Contents lists available at ScienceDirect

Journal of Clinical Orthopaedics and Trauma

journal homepage: www.elsevier.com/locate/jcot

Full Length Article

Epidemiologic characteristics and pre-hospital care of traumatic injuries during the COVID-19 pandemic in an emerging and developing country: A single tertiary centre experience



Ashwani Soni ^a, Sudhir Kumar Garg ^b, Ravi Gupta ^b, Parmanand Gupta ^b, Rajeev Kansay ^a, Akash Singhal ^{a, *}

^a Government Medical College Hospital, Chandigarh, India ^b Government Medical College and Hospital, Chandigarh, India

ARTICLE INFO

Article history: Received 4 May 2021 Received in revised form 11 October 2021 Accepted 13 October 2021 Available online 21 October 2021

Keywords: Pre hospital care COVID-19 Community participation Referrals

ABSTRACT

Background: Pre-hospital care has been shown to reduce the mortality in trauma patients. The present study is an attempt to identify the status of pre-hospital orthopaedic trauma care in developing countries during COVID-19 pandemic.

Methods: This was a prospective observational study carried out in a tertiary care setup from March 25th 2020 to January 31st 2021. All the data pertaining to the traumatic injuries including demographic details and epidemiologic characteristics were recorded in an electronic database.

Results: A total of 1044 patients were included in the study for evaluation. The mean age was 35.24 ± 19.84 years. There were 873 males and 171 females. A total of 748 presented from nearby states, with 401 being the referrals and 347 cases coming directly to hospital. A total of 141 open fractures presented directly and 269 were referred from nearby states. Out of 269 cases of open fractures, only 67 and 139 were given intravenous antibiotics and had wound dressing done respectively at the periphery site. A total of 125, 112, 92 and 84 patients were received without traction/splintage, intravenous fluids, dose of analgesics and recording of vitals respectively. Delay from injury to presentation in emergency/administration of antibiotic (Hours) was 7.06. Road side accidents were main cause comprising of 52.58% cases. Gustilo Anderson classification grade-2 comprised of majority of the open fractures (51.63%). Lower limb fractures comprised of majority of the injuries (70.59%). Majority were adults and conservative management was the most common mode of treatment. A total of 197 and 265 patients had associated head injuries and blunt trauma chest/blunt trauma abdomen respectively.

Conclusion: Emphasizing on pre-hospital care measures, with special focus on co-ordination between primary, secondary and tertiary health care facilities is the need of the hour and can prevent additional morbidities, avoiding overburden of the already compromised healthcare centres.

© 2021

1. Introduction

Traumatic injuries have been a major cause of morbidity and mortality and accounts for more than 20% of total emergency cases.¹ Currently, more than 90% of the trauma related deaths is reported from the developing countries, posing a huge burden on

E-mail addresses: asoniortho@gmail.com (A. Soni), sudhir_ortho@yahoo.com (S.K. Garg), ravikgupta2000@yahoo.com (R. Gupta), drpngupta123@rediffmail.com (P. Gupta), drkansay@yahoo.co.in (R. Kansay), akash15636@ymail.com (A. Singhal).

the healthcare system of low and middle income countries.² An estimated 50% of total deaths occur within first hour of trauma and a further 30% of total deaths in next 23 h of trauma.³ This latter part of mortalities can be prevented by properly implicating the basics of pre hospital trauma care.⁴

The pre hospital trauma care principles provide a basic framework for strengthening the already existing healthcare system and achieve health equity and helps in the development of emergency care capabilities in general healthcare systems.⁴ Further, in order to respond to the ever increasing healthcare demand, strengthening pre hospital trauma care would help in strengthening the entire healthcare system and would be more cost-effective than operating

^{*} Corresponding author. Government Medical College and Hospital, Chandigarh, India.

A. Soni, S.K. Garg, R. Gupta et al.

separate systems.⁵ Whereby the developed countries have a wellestablished pre-hospital trauma care management with all the sophisticated facilities at all times, rural and periphery areas in the developing countries like India have no access for the same.⁵ Furthermore, the presence of social workers and non-specialists physicians adds to the woes, with no proper training being provided to them to handle these extreme emergencies.^{6,7}

Integrating the pre hospital trauma care with the emergency medical services provided at the trauma care centres would help in efficiently managing the increased patient load and thereby reducing the mortality in the trauma patients.^{4–6} Additionally, in low and middle income countries like India, this will help reduce the economic burden and help in optimal mobilising of the available funds and resources for better infrastructure development.⁶ Also as has been reported in a previous study, neglect/delay in orthopaedic trauma during locked phase of COVID-19 time led to increased perioperative and postoperative complications in management of orthopaedic trauma during the unlocked phase, adding to the burden on already compromised healthcare resources.⁸

With unimaginable repercussions and challenges during COVID-19, the healthcare system worldwide has been affected in unprecedented way. The already compromised pre-hospital trauma care in developing countries has been further affected. Though several authors have discussed pre-hospital care during COVID-19 era, there is lack of literature regarding pre-hospital trauma care in developing countries. The present study makes an attempt to highlight the status of pre-hospital trauma care in orthopaedic patients during COVID-19 time in a developing country. By identifying the problems this study will further help in making strategies to improve the trauma patient care.

2. Materials and methods

This was a prospective observational study carried out in a tertiary care setup in northern part of India, catering patients from within as well as from outside the city. Since there is no established referral system in place, patients can come to this centre directly from any distant area. Even for referred patients from other centres, there are no standardised referral protocols. For current study all the patients coming to emergency department with traumatic orthopaedic injury were considered for inclusion. Patients without any fracture, received brought dead or unwilling to participate in study were excluded from the study. All the data pertaining to the traumatic injuries was recorded in electronic database from March 25th⁻ 2020 to January 31st⁻ 2021.

The data included demographic details, mode of injury, site of fracture, open/closed injury, management received from referral site, diagnosis, type of surgery, delay in injury and admission, delay in admission and surgery and associated injuries including head injuries and blunt trauma chest/blunt trauma abdomen injuries. Gustilo Anderson classification for open fractures was used to categorise the severity of the injury.⁹

ATLS guidelines were used to provide the emergent treatment and after stabilisation, a dedicated team of specialists managed these patients on a case to case basis, according to the evidence based medicine.¹⁰ All patients went through compulsory temperature charting and screened for influenza like symptoms and travel history, followed by Reverse Transcriptase- Polymerase Chain Reaction (RT-PCR) Corona testing on admission. Patients requiring life or limb saving surgeries were operated on priority by a dedicated team of doctors in separate Covid operation theatres (OT) without waiting for the COVID-19 report.

2.1. Statistical analysis

For continuous variables, mean and standard deviation were used. For categorical data, percentage/frequency was used. Data was collected in the Microsoft excel sheet. SPSS22.0 was used to perform all the tests.

