

# PRELIMINARY RESULTS OF A RETROSPECTIVE REVIEW OF HIP FRACTURE OPERATIONS AT NIGHT VERSUS DAYTIME

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## INTRODUCTION

Since the death of Libby Zion at New York Hospital in 1984, fatigue and sleep deprivation in medicine has become an issue of concern, ultimately leading to recent changes in Resident work hours.<sup>6</sup> The amount of continuous duty and work hours demanded of the profession exceed those that are legally allowed in nuclear power and transportation industries.<sup>7</sup> As a result, it has been of interest to researchers to try to explain whether or not long hours and lack of sleep have a negative effect in patient care.

Surgeries performed outside of the regular work day have been correlated with increased in-hospital mortality. In a 2001 study, Bell et al<sup>2</sup> found that patients admitted during weekends for ruptured abdominal aortic aneurysms, acute epiglottitis, and pulmonary embolism had a significantly greater mortality than those admitted on weekdays. In hip fracture surgeries, Foss et al<sup>5</sup> found that 5-day and 30-day mortality post hip fracture repair were significantly higher when performed during holidays and weekends.

Currently, there are no studies that have looked at the differences in outcomes of hip fracture surgeries performed in the daytime hours versus those after hours. The purpose of this study is to assess whether there is a risk associated with performing hip fracture surgeries after-hours as compared to those performed during the daytime hours. We believe that due to short staffing overnight and surgeon fatigue, there will be a significantly number of complications when surgeries are performed at night versus the daytime.

## MATERIALS AND METHODS

Using Beth Israel Deaconess Medical Center hospital records, we retrospectively identified all patients admitted with

ICD9 codes pertaining to hip fractures from January 2000 to June December 2005. We have reviewed over 750 records so far.

Procedures were stratified into 3 groups based on time of incision. Group 1 included those whose incision was between 07:00 and 17:59. Group 2 had procedures started between 18:00 and 23:59. Operations in Group 3 took place between 00:00 and 06:59.

Operative reports were reviewed for procedure type and length, anesthesia time, blood loss, IV fluids, transfusions, number of staff present, ASA status, and intra-operative complications, and mortality.

In-house records were reviewed for complications including infection, pneumonia, implant failure, reoperation, and mortality. Transfusions, length of hospital stay, and discharge location was also recorded.

Follow-up complications were recorded such as infection, GI bleeding, deep venous thrombosis (DVT), pulmonary embolus, Non-union, refracture, and reoperation.

Mortality assessments were made 1. During their hospital stay. 2. One-month post-operatively, and 3. One-year postoperatively. Mortality data was obtained from the Social Security Death Index (SSDI) online at <http://ssdi.rootsweb.com> and from patient records where available.

## RESULTS

750 records have been reviewed so far. Data analysis was carried out on 300 records.

There was no demographic difference found between the groups in terms of age, gender, ASA status, and fracture types. Median age at the time of surgery was 77 years with a range of 19-100 years. Approximately 2/3 of fractures were intertrochanteric, (Figure 1).

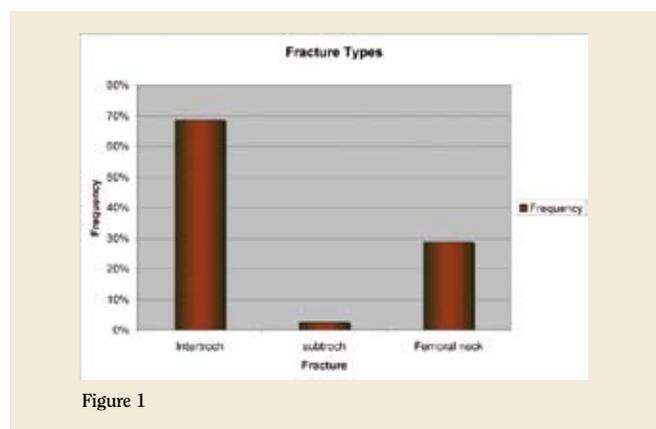


Figure 1

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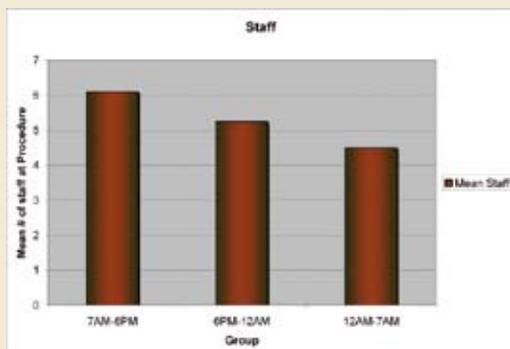


Figure 2

There was fewer staff in surgeries performed overnight versus the daytime (Figure 2). There was also greater likelihood of an assistant being present during the day. There was a small, non-significant difference in anesthesia time, with after-hours surgeries having longer time under anesthesia. There was no difference seen in intra-operative factors in terms of blood loss, IV fluids, and complications among the different groups (table1).

