

# From across the globe – traumatic injuries are an international concern at the US-Mexico border wall

Sarah Lagan,<sup>1</sup> Laura Haines,<sup>1</sup> Gabriella Waters,<sup>1</sup> Jarrett Santorelli,<sup>2</sup>  
Allison E Berndtson ,<sup>3</sup> Jay Doucet,<sup>1</sup> Todd W Costantini,<sup>4</sup> Laura Adams <sup>2</sup>

► Additional supplemental material is published online only. To view, please visit the journal online (<https://doi.org/10.1136/tsaco-2023-001308>).

<sup>1</sup>University of California San Diego Health Sciences, La Jolla, California, USA

<sup>2</sup>Department of Surgery, Division of Trauma, Surgical Critical Care, Burns and Acute Care Surgery, University of California San Diego, San Diego, California, USA

<sup>3</sup>Surgery, University of California San Diego Health System, San Diego, California, USA

<sup>4</sup>Department of Surgery, University of California San Diego, La Jolla, California, USA

## Correspondence to

Dr Laura Adams; ladams@health.ucsd.edu

## ABSTRACT

**Introduction** Socio-economic and political events of recent years have caused a significant increase in immigrants attempting to illegally cross the United States (US)-Mexico border. While a 30-foot border wall separates the US and Mexico, immigrants from around the world have used this location as their point of entry to the US. These border crossings have led to a dramatic increase in major trauma resulting in increased inpatient resource utilization and the need for comprehensive hospital services. The aim of this study was to describe the nationality of injured immigrants admitted to a Trauma Center serving a segment of the US-Mexico border wall and to report their ultimate destinations after discharge.

**Methods** We performed a retrospective review of patients admitted to an academic, Level 1 Trauma Center after injury at the US-Mexico border wall from 2021 to 2022. Demographic information was obtained from the trauma registry. The electronic medical record was searched to identify each patient's self-reported country of origin. Patients' nationality was then stratified by region of the world to understand geographic representation of border injury admissions.

**Results** We identified 597 patients injured while crossing the US-Mexico border wall representing 38 different countries. The mean age of patients was 32.2±10.4 years and 446 (75%) were male. Most patients (405, 67.8%) were Mexican, followed by 23 (3.9%) patients from Peru, 17 (2.8%) patients from India, 14 (2.3%) patients from El Salvador, 13 (2.2%) patients from Cuba and 12 (2.0%) patients from Jamaica. When considering regions of the world other than Mexico, patients were most commonly from Africa, South America and Central America.

**Conclusion** The increased volume of trauma associated with the US-Mexico border wall is a humanitarian and health crisis. (1) The diverse national origin of patients admitted after injury from border wall falls has shed new light on the social and interpreter services needed to care for these border injury patients and the challenges that exist in their post-discharge care.

## INTRODUCTION

As the number of migrants attempting to cross the United States (US)-Mexico border has increased, so too has the number of injuries sustained from border wall falls.<sup>1</sup> Trauma centers in the area of the US-Mexico border in California<sup>1</sup> Texas<sup>2</sup> and Arizona<sup>3</sup>, routinely treat patients who sustain injuries from border falls. These injuries can be associated with significant disability and even death.<sup>1,4</sup>

The toll of injuries caused by border wall falls has increased significantly in the wake of the border wall expansion.<sup>1</sup> The border wall has been extended by a length of 50 miles and raised to a height of 30 feet in Southern California.<sup>1</sup> Since the 2019 completion of the border wall expansion, trauma centers have reported an increase in the incidence, severity, and length of hospital stay for blunt cerebrovascular<sup>5</sup> orthopedic<sup>4,6</sup> and spine injuries.<sup>7</sup>

Multidisciplinary services are needed to effectively treat patients who present with complex injuries sustained at the border. Patients often require multispecialty trauma care, multiple procedures, operative interventions, and physical and occupational therapy – all of which necessitate the use of significant hospital resources.<sup>4</sup> Despite the high level of care required during their hospitalization, many patients do not receive appropriate follow-up care post-discharge.<sup>4</sup> In San Diego, for example, most border fall patients are discharged with relatives or to border custody, despite significant disability that would typically require inpatient rehabilitation.<sup>4</sup> In El Paso, Texas, the trauma system noted a similar trend and described a mere 12% patient follow-up in clinic despite more than 90% of these patients having undergone surgery.<sup>8</sup> While patients require a high level of hospital care, little information is known about their medical course after discharge.