3. Results

A total of 1044 patients were included in the study for evaluation. The mean age of patients was 35.24 ± 19.84 years (range 3-82)[Table 1].There were a total of 873 males and 171 females [Table 1]. A total of 748 (71.64%) patients presented from nearby states, with a total of 401/748 patients being the referrals and 347 cases coming directly to our tertiary care hub [Table 1]. A total of 141 open fracture patients presented directly from nearby states and 269 open fractures were referred from nearby states [Table 1]. Out of 269 cases of open fractures, only 67 patients were given intravenous antibiotic dosage at the periphery site, 139 patients had wound dressing done [Table 2]. Further, a total of 125 patients were received without any traction/splintage, 112 without any intravenous fluids, 92 without any dose of analgesics and 84 without any recording of vitals status [Table 3]. Delay from injury to presentation in emergency/administration of antibiotic (Hours) was 7.06 (0.15-23)[Table 1]. Delay from injury to presentation in emergency/administration of antibiotic (Hours) was 7.06 (0.15-23) [Table 1]. Road side accidents were main cause comprising of 549 (52.58%) cases [Table 1]. Gustilo Anderson open grade 2 comprised of majority of the open fractures [n = 269 (51.63%)] [Table 1]. Lower limb fractures comprised of majority of the injuries $\ln = 737$ (70.59%)], with fractures of the tibia being the most common fractures (n = 207) [Table 1]. Majority of the patients were adults [n = 887 (84.96%)] and conservative management was the most common mode of treatment [Table 1]. There was a total of 197 patients with associated head injuries and a total of 265 patients with associated blunt trauma chest/blunt trauma abdomen [Table 1].

4. Discussion

Coronavirus disease 2019 (COVID-19) was declared a public health emergency by the World Health Organisation (WHO) on January 20, 2020, and a pandemic on March 11, 2020. The skill to execute medical services in such exceptional situation remained a challenge. An effective work strategy needed to be executed at all healthcare centres, to prevent overburden of specialised healthcare centres and prevent inattentiveness in providing basic care treatment such as administration of antibiotic dose in open fracture, providing splintage in fractures and dislocations, etc. This study is an attempt to highlight some general deficiencies in the working of the healthcare system in providing optimum care in these unexpected pandemic scenario cases and subsequently providing a road map in formulating the future guidelines, if any such crises arise.

The most important finding of the present study was a high percentage of trauma patients reporting from nearby states (71.64%) to our tertiary care setup, with a substantial percentage of patients being the referral cases (38.40%). Further, direct admissions from outside Chandigarh comprised of 28.35% cases, indicating the absence of the necessary care in various healthcare centres in the nearby states. A possible reason for the same may be the conversion of various healthcare centres including Primary Health Centres (PHC) and Secondary Health Centres (SHC) into

Table 1

Demographic details and fracture distribution of Patients.