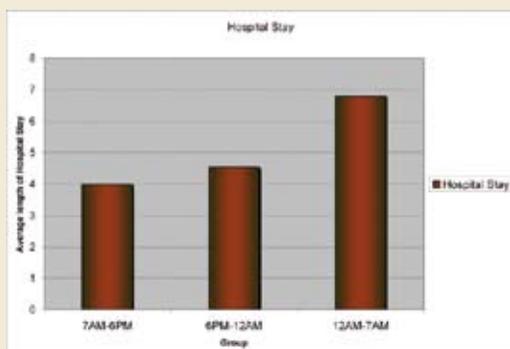


Figure 3

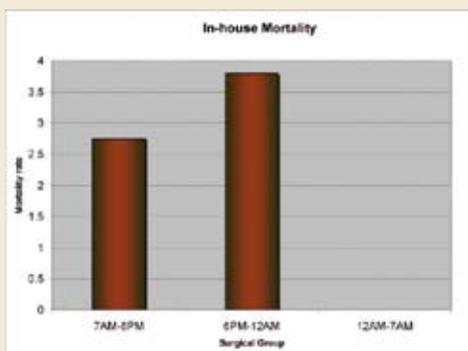


Figure 4

While in-house, there was no difference seen in the number of complications or transfusions. There was a non-significant difference in hospital stay among the different groups (Figure 3).

In-house mortality was significantly higher when surgeries were performed 6PM and 12 AM than those during the day

Parameter	Result
<b>Demographics</b>	
Age	No difference
Sex	No difference
ASA Status	No difference
Fracture Type	No difference
<b>Mortality</b>	
Inhouse Mortality	Group 2 Higher mortality
One month	No difference
One year	No difference
<b>Intraoperative</b>	
Staff	Fewer Staff in Groups 2 and 3*
Assistant	Less likely in Groups 2 and 3*
Anesthesia	More likely to use Spinal during daytime
Blood loss	No difference
IV Fluids	No difference
Immediate Complications	No difference
Surgical Time	No difference
Anesthesia Time	No difference
<b>In-house</b>	
Hospital Stay	Longer in groups 2 and 3
Transfusions	No Difference
in-house complications	No Difference
<b>Follow-up</b>	
Follow-up Complications	No Difference

\* Denotes Statistical Significance

Table 1

hours (Figure 4). There was no difference seen in one-month or one-year mortalities among the groups.

## DISCUSSION

Several studies have shown that fatigue and sleep deprivation negatively impairs performance, alertness, and mood.<sup>1,3,4,10,11</sup> House officer function after a long call night has been shown to be equivalent to having a blood alcohol concentration of 0.04 to 0.05 g%.<sup>1</sup> Reaction times of residents with heavy call were 7% slower than those with a light call. Taffinder et al found that surgeons who had no sleep committed 20% more errors and took 14% longer to complete a laparoscopy simulator exercise than when they had a full night of sleep.<sup>14</sup> Another study looking at medical errors performed by residents found that approximately one third of errors occurred as a result of working long hours.<sup>8</sup>

There is unclear evidence to support how these fatigue impairments in surgical dexterity and attention translate to poor clinical performance. Resident on-call status had no effect on their performance on the American Board of Surgery In-Training Examination (ABSITE).<sup>13</sup> A study comparing the difference in medical errors between a night float system vs. traditional on-call system found that although residents in traditional call system performed significantly lower on memory scanning and addition tasks than those in the night-float system ( $p < 0.05$ ), errors were not different among the two groups.<sup>9</sup> These results suggest that although cognitive and physical performance may be impaired with lack of sleep, this does not seem to translate negatively into patient care. A potential reason for this may be that residents that are sleep-deprived are able to compensate for sleep loss in crises or stressful situation, however, they may be more prone to errors on routine tasks, or tasks that require constant attention, such as surgery<sup>12</sup>.

Based on preliminary results from our study, there seems to be little difference in surgeries performed at night versus the daytime. Despite the fact that surgeries performed after-hours had fewer staff and were less likely to have an assistant, there was no significant difference in surgery complications between the groups. There was no difference in complications in-house or at follow-up.

There was a higher in-hospital mortality associated with surgeries performed between 6PM and 12 AM. Most deaths were caused by cardiopulmonary arrest, with no intraoperative deaths. There were, however, no perceived differences in one-month or one-year mortality rates. Patients operated after-hours had longer hospital stays than those operated between 7AM and 6 PM.

This project is currently at 70% of data collection and 30% of data analysis. We hope to have a finished project in early July 2006.

## CONCLUSIONS

Preliminary results show that there is an increased risk of intra-hospital mortality associated with after-hour surgeries. So far, there is no statistical difference in one-month or one-year mortality rates. Surgeries performed at night are significantly fewer-staffed and have less of a likelihood to have an assistant than those performed during the day. There is also no difference seen in intraoperative or in-house complications.

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