While the nature of injuries sustained at the border and the impact on hospital resources have already been explored, there is little information regarding patients' countries of origin and their ultimate destination after discharge. At present, US Customs and Border Patrol (CBP) is the main source for this data on migrant nationality and destinations.<sup>9</sup> Although CBP releases information on the nationality of migrants, there has been no characterization of these nationalities, primary languages and discharge destinations of patients who present to trauma centers with injuries sustained at the border. Given the increasing frequency and high severity of injuries associated with border falls, this demographic information is crucial for providing adequate social services, language interpretation and discharge instructions to patients. The aim of this study was thus to describe the nationality of injured migrants admitted to the trauma center serving the San Diego segment of the US-Mexico border wall. We hypothesized that border fall patients would present from countries from around the world, consistent with nationality trends from CBP reports, with discharge to destinations across the United States.

© Author(s) (or their employer(s)) 2024. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

**To cite:** Lagan S, Haines L, Waters G, et al. *Trauma Surg Acute Care Open* 2024;**9**:e001308.

**Table 1** Patient Demographics

Age (y), mean (SD)	32.2 (10.4)
Sex	
Male	446 (74.7%)
Female	151 (25.3%)
ISS, mean (SD)	8 (6.8)
Hospital length of stay (days), median (IQR)	3 (2,7)
IQR, interquartile range; ISS, give details; SD, standard deviation; y, years.	

## METHODS

We conducted a retrospective review of patients admitted after injury at the US-Mexico Border wall to our Level 1 Trauma Center during a 2 year period between January 1, 2021 and December 31, 2022. Data sources included the trauma registry as well as the electronic medical record. We collected demographic data, hospital length of stay, injury severity score (ISS), patients' home country of origin, patients' preferred primary language, and the patients' planned discharge destination. The patient's home country of origin as well as discharge destination were obtained from the electronic medical record utilizing case manager and social work documentation. The patient's home country of origin was then stratified by region of the world to understand the geographic representation of border injury admissions. Preferred language is routinely collected during admission and entered into our electronic medical record.

Discharge planning was performed by our inpatient case management and social work team. The patient's planned discharge destination was found in the medical record. Discharge destination within California was grouped by regions including Northern California, Los Angeles, and San Diego. For patients discharged to a destination outside of California, the planned discharge destination state was collected.

Data are reported as either mean (standard deviation [SD]) or median (interquartile range [IQR] reported as first quartile, third quartile) where appropriate. This study was approved by the University of California San Diego Institutional Review Board.

## RESULTS

A total of 597 patients were admitted after falling from the US-Mexico border wall between 2021 to 2022. Demographic data are listed in [table 1](#). The median age was 32 years; 74.7% were male and 25.3% were female. The median hospital length of stay (LOS) was 3 days (IQR 2, 7) with a mean ISS of 8 (SD 6.8).

Patients came from 38 different countries ([table 2](#)). A majority of these patients (405, 67.8%) were Mexican nationals, followed by 23 (3.9%) from Peru, 17 (2.8%) from India, 14 (2.3%) from El Salvador, 13 (2.2%) from Cuba and 12 (2.0%) each from Jamaica and Somalia. Regions of the world represented by these patients include North America (Mexico), Central and South America, the Caribbean, Africa, Asia, Europe and the Middle East ([figure 1](#)). After Mexico, the most common regions were Africa (7.9%), South America (7.0%) and Central America (5.7%, [table 3](#)).

