Predictors of Outcomes in Patients with Facial Burns: A Retrospective Chart Review

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1. Background

As well as allowing one to see, hear, speak, eat and breathe, the face is central to one's ability to communicate expression and emotion. Consequently, burns to the face are especially debilitating and are associated with poorer functional and psychological outcomes.

2. Method

We conducted a retrospective chart review on 726 patients with facial burns who presented to Royal North Shore Hospital's Severe Burns Unit during a ten-year period (2008 to 2017). Data were analysed using SPSS®. Multiple linear regression and binary logistic regression models were used.

To estimate the effect on hospital length of stay, we generated a regression model for patients with less than or equal to 10% TBSA burned. This was because including patients with all TBSA %s generated a model with skewed residuals, such that the assumption of normality could not be satisfied. The clinical reasoning behind our model was that there likely exists a fixed maximum amount of time it takes to treat certain conditions, such as a full-thickness facial burn or an inhalational injury. In patients with larger burns, these maximum lengths of time may be less than the patients' average length of stay. Therefore, in patients with larger burns, the presence of inhalational injury or full-thickness facial burns may have no marginal effect on total length of stay.

Below is our multiple linear regression model for patients with a TBSA < 10%. The *p* values under each co-efficient were calculated using robust standard errors.

*Length of stay (Days) = 0.32 + 2.19*Face burn depth + 4.70*Inhalational injury + 0.68*TBSA + 4.83*Non-accidental cause*

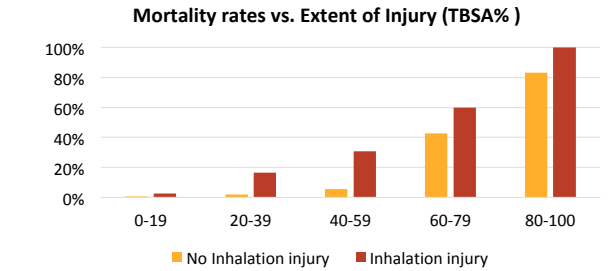
(0.559) (0.001) (0.001) (0.000) (0.009)

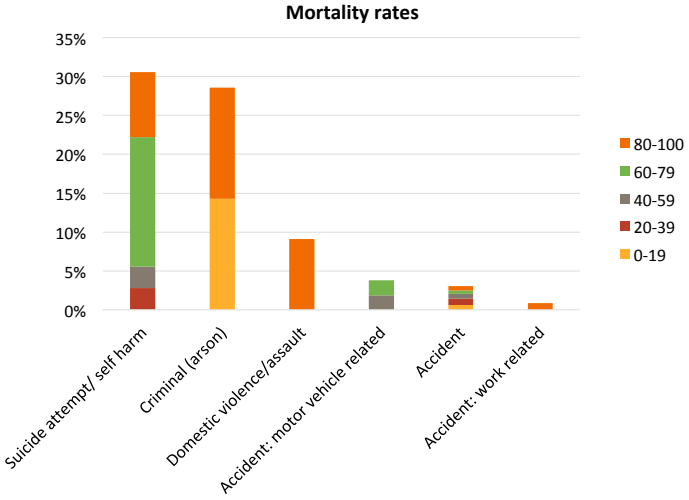
We then ran a binary logistic model, in which the dependent variable was whether or not the patient died during initial admission. The independent variables were whether or not the patient had inhalation injury, whether or not their reason for burn was non-accidental, depth of facial burn and TBSA% category. We anticipated that patients with burns < 10% would hardly ever die due to their burns. Therefore, these patients were removed from the sample to reduce the skewness of the distribution. All coefficients in the model were significant at alpha = 0.05 except for that of the independent variable *Inhalational Injury*. This suggests that once we account for depth of facial burn, reason for the burn and TBSA% burned, inhalational injury does not have a significant correlation with mortality.

A major shortcoming of both models is that they did not include age as a dependent variable.

3. Results

- 82% of patients were male
- The most common type of burn was the flame burn, followed by the explosion burn
- Chemical burns had a higher proportion of full-thickness burns compared to other burn categories
- 64% of patients had < 10% total body surface area (TBSA) burned
- The presence of inhalational injury was found to have no effect on mortality, once TBSA% and facial burn depth was accounted for
- Amongst patients with TBSA > 10%, those with non-accidental burns were at a 5.27 times increased chance of dying during initial admission
- Amongst patients with TBSA < 10%, the presence of inhalational injury increased length of stay by 4.70 days on average, while those with non-accidental burns had an increased length of stay of 4.83 days





4. Conclusions

Special care should be taken when treating patients whose burns are due to non-accidental causes, since they have a much higher chance of dying during initial admission. While the presence of inhalational injury increases a patient's length of stay, it does not influence mortality, suggesting that our current treatment approach to inhalational injury may be highly successful.

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