Age (Vears) 35.24 ± 19.34 (3-82) Allers: Females 373: 171 Outside Farent State (Chandigarh) atmissions 748 (71.64x) Pelay (fom admission to surgery (Hours) 34 (12-96) Fom Parent state (Chandigarh) [n = 296(28.35%)] 193 Open Factures (n) 193 Open Factures (n) 193 Open Factures (n) 193 Open Factures (n) 132 Open Factures (n) 132 Open Factures (n) 198 Opensor 540 (62.3 0x 04x) At Home 540 (62.9 x8) At public places (parks, market, hospital, staicase, firearm injuries, railway track/crush injuries, etc.) 173 (98.63) Operative Management (Splintage ± debridement) 700 (62.9 x8) Operative Management (Splintage ± debridement) <th>Category</th> <th>n = 1044</th>	Category	n = 1044
NumberAfterAfterNumberAdditional and antisation to surgery (Hours)34 (12-96)Perom Parent State (Chandigarh) = 296(28.35%)]103Closed Fractures (n)103Delay from Jiny to presentation in emergency/administration of antibiotic (Hours)235 (0.0 to 28)Referral cases [n = 401(38.4%)]132Closed Fractures (n)132Open Fractures (n)132Open Fractures (n)132Open Fractures (n)149Closed Fractures (n)149Open Fractures (n)149Open Fractures (n)149Open Fractures (n)198Open Fractures (n)198 </td <td>Age (Years)</td> <td>$35.24 \pm 19.84 (3-82)$</td>	Age (Years)	$35.24 \pm 19.84 (3-82)$
Outside Parent State (Chandigarh) almissions748 (71.648)Peday from admission to surgery (Hours)34 (12–96)Prom Parent state (Chandigarh) [n = 296(28.35%)]103Open Practures (n)103Open Practures (n)23 (0.10 to 28)Referral cases [n = 401(38.40%)]12Cosed Factures (n)206Open Practures (n)706(0.45 to 72)Open Factures (n)14Open Factures (n)198Open Factures (n)198Open Factures (n)198Open Factures (n)198Open Factures (n)198Cosed Factures (n)198Place of Factures (n)129 (28.448)Pada State Acidents297 (28.448)At Home297 (28.448)At public places (parks, market, hospital, staticase, firearm injuries, railway track/crush injuries, etc.)173 (906(3)Operative Management (Stelf)Rife)243 (22.398)Parce Location244 (22.418)Humenal factures30Operative Management (Stelf)Rife)43 (22.858)Facture Location244 (24.118)Humenal factures31If and factures30If and factures31If and factures31Operative Management (Stelf)Rife)126If and factures31If and factures31 <td>Males: Females</td> <td>873: 171</td>	Males: Females	873: 171
Delay from Aminision to surgiary (Hours) 34 (12–96) From Parent state (Chandigach)(n = 296/28.35%)] 193 Closed Fractures (n) 193 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 235 (0.10 to 28) Referral cases in = 401(38.06%) 132 Open Fractures (n) 699 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 132 Open Fractures (n) 149 Closed Fractures (n) 149 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 149 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 440 (52.58%) Delay from injury to presentation in emergency/administration of antibiotic (Hours) 440 (52.58%) Delay from injury to presentation in emergency/administration of antibiotic (Hours) 440 (52.58%) Delay from injury to presentation in emergency/administration of antibiotic (Hours) 440 (52.58%) Delay from injury to presentation in emergency/administration of antibiotic (Hours) 440 (52.58%) Delay from injury to presentation in emergency/administration of antibiotic (Hours) 450 (52.58%) Delay from injury to presentation in emergency/administration of antibiotic (Hou	Outside Parent State (Chandigarh) admissions	748 (71.64%)
Prom Parent state (Chandigarh) [n = 296(28.35%)] 193 Open Fractures (n) 103 Open Fractures (n) 235 (0.10 0.28) Closed Fractures (n) 23 Open Fractures (n) 269 Dealy from injury to presentation in emergency/administration of antibiotic (Hours) 269 Dealy from injury to presentation in emergency/administration of antibiotic (Hours) 269 Dealy from injury to presentation in emergency/administration of antibiotic (Hours) 260 Closed Fractures (n) 198 Dealy from injury to presentation in emergency/administration of antibiotic (Hours) 500(0.30 to 48) Place of Fractures (n) 198 Dealy from injury to presentation in emergency/administration of antibiotic (Hours) 500(0.30 to 48) Place of Fractures (n) 173 (9.808) Open fractures (n) 27 (24.442) At Home 27 (24.442) At Home 241 (22.418) Place of Fracture occurreme 27 (24.442) Proter fractures (Defining = ± debridement) 70 (67.452) Open tractures 241 (22.418) Humeral fractures 31 Open tractures 32 <td>Delay from admission to surgery (Hours)</td> <td>34 (12–96)</td>	Delay from admission to surgery (Hours)	34 (12–96)
Closed Factures (n) 193 Open Factures (n) 103 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 2.35 (0.10 to 28) Referral cases in = 401(38,00%) 132 Open Factures (n) 269 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 7.06(0.45 to 72) Came direct/from outside Chandigarh (n = 347(33.23%)) 149 Open Factures (n) 149 Doday from injury to presentation in emergency/administration of antibiotic (Hours) 5.06(0.30 to 48) Place fractures (n) 149 Doday from injury to presentation in emergency/administration of antibiotic (Hours) 5.06(0.30 to 48) Place fractures (n) 173 (9.06%) 25.8% Doday from injury to presentation in emergency/administration of antibiotic (Hours) 5.06(0.30 to 48) Place fractures (n) 173 (9.06%) 25.8% Doda bit cacdents 5.06(0.30 to 48) 173 (9.06%) At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.) 173 (9.06%) 25 (2.39%) Sports injuries 24 (2.2.41%) 134 136 Operative Manag	From Parent state (Chandigarh) $[n = 296(28.35\%)]$	
Open Factures (n) 103 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 235 (0.10 to 28) Referral case [n = 401(38.40%)] 132 Open Fractures (n) 269 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 269 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 149 Closed Fractures (n) 149 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 546(03.00 48) Place of Fractures (n) 149 Delay from injury to presentation in emergency/administration of antibiotic (Hours) 549 (52.58%) At Home 574 (28.44%) At Home for surgery 713 (9868) Conservative Management (SkPintage ± debridement) 701 (67.14%) Oper trube Management (SkPintage ± debridement) 701 (67.14%) Oper trube Management (SkPintage ± debridement) 30 Oper trube Management (SkPintage ± debridement) 701 (67.14%) Oper trube Management (SkPintage ± debridement) 701 (67.14%) Oper trube Management (SkPintage ± debridement) 701 (67.14%) Operet infor factures 71 (70.59%) <td>Closed Fractures (n)</td> <td>193</td>	Closed Fractures (n)	193
Delay from injury to presentation in emergency/administration of antibiotic (Hours)2.33 (0.10 c.28)Referal case fina ~ 401(38.40%)132Open Factures (n)269Delay from injury to presentation in emergency/administration of antibiotic (Hours)7.06(0.45 to 72)Came directly from outside Chandigari [n = 347(33.23%)]149Open Factures (n)149Closed Factures (n)560(5.30 to 48)Plead from injury to presentation in emergency/administration of antibiotic (Hours)560(5.30 to 48)Plead form injury to presentation in emergency/administration of antibiotic (Hours)590 (52.58%)Nad Side Accidents590 (52.58%)At Home590 (52.58%)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)590 (52.58%)Sports injuries25 (2.39%)Type of surgery23 (32.85%)Upper lum fracture51 (54.78%)Parket Management (CRIF/ORIF)23 (32.85%)Humeral fractures30 (32.85%)Fracture Location24 (22.41%)Humeral fractures51 (34.86%)Operative Management (CRIF/ORIF)31 (32.86%)Humeral fractures31 (32.85%)Fracture Location31 (32.85%)Humeral fractures31 (32.85%)Proteo tractures31 (32.85%)Humeral fractures31 (32.85%)Proteo tractures31 (32.85%)Proteo tractures31 (32.85%)Humeral fractures31 (32.85%)Humeral fractures31 (32.85%)Proteo tractures	Open Fractures (n)	103
Referral case in a ditabute in the second se	Delay from injury to presentation in emergency/administration of antibiotic (Hours)	2.35 (0.10 to 28)