There were 22 different primary/preferred languages spoken by these patients. The most common preferred languages spoken were Spanish (80%), English (10%), Punjabi (2%) and Somali (1.5%). When the provider did not speak the preferred language of the patient, video, phone or in-person interpreter services were utilized. There were four cases in which no interpreter services were available in the patient's preferred language:

**Table 2** Countries of Origin

Country	N	Percent
Mexico	405	67.8%
Peru	23	3.9%
India	17	2.8%
El Salvador	14	2.3%
Cuba	13	2.2%
Jamaica	12	2.0%
Somalia	12	2.0%
Colombia	10	1.7%
Ghana	10	1.7%
Guatemala	10	1.7%
Bangladesh	6	1.0%
Mauritania	6	1.0%
Cameroon	5	0.8%
Nicaragua	5	0.8%
Brazil	4	0.7%
Honduras	4	0.7%
United States of America	4	0.7%
unknown	4	0.7%
Venezuela	4	0.7%
Afghanistan	3	0.5%
Nepal	3	0.5%
Eritrea	2	0.3%
Ethiopia	2	0.3%
Guinea	2	0.3%
Nigeria	2	0.3%
Senegal	2	0.3%
Sierra Leone	2	0.3%
Belize	1	0.2%
Benin	1	0.2%
Chile	1	0.2%
China	1	0.2%
Egypt	1	0.2%
Iraq	1	0.2%
Ivory Coast	1	0.2%
Pakistan	1	0.2%
Romania	1	0.2%
Russia	1	0.2%
Turkey	1	0.2%

Amuzgo, Bengali, Fulani, and Kotokoli (online supplemental table 1).

The majority of patients (74%) were discharged 'home' within the United States; discharge destinations, however, were dispersed widely throughout the country ([figure 2](#)). California was the most common state of discharge (49%), with 15.2% of all patients discharged within the San Diego region (San Diego, Imperial, and Orange counties), and 20.4% of patients discharging to Los Angeles County or the Inland Empire. New York was the destination for 5.2% of patients, followed by Florida (3.2%, [table 4](#)). Outside of 'home' discharge destinations within the United States, 20% were discharged to CBP, 3.9% were discharged to Mexico, and 1% of the discharge destinations were unknown/lost to follow-up. Of the patients who discharged in the United States, most were discharged with family or friend support (94.8%), with a small number discharging to religious, non-profit, or cultural organizations.



**Figure 1** Regions of origin for patients admitted after a fall at the US-Mexico border wall. MENA, Middle East and North Africa.

## DISCUSSION

The aim of this study was to describe patient nationalities and discharge destinations of injured migrants admitted to a trauma center serving the San Diego County segment of the US-Mexico border wall. We observed that most patients were from Mexico (67.8%) and their preferred language was Spanish (80%). In addition to Mexico, patients came from 37 different countries and spoke 21 other preferred languages besides Spanish. This data shed new light on the social and interpreter services needed

to care for these border injury patients and the challenges that exist in their post-discharge care.

Our study is the first to investigate detailed demographics of border fall injury patients at this segment of the border wall and we observed a wider range of nationalities in comparison to prior research. Only one previous study has examined the nationality of patients presenting with border fall injuries.<sup>8</sup> Of the 498 patients presenting to a Level 1 Trauma Center in El Paso, Texas, between 2016 and 2021, all patients identified were Hispanic or Latino and came from 13 countries in Central and South America, with the exception of one patient from China.<sup>8</sup> While increasing rates of injuries have been noted along different segments of the border wall from California, Arizona and Texas, our study highlights differences in patient population based on the San Diego border wall segment. This study also provides a foundation for further research by characterizing the diverse nationalities and multidisciplinary services needed to treat these patients.

