Epidemiology of traumatic brain injury patients attending a tertiary care centre in eastern India

Debojit Basak

05/06/2020

# Abstract

Trauma is one of the leading causes of death in India. Road traffic accidents cause about 60% of all Traumatic Brain Injury (TBI) in India.[1] According to an estimate 50% of trauma deaths in India is caused by Traumatic Brain Injury (TBI). [2] The Purpose of this study is to access the prevalence, severity, cause, outcome of TBI patients.

## Method:

For this study we will use data from a prospective observational cohort study called Trauma Audit Filter Trial (TAFT): The data was collected from Seth Sukhlal Karnani Memorial Hospital (SSKM) also known as Institute of Post Graduate Medical Education and Research (IPGME&R) which is a tertiary care centre in Kolkata, West Bengal. Data collection period: October, 2017 to Jan, 2020. In this hospital, one project officer was appointed to collect data prospectively for eight hours per day in the emergency room. Vital signs i.e. blood pressure, heart rate, respiratory rate, spo2, Glasgow coma scale (GCS), AVPU was measured at the emergency by data collector. For measurement of blood pressure, heart rate, Spo2 calibrated electronic bp-machine and Spo2 machine was provided. Data collector was trained to measure vitals at the start of the study. The project officer’s duty was divided into morning, evening and night shifts. Patient’s outcome was recorded from patients file till discharge or death. Data was uploaded in data server on weekly basis and data review was conducted. Audit of data collection and vital sign measurement was done quarterly. In addition to audit, project officer at quarterly interval was made to collect vitals of 10 patients with the Investigator on site to ensure that data quality and data integrity is maintained. For this study any adult (age: 18 years and above) TBI patient presenting to the emergency department (ED) and was admitted was enrolled for this study.

## Results:

A total of 776 TBI patient along with associated injuries were admitted during the period of our study of which 609 (78%) were male. Median age of patients was 40 (IQR: 30 to 54; range: 18 to 85).There were 369(47.6%) Of all the TBI patients 655(84.4%) were transferred from other hospitals. Almost 741(95%) patients were brought to SSKM via ambulance. Mean arterial pressure among them were 84.5 (IQR: 81.17 to 88.88; range: 53.17 to 139.67). 340(44%) patients had GCS within range of 14-15 and 434 (56%) patients were Alert (A). Among 336 (43%) patients operative intervention was needed. Road traffic accident (RTA) accounts for majority of TBIs 430 (55.35%) followed by fall 177(22.81%). Of all the RTA’s, two wheeler accident consist of 335(43.19%). Mortality was 29.8% among these patients.

###loading the csv file

data\_taft <- read.csv(file= “C:/Users/Debojit/Desktop/corsera/taft-dataset-2736-20200525172700.csv”, header = TRUE)

###sorting file based on PID from smallest to largest

PID\_order <- order(data\_taft$pid) a <- data\_taft[PID\_order,]

###applying filter to find all TBI patients in dataset using ICD 10 codes library(dplyr)

tbi <- filter(a, a$ctinj1icd %in% c ( “S065”, “S063”, “S020” , “S008” , “S021” ,“S026” , “S032”, “S053” , “S056” , “S061” , “S062” , “S0064” , “S066” , “S068”, “S035”))

###to find the sample size

dim(tbi)

nrow(tbi)

###To find median of age age <- tbi[,7] summary(age)

###to find no of male female and there percentage sex <- as.factor(tbi[,8]) sex\_1 <-ifelse(sex == 0,“Female”,“Male”)

table\_gender <- table(sex\_1) table\_gender

###prop.table to see how much proportion in each gender & round used for rounding off here i choose 2 decimal place and multiplied with 100 for percent prop.table(table\_gender) table\_gender\_round <-round(prop.table(table\_gender),2)\*100

###replacing 999 with NA in column mortality

hd <- tbi[,62] hd <- replace(hd,hd>3,NA) hd <- as.factor(hd)

###to find % mortality

mortality1 <- tbi[“mortalityfinal”] <- ifelse(hd == 0,“discharge”, ifelse(hd == 1,“death”, ifelse(hd == 2, “alive and tranferred”, ifelse(hd == 3, “DAMA”,0) ) ) )

b <- table(mortality1) prop.table(b) mortality\_round <- round(prop.table(b),4)\*100

##to find percentage transferred

transferred <- as.factor (tbi [,12]) transferred1 <- ifelse(transferred == 0,“direct”,“transferred”) trans\_table <- table(transferred1) prop.table(trans\_table) round(prop.table(trans\_table),4)\*100