Closed Factures (n)132Open Factures (n)269Delay from injury to presentation in emergency/administration of antibiotic (Hours)7.06(0.45 to 72)Open Factures (n)149Closed Factures (n)198Delay from injury to presentation in emergency/administration of antibiotic (Hours)5.06(0.30 to 48)Place of Factures (n)297 (28.443)Road Side Accidents297 (28.443)At Home297 (28.443)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)701 (67.143)Operative Management (CRIF/ORIF)701 (67.143)Operative Management (CRIF/ORIF)701 (67.143)Operative Management (CRIF/ORIF)294 (22.13)Humeral fractures34Elbow fractures30Write factures30Write factures31Humeral fractures31Conservetive Kingtone137Humeral fractures31Humeral fractures31Humeral fractures31Humeral fractures31Humeral fractures31Conservet inb fractures31Humeral fractures31Hand fractures31Hand fractures31Hand fractures31Hand fractures31Humeral fractures31Humeral fractures31Humeral fractures31Humeral fractures31Humeral fractures31Hand fractures31Hand fractures <td>Referral cases $[n = 401(38.40\%)]$</td> <td></td>	Referral cases $[n = 401(38.40\%)]$	
Open Factures (n)269Delay from injury to presentation in emergency/administration of antibiotic (Hours)7,06(0.45 to 72)Come directly from outside Chandigarh (n = 347(33.23%))149Open Fractures (n)198Delay from injury to presentation in emergency/administration of antibiotic (Hours)198Delay from injury to presentation in emergency/administration of antibiotic (Hours)49Place Of Fracture occurrence997 (28.43%)Rod Side Accidents597 (28.43%)At Home297 (28.43%)At polic places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)73 (38.68%)Sports injuries297 (28.43%)Operative Management (Splintage ± debridement)701 (67.14%)Operative Management (CRIF/ORIP)204 (22.41%)Humeral fractures343 (32.85%)Fracture Location214 (22.41%)Humeral fractures304 (22.41%)Humeral fractures<	Closed Fractures (n)	132
Delay from injury to presentation in emergency/administration of antibiotic (Hours)7.06(.045 to 72)Open Fractures (n)149Closed Fractures (n)198Delay from injury to presentation in emergency/administration of antibiotic (Hours)5.06(0.30 to 48)Place of Fracture occurrence297 (28.443)At Home297 (28.443)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)297 (28.443)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)207 (28.443)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)207 (28.443)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)207 (28.443)At Home Intercent (Splintage ± debridement)701 (67.143)Operative Management (CRIF/ORIF)234 (22.833)Preature Location234 (22.413)Humeral fractures30Vist fractures31Intercent (Splintage ± debridement)30Wrist fractures31Intercent (Splintage ± debridement)31Operative Management (CRIF/ORIF)34Evacute (Statures)34Humeral fractures34Intercent (Splintage ± debridement)34Evacute (Statures)31Intercent (Splintage ± debridement)31Intercent (Splintage ± debridement)37Operative Statures34Intercent (Splintage ± debridement)37Intercent	Open Fractures (n)	269
Came directly from outside Chandigarh [n = 347(33.23%)]149Open Fractures (n)149Closed Fractures (n)198Delay from injury to presentation in emergency/administration of antibiotic (Hours)506(0.30 to 48)Place of Fracture occurrence297 (28.44%)Road Side Accidents549 (52.58%)At Home297 (28.44%)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)173 (9.86%)Sports injuries297 (28.44%)Operative Management (Splintage ± debridement)701 (67.14%)Operative Management (Splintage ± debridement)343 (32.85%)Practure Location344 (22.41%)Humeral fractures344 (22.41%)Humeral fractures34Elbow fractures30Forearm fractures30Forearm fractures30Home fractures30Humeral fractures317Forearm fractures317Forearm fractures317Forearm fractures317Forearm fractures317Forear fractures317Four fractures317Four fractures317Four fractures318Four fractures317Four fractures317Four fractures317Four fractures318Four fractures317Four fractures318Four fractures318Four fractures318Four fractures318Four fractures318 <td>Delay from injury to presentation in emergency/administration of antibiotic (Hours)</td> <td>7.06(0.45 to 72)</td>	Delay from injury to presentation in emergency/administration of antibiotic (Hours)	7.06(0.45 to 72)
Open Factures (n)149Closed Fractures (n)198Delay from injury to presentation in emergency/administration of antibiotic (Hours)506(0.30 to 48)Place of Fracture occurrence297 (28.44%)Road Side Accidents297 (28.44%)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)217 (39.65%)Sports injuries297 (28.44%)Type of surgery701 (67.14%)Conservative Management (Splintage ± debridement)701 (67.14%)Operative Management (CNF/ONF)234 (22.41%)Humeral fractures34Elow fractures51Forearm fractures30Porearm fractures30Humeral fractures30Hand fractures31Conservative fractures31Correar fractures31Forearm fractures33Hand fractures33Hand fractures33Forearm fractures33Hand fractures33Forearm fractures33Forearm fractures33Fortar fractures33Fortar fractures33Fortar fractures33Forearm fractures34Forearm fractures33Forearm fractures33Forearm fractures34Forearm fractures34Forearm fractures34Forearm fractures34Forearm fractures34Forearm fractures34Forearm fractures34<	Came directly from outside Chandigarh $[n = 347(33.23\%)]$	
Closed Fractures (n)198Delay from injury to presentation in emergency/administration of antibiotic (Hours)506(0.30 to 48)Phace of Fracture occurrenceRoad Side Accidents249 (52.58%)At Home297 (28.44%)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)173 (9.86%)Sports injuries25 (2.39%)Type of surgery25 (2.39%)Conservative Management (Splintage ± debridement)343 (32.85%)Operative Management (CMF/ONIF)343 (32.85%)Fracture Location234 (22.41%)Humeral fractures344Elbow fractures344Elbow fractures344Foream fractures34Foream fractures31Foream fractures31Foream fractures377 (70.59%)Fermu fractures313Tibia fractures377 (70.59%)Foream fractures313Tibia fractures326Fortures313Tibia fractures314Pervis and Actabulum fractures316Fortures316Ankle fractures316Fort f	Open Fractures (n)	149
Delay from injury to presentation in emergency/administration of antibiotic (Hours) 5.06(0.30 to 48) Place of Fracture occurrence	Closed Fractures (n)	198
Place of Fracture occurrenceStatusRoad Side Accidents549 (52.58%)At Home297 (28.44%)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)173 (9.86%)Sports injuries25 (2.39%)Type of surgery701 (67.14%)Conservative Management (Splintage ± debridement)701 (67.14%)Operative Management (CNIF/ORIF)343 (32.85%)Fracture Location24 (22.41%)Humeral fractures51Elbow fractures51Forearm fractures51Forearm fractures74Land Tactures737 (70.59%)Fractures133Forearm fractures137Knee fractures207Ankle fractures207Pelvis and Accetabulum fractures51Fortures207Ankle fractures207Potient Instance74 (71.26%)Elvis and Accetabulum fractures51Fot fractures126Pelvis and Accetabulum fractures51Axial Skeleton (Spine Injuries)744 (71.26%)Voung Patients (<14 years)	Delay from injury to presentation in emergency/administration of antibiotic (Hours)	5.06(0.30 to 48)
Road Side Accidents549 (52.58%)At Home297 (28.44%)At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)297 (28.44%)Sports injuries25 (2.39%) Type of surgery 701 (67.14%)Operative Management (Splintage ± debridement)701 (67.14%)Operative Management (CRIF/ORIF)234 (22.41%) Humeral fractures 234 (22.41%)Humeral fractures234 (22.41%)Kinster Market34Elbow fractures30Wrist fractures30Wrist fractures30Hower Imb fractures74Lower Imb fractures737 (70.59%)Femur fractures373 (70.59%)Femur fractures30Lower Imb fractures30Hower Imb fractures30Houres Individe fractures30Houre Individe fractures31Hand fractures30Houre Individe fractures30Houre Individe fractures31Houre Individe fractures30Houre Individe fractures31Nee fractures30Vourg Patients31Note fractures31Poot fr	Place of Fracture occurrence	