The patients included in this analysis constitute just a fraction of migrants crossing the Southwest border, which includes an almost 2000 mile border stretch between San Diego and the Rio Grande Valley. Per CBP reports, 2022 had the largest number of Border Patrol encounters at the Southwest Border to date with migrants from Mexico (34%, or 738 780 encounters), Guatemala (10%), Cuba (10%), Honduras (9%), and Venezuela (9%).<sup>10</sup> The most common nationalities of patients in our sample were Mexico, Peru, India, El Salvador, and Cuba. Patients from Mexico represented a larger percentage (67.8%) in comparison to the number of migrants noted by CBP encounters. While the CBP record of migrants at the San Diego segment of the border tend to include a higher percentage of Mexican nationals than other segments of the Southwest border,<sup>9</sup> our patients also represent populations not always captured in broader national data. India was the third most common nationality with Punjabi being the most common preferred language spoken by these patients in this analysis.

**Table 3** Regions of the World Represented

Region	Countries represented		
Mexico	1		
Africa	12		
Asia	4		
Caribbean	2		
Europe	2		
Central America	5		
South America	5		
MENA (Middle East and North Africa)	5		
Region	Countries represented	Patients	Percentage of patients from region
Africa	12	47	7.9
Asia	4	27	4.5
Caribbean	2	25	4.2
Central America	5	34	5.7
Europe	2	2	0.3
MENA (Middle East and North Africa)	5	7	1.2
Mexico	1	402	67.8
South America	5	42	7.0
United States of America	1	4	0.7
Unknown	n/a	4	0.7
n/a, not applicable.			



**Figure 2** Most common discharge destinations for patients admitted after border wall fall. LA, Los Angeles; SD, San Diego.

The majority (85%) of patients in this study were discharged outside of the San Diego area, despite an average ISS of 8. We have previously shown that the injury patterns of these border fall injury patients would typically require post-discharge rehabilitation or physical therapy.<sup>4</sup> Follow-up rates were low even among patients discharged to San Diego, consistent with the small but growing body of literature on this patient-population. As Williams et al., (2023) report, only 1 out of 7 patients discharged with an external fixator for traumatic leg fracture returned to a follow-up visit to have their fixator removed; the rest were lost to follow-up and it is unclear where and how patients might have removed external fixation devices. Prior research focused on patients with border fall injuries has demonstrated follow-up rates below 20% at trauma centers in both San Diego (4),<sup>4</sup> (4),<sup>7</sup> and Texas.<sup>8</sup> This lack of follow-up care means that post-operative complications might go unrecognized and rehabilitative therapy might be deferred, all hampering the recovery from potentially disabling injuries.

Our findings characterize the need for trauma informed and language-concordant patient care. The wide array of primary and preferred languages among patients in this study underscores the need for finding ways to incorporate language services into trauma evaluation and treatment. High-quality language interpretation, which includes certified medical interpreters (CMI) and bilingual healthcare providers, has been shown to improve communication, quality of patient care and overall outcomes.<sup>11 12</sup> The trauma center where this study was conducted offers multiple modalities of language interpretation including in-person, video and telephone interpretation services, all of which were utilized in this sample. While video and telephone interpretation services have enhanced the accessibility of CMI, the fast-paced, high intensity setting of a trauma bay or emergency department still poses challenges for patients with limited English proficiency. Previous research has shown that Spanish-speaking patients are less likely to receive a

comprehensive trauma evaluation<sup>13</sup> and more likely to be readmitted to the hospital.<sup>14</sup> Given that these challenges have been documented for patients who speak languages for which CMIs and professional interpretation services *are* available, it is plausible that the difficulties of language-concordant, comprehensive trauma evaluation are even more significant among patients whose preferred language is not spoken by any CMI service. We have encountered some local dialects and indigenous languages that are not provided by CMI services, including video-based CMI services, such as Amuzgo (indigenous language spoken in Oaxaca, Mexico), Fulani (spoken in areas of West Africa and in a patient from Senegal), and Kotokoli (spoken by a patient from Ghana). These situations require an ongoing need for creative solutions to augment care, whether through incorporating friends or family, artificial intelligence that could provide basic translation,<sup>15</sup> or connecting with cultural groups.