##to find mode of transport

transport <- as.factor(tbi [,11]) transport1 <- ifelse(transport == 0, “ambulance”,“police”) transport\_table <- table(transport1) prop.table (transport\_table) round(prop.table(transport\_table),2)\*100

##to find mechanism of injury ## tried but failed ##i tried to add ICD code for RTA, fall, assault and then tried to create a table but was unable ##i tried using replace , as well as ifelse but using ifelse would create a very long code. so i used a external calculator to add individual percent injury <- as.factor (tbi [,9]) injury\_table <- table(injury) round(prop.table (injury\_table),4)\*100

##to find mean arterial pressure

sbp\_avg <- tbi[“sbpfinal”] <- (tbisbp2)/2 dbp\_avg <- tbi[“dbpfinal”] <- (tbidbp2)/2

bp1 <- tbi[“map1”] <- sbp\_avg + dbp\_avg bp2 <- tbi[“map2”] <- bp1 + dbp\_avg mean\_arterial\_pressure <- tbi[“mapfinal”] <- bp2/3 ##its almost a normal distribution curve summary (mean\_arterial\_pressure)

##creating a new column with colname GCS which will contain total gcs

G <- tbi[“GCS”] <- tbivgcs+tbi$mgcs gcs <- replace(G,G > 15 ,NA)

#breaking gcs into groups

gcs\_groups <- cut(gcs, breaks = c(2,8,13,15), labels = c( “3-8”,“9-13”,“14-15”)) table

#creating table of GCS distribution gcs\_table <-table(gcs\_groups) round(prop.table(gcs\_table),2)\*100

###calculating proportion of patients in AVPU

avpu <- tbi[,33] avpu <- replace(avpu,avpu>3,NA)

avpu1 <- ifelse(avpu == 0,“Unresponsive”, ifelse(avpu == 1,“Pain responsive”, ifelse(avpu == 2, “Voice responsive”, ifelse(avpu == 3, “Alert”,0) ) ) )

avpu\_table <- table(avpu1)

round(prop.table(avpu\_table),2)\*100

#breaking age into groups

age\_groups <- cut(age, breaks = c(17,25,45,65,85), labels = c(“18-24”,“25-44”,“45-64”,“65+”))

table (age\_groups)

#to find number of ot done

#creating a seperate column surgery to contain to terms “conservative” , “intervention” #inorder to do so first i replaced all zero’s with 999 as it was errors while typing s <- tbi[,61] surg <- replace(s,s==0,999) #then created a seperate column using ifelse surgery <- tbi[“surgeryfinal”] <- ifelse(surg == 999,“conservative”,“intervention”)

table\_surgery <- table(surgery) round(prop.table(table\_surgery),2)\*100

## Conclusion:

There has been a significant rise of trauma in India in last few decades of which TBI forms a major portion. Prevention, Pre-hospital care and rehabilitation are the needs of the hour as the burden of TBI is increasing. Major developing economy like India faces a major challenge in these fields.

# Analysis

##crosstabulating map and mortality map\_table <- table(map\_group, mortality1)

round(prop.table(map\_table,1),2)\*100

##crosstabulation between GCS and mortality

gcs\_mortality <- table(gcs\_groups, mortality1)

#calculating row% to calculate mortality in each gcs groups

round(prop.table(gcs\_mortality,1),2)\*100

##cross tabulation AVPU and mortality

avpu\_mortality <- table (avpu1,mortality1)

#calculating row% to calculate mortality in each avpu groups

round(prop.table(avpu\_mortality,1),2)\*100

##crosstabulation between age and mortality

age\_mortality <- table(age\_groups,mortality1)

#calculating row% to calculate mortality in each age group

age\_mortality\_rounded <- round(prop.table(age\_mortality,1),2)\*100

##crosstabulation between gender and mortality

sex\_mortality <- table (sex\_1,mortality1)

#calculating row% to calculate mortality in each gender

sex\_mortality\_round <- round(prop.table(sex\_mortality,1),2)\*100

##crosstabulation between transfer status and mortality

trans\_mortality <- table(tbi$tran, mortality1)

#calculating row% to calculate mortality in transfer status round(prop.table(trans\_mortality,1),2)\*100

#comparing surgery with mortality surgery\_mortality <- table(surgery,mortality1) #calculating row% to calculate mortality among intervention and conservative managements round(prop.table(surgery\_mortality,1),2)\*100

# Reference

1. Traumatic brain injury. (n.d). Retrieved from <http://indianheadinjuryfoundation.org/traumatic-brain-injury/>
2. Maas AI. Traumatic brain injury in India: A big problem in need of data. Neurol India 2017;65:257-8