At Home 297 (28.44%) At Home 297 (28.44%) At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.) 297 (28.44%) Sports injuries 273 (9.86%) Type of surgery 701 (67.14%) Conservative Management (CRIF/ORIF) 343 (32.85%) Fracture Location 234 (22.41%) Humeral fractures 34 Elbow fractures 30 Wrist fractures 31 Hand fractures 37 (70.59%) Femur fractures 37 Knee fractures 37 Foot fractures 207 Axial Skeleton (Spine Injuries) 74 (71.26%) Voung Patients 51 Foot fractures 126 Pelvis and Acetabulum fractures 51 Young Patients (≤14 years) 74 (71.26%) Elderly patients 74 (71.26%) Padedatic Patients (≤14 years) 77 (13.63%) Distribution according to Gustilo Anderson Classification for open Fractures (n = 521) 71 (13.63%) Grade 2 269 (51.63%)	Road Side Accidents	549 (52.58%)
At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)173 (9.86%)Sports injuries25 (2.39%)Type of surgery011 (67.14%)Conservative Management (Splintage ± debridement)701 (67.14%)Operative Management (CRIF/ORIF)34 (32.85%)Fracture Location234 (22.41%)Humeral fractures34Elbow fractures30Wrist fractures30Wrist fractures30Wrist fractures30Hand fractures31Forearm fractures31Forearm fractures31Forearm fractures31Ibid fractures33Femur fractures33Hand fractures33Forearm fractures31Ibid fractures33Hand fractures33Knee fractures33Note fractures31Sport fractures31Ibid fractures33Foot fractures36Foot fractures31Foot fractures31 <t< td=""><td>At Home</td><td>297 (28.44%)</td></t<>	At Home	297 (28.44%)
Sports injuries25 (2.39%)Type of surgery701 (67.14%)Conservative Management (Splintage ± debridement)343 (32.85%)Practure Location234 (22.41%)Upper limb fractures234 (22.41%)Elbow fractures34Elbow fractures30Wrist fractures30Wrist fractures30Wrist fractures30Wrist fractures30Kee fractures31Ibow fractures74Lower limb fractures37 (70.59%)Femur fractures37 (70.59%)Femur fractures31This fractures31Ibi fractures31Ankle fractures31This fractures31Foot fractures31Foot fractures31Foot fractures33 (30.9%)Young Patients33 (6.99%)Young Patients33 (13.69%)Young Patients33 (13.69%)Petvis and Acetabulum fractures33 (13.69%)Young Patients13Identify patients13Elderly patients143 (13.69%)Prediatic Patients (≤14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)11 (13.62%)Grade 126269 (51.63%)Grade 3181 (34.80%)Grade 3A181 (34.80%)Grade 3A181 (34.80%)Grade 3A29Grade 3B29Grade 3C9Associated Injuries other than Orthopa	At public places (parks, market, hospital, staircase, firearm injuries, railway track/crush injuries, etc.)	173 (9.86%)
Type of surgery Total (5) Conservative Management (Splintage ± debridement) 701 (67.14%) Operative Management (CRIF/ORIF) 343 (32.85%) Fracture Location 234 (22.41%) Humeral fractures 34 Elbow fractures 31 Wrist fractures 31 Wrist fractures 31 Wrist fractures 45 Hand fractures 45 Hand fractures 37 (70.59%) Femur fractures 137 Knee fractures 207 Ankle fractures 207 Ankle fractures 207 Ankle fractures 51 Poterative S 51 Potagement (Splintinge (≤ 14 years)) 73 (6.99%) Young Patients 143 (13.69%) Patients (≤ 14 years) 143 (13.69%) Patients (≤ 14 years) 157 (15.03%) Distribution according to Gustilo Anderson Classification for open Fractures (n = 521) 11 (13.62%) Grade 2 269 (51.63%) 269 (51.63%) Grade 3A 143 (48.0%) 34 (34.80%)	Sports injuries	25 (2.39%)
Spectral production701 (67.14%)Operative Management (CRIF/ORIF)343 (32.85%)Fracture Location234 (22.41%)Upper limb fracture234 (22.41%)Humeral fractures34Elbow fractures51Forearm fractures30Wrist fractures30Wrist fractures45Hand fractures74Lower limb fractures737 (70.59%)Femur fractures131Tibia fractures207Ankle fractures207Ankle fractures207Ankle fractures131Tibia fractures126Pelvis and Acetabulum fractures51Axial Skeleton (Spine Injuries)74 (71.26%)Patients74 (71.26%)Elderly patients74 (71.26%)Elderly patients (≤14 years)74 (71.26%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 331 (31.69%)Grade 3A181 (34.00%)Grade 3A181 (34.00%)Grade 3A29Grade 3A29Grade 3A29Grade 3A29Grade 3A29Grade 3B20Grade 3C9Associated Injuries other than Orthopaedics (n = 462)9Humeries265Head Injuries265Head Injuries265Hadiomen/Blutt Trauma Chest265Head Injuries265Head Injuries265Head Injuries265<	Type of surgery	
Constraint of the second se	Conservative Management (Splintage + debridement)	701 (67 14%)
Practure Location Jump (lam (lam (lam)) Upper limb fractures 234 (22.41%) Humeral fractures 34 Elbow fractures 31 Forearm fractures 30 Wrist fractures 30 Wrist fractures 30 Wrist fractures 30 Wrist fractures 31 Lower limb fractures 74 Lower limb fractures 737 (70.59%) Femur fractures 131 Tibia fractures 131 Tibia fractures 207 Ankle fractures 207 Ankle fractures 126 Pelvis and Acetabulum fractures 51 Axial Skeleton (Spine Injuries) 73 (6.99%) Young Patients 143 (13.69%) Padiatric Patients (≤14 years) 143 (13.69%) Distribution according to Custilo Anderson Classification for open Fractures (n = 521) 71 (13.62%) Grade 1 71 (13.62%) 73 (6.93%) Grade 3 29 67 (13.49%) Grade 3A 433 434 Grade 3C<	Operative Management (CRIF/ORIE)	343 (32.85%)
Upper limb fractures 234 (22.41%) Humeral fractures 34 Elbow fractures 51 Forearm fractures 30 Wrist fractures 30 Wrist fractures 45 Hand fractures 74 Lower limb fractures 737 (70.59%) Femur fractures 131 Tibia fractures 131 Tibia fractures 207 Ankle fractures 207 Ankle fractures 131 Foot fractures 131 Pelvis and Acetabulum fractures 51 Axial Skeleton (Spine Injuries) 73 (6.99%) Young Patients 744 (71.26%) Elderly patients 744 (71.26%) Elderly patients 143 (13.69%) Paediatric Patients (≤14 years) 157 (15.03%) Distribution according to Gustilo Anderson Classification for open Fractures (n = 521) 11 (13.62%) Grade 1 71 (13.62%) 136 Grade 2 269 (51.63%) 137 Grade 3 181 (34.80%) 138 Grade 3A <td>Fracture Location</td> <td>010(0210070)</td>	Fracture Location	010(0210070)
Grade 1StructuresStructuresHumeral fractures34Elbow fractures51Forearm fractures30Wrist fractures45Hand fractures74Lower limb fractures737 (70.59%)Femur fractures137Knee fractures131Tibia fractures207Ankle fractures207Ankle fractures126Pelvis and Acetabulum fractures51Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients744 (71.26%)Elderly patients744 (71.26%)Elderly patients744 (71.26%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 3299 (51.63%)Grade 3A143Grade 3C9Associated Injuries other than Orthopaedics (n = 462)9Butu Trauma Abdomen/Bluut Trauma Chest265Had Injuries197	Unner limb fracture	234 (22 41%)
Instruments S1 Forearm fractures 30 Wrist fractures 30 Wrist fractures 45 Hand fractures 74 Lower limb fractures 737 (70.59%) Femur fractures 137 Knee fractures 131 Tibia fractures 207 Ankle fractures 207 Ankle fractures 85 Foot fractures 126 Pelvis and Acetabulum fractures 51 Axial Skeleton (Spine Injuries) 73 (6.99%) Young Patients 744 (71.263%) Elderly patients 744 (71.263%) Elderly patients (<14 years)	Humeral fractures	34
Boream fractures30Wrist fractures45Hand fractures74Lower limb fractures737 (70.59%)Femur fractures137Knee fractures137Knee fractures131Tibia fractures207Ankle fractures207Foot fractures126Pelvis and Acetabulum fractures51Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients74 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (≤14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 1269 (51.63%)Grade 3181 (34.80%)Grade 3181 (34.80%)Grade 3B29Grade 3C9Associated Injuries other than Orthopaedics (n = 462)9Blunt Trauma Abdomen/Blunt Trauma Chest265	Elhow fractures	51
