶ Participants completed PVP test 3 times each day (Phase III)



Results



- 84% of surgeries in phase II and 89% of surgeries in phase III were graded as satisfactory or better.
- Phase I/II found no significant effects on performance within HRV data when compared to non-motion data
- PVT response speed and errors were worse on 12 hour work days vs. 8 hour workdays

Conclusion

- ▶ HRV data suggests surgeons are able to maintain a physiologic balance while performing surgery at SS4 to lead to successful patient outcomes
- ▶ PVT data shows that fatigue and decreased alertness can happen at SS4 yet it still has no effect on successful patient outcome.
- ▶ These findings suggest that surgical teams have the ability to successfully perform surgical tasks aboard non-traditional U.S. Navy vessels