Nitial fractures Joint fractures Hand fractures 74 Lower limb fractures 737 (70.59%) Femur fractures 137 Knee fractures 131 Tibia fractures 207 Ankle fractures 207 Ankle fractures 207 Pelvis and Acetabulum fractures 85 Foot fractures 126 Pelvis and Acetabulum fractures 51 Axial Skeleton (Spine Injuries) 73 (6.99%) Young Patients 134 (13.69%) Elderly patients 143 (13.69%) Paediatric Patients (≤14 years) 157 (15.03%) Distribution according to Gustilo Anderson Classification for open Fractures (n = 521) 71 (13.62%) Grade 1 71 (13.62%) 269 (51.63%) Grade 2 269 (51.63%) 143 Grade 3 143 13.40% Grade 3 143 13.60% Grade 3B 29 29 Grade 3C 9 9 Associated Injuries other than Orthopaedics (n = 462) 9 Hea	Enream fractures	30
Hand fractures74Lower limb fractures737 (70.59%)Femur fractures137Knee fractures131Knee fractures207Ankle fractures207Ankle fractures85Foot fractures126Pelvis and Acetabulum fractures51Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients744 (71.26%)Elderly patients744 (71.26%)Elderly patients143 (13.69%)Pactiaric Patients (≤14 years)71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3143 (34.80%)Grade 3143Grade 3B143Grade 3B143Grade 3B143Grade 3C9Associated Injuries other than Orthopaedics (n = 462)9Blunt Trauma Abdomen/Blunt Trauma Chest265Head Iniuries197	Wrist fractures	45
Instruction717 (70.59%)Lower limb fractures137Knee fractures131Knee fractures131Tibia fractures207Ankle fractures85Foot fractures126Pelvis and Acetabulum fractures126Pelvis and Acetabulum fractures51Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients744 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (≤14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3A143Grade 3A143Grade 3A29Grade 3C9Associated Injuries other than Orthopaedics (n = 462)9Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Hand fractures	74
Event fractures131Femur fractures131Tibia fractures207Ankle fractures207Ankle fractures85Foot fractures126Pelvis and Acetabulum fractures51Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients734 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (≤14 years)143 (13.69%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3A181 (34.80%)Grade 3A29Grade 3B29Grade 3C9Associated Injuries other than Orthopaedics (n = 462)Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Lower limb fractures	737 (70 59%)
Knee fractures131Tibia fractures207Ankle fractures207Ankle fractures85Foot fractures126Pelvis and Acetabulum fractures51Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients744 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (≤14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3143 (34.80%)Grade 3A143Grade 3B29Grade 3C9Associated Injuries other than Orthopaedics (n = 462)9Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Femily fractures	137
InitialInitialTibia fractures207Ankle fractures85Foot fractures126Pelvis and Acetabulum fractures51Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients74 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (≤14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 269 (51.63%)Grade 3181 (34.80%)Grade 3A143Grade 3B29Grade 3C9Associated Injuries other than Orthopaedics (n = 462)Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Knee fractures	137
InstructionInstructionAnkle fractures85Foot fractures126Pelvis and Acetabulum fractures51Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients74 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (≤ 14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures ($n = 521$)71 (13.62%)Grade 171 (13.62%)Grade 269 (51.63%)Grade 3181 (34.80%)Grade 3A29Grade 3B29Grade 3C9Associated Injuries other than Orthopaedics ($n = 462$)265Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Tible fractures	207
Find fractures126Foot fractures51Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients744 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (≤14 years)143 (13.69%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3181 (34.80%)Grade 3A143Grade 3B29Grade 3C29Associated Injuries other than Orthopaedics (n = 462)Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Ankle fractures	85
Pelvis and Acetabulum fractures15Axial Skeleton (Spine Injuries)73 (6.99%)Young Patients744 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (≤ 14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3181 (34.80%)Grade 3A143Grade 3B29Grade 3C92Associated Injuries other than Orthopaedics (n = 462)265Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Foot fractures	126
Axial Skeleton (Spine Injuries) 73 (6.99%)Young Patients 744 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (≤ 14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521) 71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3181 (34.80%)Grade 3A143Grade 3B29Grade 3C29Grade 3C29Associated Injuries other than Orthopaedics (n = 462)265Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Pelvis and Acetabulum fractures	51
Young Patients754 (71.26%)Young Patients744 (71.26%)Elderly patients143 (13.69%)Paediatric Patients (\leq 14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3143Grade 3A143Grade 3B29Grade 3C9Associated Injuries other than Orthopaedics (n = 462)9Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Axial Skeleton (Snine Iniuries)	73 (6 99%)
Total of the formulaThe (TL3.69%)Elderly patients143 (TL3.69%)Paediatric Patients (\leq 14 years)157 (TL3.69%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (TL3.69%)Grade 171 (TL3.62%)Grade 269 (51.63%)Grade 3181 (34.80%)Grade 3A143Grade 3B29Grade 3C9Associated Injuries other than Orthopaedics (n = 462)9Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Young Patients	744 (71 26%)
Paediatric Patients (\leq 14 years)157 (15.03%)Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3181 (34.80%)Grade 3A143Grade 3B29Grade 3C9Associated Injuries other than Orthopaedics (n = 462)Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Elderly patients	143 (13.69%)
Distribution according to Gustilo Anderson Classification for open Fractures (n = 521)71 (13.62%)Grade 171 (13.62%)Grade 2269 (51.63%)Grade 3181 (34.80%)Grade 3A143Grade 3B29Grade 3C9Associated Injuries other than Orthopaedics (n = 462)Blunt Trauma Abdomen/Blunt Trauma Chest265Head Injuries197	Parelia priorita (<14 years)	157 (15.03%)
Grade 1 71 (13.62%) Grade 2 269 (51.63%) Grade 3 181 (34.80%) Grade 3A 143 Grade 3B 29 Grade 3C 9 Associated Injuries other than Orthopaedics (n = 462) 265 Blunt Trauma Abdomen/Blunt Trauma Chest 265 Head Injuries 197	Distribution according to Custilo Anderson Classification for onen Fractures ($n = 521$)	107 (10100/0)
Grade 2 269 (51.63%) Grade 2 181 (34.80%) Grade 3 143 Grade 3B 29 Grade 3C 9 Associated Injuries other than Orthopaedics (n = 462) 265 Blunt Trauma Abdomen/Blunt Trauma Chest 265 Head Injuries 197	Grade 1	71 (13 62%)
Grade 3 181 (34.80%) Grade 3A 143 Grade 3B 29 Grade 3C 9 Associated Injuries other than Orthopaedics (n = 462) 9 Blunt Trauma Abdomen/Blunt Trauma Chest 265 Head Injuries 197	Grade 2	269 (51 63%)
Grade 3A 143 Grade 3B 29 Grade 3C 9 Associated Injuries other than Orthopaedics (n = 462) 9 Blunt Trauma Abdomen/Blunt Trauma Chest 265 Head Injuries 197	Grade 3	181 (34 80%)
Grade 3B 29 Grade 3C 9 Associated Injuries other than Orthopaedics (n = 462) 9 Blunt Trauma Abdomen/Blunt Trauma Chest 265 Head Injuries 197	Grade 3A	143
Grade 3C 9 Associated Injuries other than Orthopaedics (n = 462) Blunt Trauma Abdomen/Blunt Trauma Chest 265 Head Injuries 197	Grade 3B	29
Associated Injuries other than Orthopaedics (n = 462) Blunt Trauma Abdomen/Blunt Trauma Chest 265 Head Injuries 197	Grade 3C	9
Blunt Trauma Abdomen/Blunt Trauma Chest 265 Head Injuries 197	Associated Injuries other than Orthopaedics ($n = 462$)	5
Head Injuries 197	Blunt Trauma Abdomen/Blunt Trauma Chest	265
	Head Injuries	197

Table 2

Patients with open fractures who received basic trauma care before referral.

Patients referred from outside Chandigarh (open fractures) ($n = 269$)		
Wound dressing Received with wound dressing		(n) 139
Without dressing		130
Antibiotics given before referring		(n)
	Yes	67
	No	202

dedicated COVID care centres as a result of exponential increase in the COVID-19 cases. Subsequently, specialised trauma hubs (tertiary care centres) had to cater to this additional trauma cases besides managing the COVID-19 case load, despite the prediction of less number of trauma as a result of lockdown.

Pre-hospital emergency services in developing countries like

India are highly under-utilized.¹¹ Chandrashekhran et al. reported that inapt pre-hospital emergency care and first aid, led to augmented morbidity and mortality.¹² In the present study, a total of 125 patients were received without traction/splintage, 112 without any intravenous fluids, 92 without any dose of analgesic, 84 without any previous mention of vitals recording, 130 without

Table 3

Patients given basic trauma care before presentation to emergency department.

Total patients referred from outside Chandigarh ($n = 401$)	
Open fractures	(n = 269)
Intravenous fluids	194
Splintage/traction	185
Analgesics	203
Vitals checked	219
Antibiotics	67
Dressing of the wound	139
Closed fractures	(n = 132)
I/V fluid	91
Splintage/traction	91
Analgesics	106
Vitals checked	98

any wound dressing for open wounds and 202 without any dose of intravenous antibiotics for open wounds. There is an urgent need to upgrade the pre hospital care emergency services, besides maintaining well-planned referral service criteria, to prevent over burdening of the tertiary care setups, especially during the time of pandemic.^{5,11,13} Whereas developed countries have a well organised setup for providing pre hospital emergency care services, developing countries have for long lingered on with the inadequate pre hospital care services for several decades and hence not able to reduce morbidity and mortality related to trauma by providing swift and apposite pre-hospital care. $^{4-6,11}$ The basic care of the trauma patients including traction/splintage, wound dressing, recording of vitals at presentation, giving of intravenous fluids. antibiotics and analgesics at periphery healthcare centres was not done in a substantial number of trauma cases, received at our tertiary care centre. A provision of education for social care workers/ junior healthcare workers in managing the emergency cases and in providing basic pre hospital care should be emphasized.

As reported in the previous literature, delay in presentation/ delay in administration of antibiotics may lead to increased infection rates, further adding stress to the already saturated capacity of the hospital.^{14,15} Further, with a high percentage of open fractures being the Gustilo Anderson grade 3 (34.80%), possibility of patients getting infected remains quite high, if wound debridement and administration of intravenous antibiotics is delayed.^{16,17} Ketonis et al. and Schenker et al. in their respective studies have stated that there exists a correspondence between early administrations of intravenous antibiotics with diminished infection rates.^{14,15} Delay in presentation to the hospital along with the delay in the administration of the intravenous antibiotic was observed in the present study. The lack of public transportation services, strict enforcement of lockdown, economic implications associated with the lockdown and conversion of healthcare centres to dedicated COVID centres, may have led to the possible delay in the presentation to the hospital. In a previous study by Gupta et al. similar observations were reported during lockdown period compared to the pre lockdown period, simulating the results of the present study.¹

Conservative management in form of traction/splintage for closed fractures and debridement with traction/splintage for open grade 1 and 2 fractures, constituted the major form of treatment wherever possible, according to the evidence based medicine guidelines.^{19,20} Managing fracture in a conservative way as described by Sir John Charnley in his monograph in 1950 which relies on 3 basic principles; namely, reduction of the fracture, holding the fracture reduced and keeping it reduced in a supported environment (such as a cast or splint) till the fracture heals.²¹ Most of the upper limb injuries and the lower limb injuries below-knee can be managed conservatively and has shown good results in literature.²¹ Sarmiento functional bracing techniques conservatively managed tibial fractures, Thomas splint for managing femoral shaft fractures as propagated by Sir Robert Jones during the World War II are some of the few examples where the conservative manner has shown good to excellent results.²¹ Further, BOA and NHS in their revised guidelines have stressed on the use of conservative way of fracture management where possible and this can be applied to the paediatric trauma cases also.^{19,20} In addition with use of conservative management, less aerosol generation is present secondary to less use of diathermy, drilling procedures and pulse lavage and thus less chances of getting infected in the enclosed spaces such as emergency operation theatres.^{22,23}

With the COVID-19 cases rising again with each passing day in our country and another peak cannot be ruled out, along with an unparalleled global crisis, there is a need to constantly assess the orthopaedic surgical conditions at all levels and upgrade the necessary trauma care at all local, regional and national centres following the necessary evidence based medicine guidelines, so that the basic care is not compromised during these unprecedented times and the tertiary care setups are not over-compromised.²⁴ There is a constant need to keep the pace with increasing COVID cases, besides taking care that, the non COVID cases (trauma cases) are not compromised, preventing morbidities and mortalities. Because the peak of COVID-19 cases presented at different times in various countries around the world, much has been stated about the global community response to the virus in a short period of 6-8 weeks with a small number of cases and only few studies present long term observational research, in identifying epidemiologic factors and challenges amid response to the COVID-19 pandemic.¹⁸ The present study will not only summarize the deficiencies and better understanding of COVID-19, but will also cater to the future outbreaks and timely actions need to be taken, to tackle these extraordinary situations in a more optimal way.

5. Author's suggestions

- Streamlining transportation services and better coordination among adjacent states before referrals between healthcare centres.
- Diversifying the healthcare resources in all periphery setups would help in integrating the basic emergency care before referrals to the nearby trauma care setups.
- A formal training of healthcare workers in application of splintage, aseptic dressings, vitals recording, intravenous antibiotics and fluids at primary and secondary health centres can help in upgrading the pre-hospital services, preventing morbidities and mortalities in trauma patients and will reduce burden on tertiary healthcare facilities.

• Managing fractures in a conservative way, education of the healthcare workers pertaining how to wear and remove personal protective equipment (PPE), wherever time permits COVID testing for all patients before surgery, minimum staff in the theatre, avoidance of aerosol generating procedures and diversifying use of telemedicine and online out-patient services is the need of the hour.^{25,26}

6. Conclusion

Since the COVID-19 situation seems far from over, the prehospital trauma care will continue to be a challenge. However certain things like co-ordination between primary, secondary and tertiary health care level can be improved. Community level participation can be an effective measure to improve trauma care. Further, educating and boosting people for community level contributions without breaking COVID-19 protocols should be encouraged.

Funding

No funding received.

Ethical approval

Institutional ethical committee approval was taken before the start of research.

Ethical review committee statement

This study was conducted as per Ethical guidelines for biomedical research on human subject as given in "Declaration of Helsinki" and by Central Ethics Committee on Human Research of ICMR, New Delhi. A written and informed consent was taken from all. The interventions involved in this study were completely safe. Patients were given right to opt out of study at any time they want, without any impact on treatment being given to them.

A statement of the location

This study was conducted among the patients coming to Department of Orthopaedics of GMCH-32, Chandigarh.

CRediT authorship contribution statement

Ashwani Soni: was the conceptualized the study. Sudhir Kumar Garg: and. Ravi Gupta: MD did the review of literature. Parmanand Gupta: wrote the manuscript. Rajeev Kansay: did the proof reading. Akash Singhal: did the editing of the manuscript.

Declaration of competing interest

No conflict of interest for any author.

References

 Haagsma JA, Graetz N, Bolliger I, et al. The global burden of injury: incidence, mortality, disability-adjusted life years and time trends from the Global Burden of Disease study 2013. *Inj Prev J Int Soc Child Adolesc Inj Prev*. 2016;22(1):3–18. https://doi.org/10.1136/injuryprev-2015-041616.

- Mock C, Joshipura M, Arreola-Risa C, Quansah R. An estimate of the number of lives that could be saved through improvements in trauma care globally. World J Surg. 2012;36(5):959–963. https://doi.org/10.1007/s00268-012-1459-6.
- Sobrino J, Shafi S. Timing and causes of death after injuries. SAVE Proc. 2013;26(2):120–123. https://doi.org/10.1080/08998280.2013.11928934.
- WHO | Prehospital trauma care systems. https://www.who.int/violence_ injury_prevention/media/news/04_07_2005/en/. Accessed April 13, 2021.
- Henry JA, Reingold AL. Prehospital trauma systems reduce mortality in developing countries: a systematic review and meta-analysis. J Trauma Acute Care Surg. 2012;73(1):261–268. https://doi.org/10.1097/TA.0b013e31824bde1e.
- Nakahara S, Ichikawa M, Sakamoto T. Strengthening the healthcare system in low- and middle-income countries by integrating emergency care capacities. JMA J. 2019;2(2):123–130. https://doi.org/10.31662/jmaj.2018-0041.
- Ciapponi A, Lewin S, Herrera CA, et al. Delivery arrangements for health systems in low-income countries: an overview of systematic reviews. *Cochrane Database Syst Rev.* 2017;9(9):CD011083. https://doi.org/10.1002/ 14651858.CD011083.pub2.
- Saini N, Ranjan R, Jain VK, Shukla A. Pooling of neglected and delayed trauma patients - consequences of "lockdown" and "Unlock" phases of COVID-19 pandemic- A retrospective cohort analysis from a tertiary centre. J Clin Orthop trauma. 2021;21:101533. https://doi.org/10.1016/j.jcot.2021.101533.
- Thakore RV, Francois EL, Nwosu SK, et al. The Gustilo–Anderson classification system as predictor of nonunion and infection in open tibia fractures. *Eur J Trauma Emerg Surg.* 2017;43(5):651–656.
- Galvagno SM, Nahmias JT, Young DA. Advanced trauma life support® Update 2019: management and applications for adults and special populations. *Anes*thesiol Clin. 2019;37(1):13–32.
- Newberry JA, Bills CB, Matheson L, et al. A profile of traumatic injury in the prehospital setting in India: a prospective observational study across seven states. *Injury*. 2020;51(2):286–293. https://doi.org/10.1016/ j.injury.2019.11.020.
- Chandrasekharan A, Nanavati AJ, Prabhakar S, Prabhakar S. Factors impacting mortality in the pre-hospital period after road traffic accidents in urban India. *Trauma Mon.* 2016;21(3), e22456. https://doi.org/10.5812/traumamon.22456.
- Rasanathan K, Montesinos EV, Matheson D, Etienne C, Evans T. Primary health care and the social determinants of health: essential and complementary approaches for reducing inequities in health. J Epidemiol Community Health. 2011;65(8):656–660. https://doi.org/10.1136/jech.2009.093914.
- Ketonis C, Dwyer J, Ilyas AM. Timing of debridement and infection rates in open fractures of the hand: a systematic review. *Hand*. 2017;12(2):119–126.
 Schenker ML, Yannascoli S, Baldwin KD, Ahn J, Mehta S. Does timing to oper-
- Schenker ML, Yannascoli S, Baldwin KD, Ahn J, Mehta S. Does timing to operative debridement affect infectious complications in open long-bone fractures? A systematic review. J Bone Joint Surg Am. 2012;94(12):1057–1064. https:// doi.org/10.2106/JBJS.K.00582.
- Patzakis MJ, Harvey JRJP, Ivler D. The role of antibiotics in the management of open fractures. JBJS. 1974;56(3):532–541.
- Dellinger EP, Miller SD, Wertz MJ, Grypma M, Droppert B, Anderson PA. Risk of infection after open fracture of the arm or leg. *Arch Surg.* 1988;123(11): 1320–1327.
- Gupta R, Singhal A, Kapoor A, Dhillon M, Masih GD. Effect of COVID-19 on surgical management of open fractures and infection rates: a tertiary care experience in Indian set-up. J Clin Orthop trauma. 2021;12(1):16–21. https:// doi.org/10.1016/j.jcot.2020.10.050.
- Coronavirus » secondary care. https://www.england.nhs.uk/coronavirus/ secondary-care/. Accessed April 13, 2021.
- Covid boast management of patients with urgent orthopaedic conditions and trauma during the coronavirus pandemic. https://www.boa.ac.uk/resources/ covid-19-boasts-combined.html. Accessed April 13, 2021.
- Iyengar K, Vaish A, Vaishya R. Revisiting conservative orthopaedic management of fractures during COVID-19 pandemic. J Clin Orthop trauma. 2020;11(4): 718–720. https://doi.org/10.1016/j.jcot.2020.05.010.
- Sobti A, Fathi M, Mokhtar MA, et al. Aerosol generating procedures in trauma and orthopaedics in the era of the Covid-19 pandemic; what do we know? Surgeon. 2021;19(2):e42–e48. https://doi.org/10.1016/j.surge.2020.08.001.
- Jain VK, Upadhyaya GK, Iyengar KP, Patralekh MK, Lal H, Vaishya R. Impact of COVID-19 on clinical practices during lockdown: a pan India survey of orthopaedic surgeons. *Malaysian Orthop J.* 2021;15(1):55–62. https://doi.org/ 10.5704/MOJ.2103.009.
- Jain VK, Iyengar KP, Vaishya R. Differences between first wave and second wave of COVID-19 in India. *Diabetes Metab Syndr.* 2021;15(3):1047–1048. https://doi.org/10.1016/j.dsx.2021.05.009.
- Vaish A, Jain VK, Iyengar KP, Vaishya R. COVID-19: current knowledge and best practices for orthopaedic surgeons. *Indian J Orthop*. 2020;54(6):1–2. https:// doi.org/10.1007/s43465-020-00183-7.
- Jain VK, Vaishya R. COVID-19 and orthopaedic surgeons: the Indian scenario. Trop Doct. 2020;50(2):108–110. https://doi.org/10.1177/0049475520921616.