While this study is the first to characterize both nationality and discharge destinations of patients sustaining injuries at this specific segment of the US-Mexico border wall, the data presented has its limitations. Our analysis is limited to one trauma center that serves one segment of the US-Mexico border wall. As previously described, the patient demographics differ significantly based on border wall segment, and our results therefore cannot be extrapolated to trauma centers serving different segments of the border wall. Additionally, our sample includes only patients that presented to our trauma center. Patients who sustained injuries along the same segment of border wall may have presented to different area hospitals and are not included in our analysis. Finally, our data only captures patients who sustained injuries between 2021 and 2022. We thus are not able to identify longer term trends in nationalities. We hope to build on this work in coming years as patients from across the world continue to incur significant injury at the border.

Another significant limitation is that our analysis is limited to the EMR used at one medical center. It is unclear what follow-up



**Table 4** Discharge Destination

State	N	Percent
California (LA+inland empire)	122	20.4%
CBP/Law enforcement custody	121	20.3%
California (San Diego+Imperial + Orange)	91	15.2%
California (Northern)	80	13.4%
New York	31	5.2%
Mexico	23	3.9%
Florida	19	3.2%
New Jersey	8	1.3%
Ohio	8	1.3%
Texas	8	1.3%
Unknown/Lost to follow-up	6	1.0%
Minnesota	6	1.0%
Pennsylvania	6	1.0%
Washington	6	1.0%
Oregon	5	0.8%
Colorado	4	0.7%
Connecticut	4	0.7%
Maryland	4	0.7%
Utah	4	0.7%
Passed away	4	0.6%
Arizona	3	0.5%
Indiana	3	0.5%
Massachusetts	3	0.5%
Nevada	3	0.5%
North Carolina	3	0.5%
Virginia	3	0.5%
Michigan	2	0.3%
Nebraska	2	0.3%
Tennessee	2	0.3%
Washington DC	2	0.3%
Wisconsin	2	0.3%
Arkansas	1	0.2%
Delaware	1	0.2%
Idaho	1	0.2%
Illinois	1	0.2%
Kansas	1	0.2%
New Hampshire	1	0.2%
Oklahoma	1	0.2%
Wyoming	1	0.2%
Colombia	1	0.2%

CBP, Customs and Border Patrol; LA, Los Angeles.

care patients might have pursued after discharge and whether they accessed healthcare for their injuries in the city or state to which they were discharged. Regardless, the lack of follow-up care highlights the need for careful clinical consideration on discharge, with particular attention paid to detailed written and verbal instructions, discharge with all medications, and use of absorbable sutures when possible given the challenges to post-operative follow-up.

Overall, our study characterizes the global nature of the public health and humanitarian crisis unfolding at the southern United States border and demonstrates the diverse patient population associated with border fall injuries – represented by five continents, 38 countries, 22 languages, and cross-country discharge destinations. This work is timely, given the approval of new border wall construction in Texas which was announced on

October 5, 2023.<sup>16</sup> Previous work has shown that increased border wall height is associated with increased incidence, severity and length of hospital stay for injuries sustained in border falls.<sup>14, 7</sup> As many patients do not stay in the region of the discharge hospital, providers may see these patients follow-up in communities remote from the US-Mexico border. In treating patients from across the world with such injuries, our work highlights the need for culturally conscious, multilingual care with recognition of follow-up difficulties.

**Contributors** SL, literature search, data collection, data analysis, writer; LA, data analysis, writer, critical revisions; TC, literature search, writer, critical revisions, data collection, data analysis; LH, literature search, data collection, data analysis, critical revisions; AB, critical revisions; JS, critical revisions; GW, data collection; JD, critical revisions.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Map disclaimer** The inclusion of any map (including the depiction of any boundaries therein), or of any geographic or locational reference, does not imply the expression of any opinion whatsoever on the part of BMJ concerning the legal status of any country, territory, jurisdiction or area or of its authorities. Any such expression remains solely that of the relevant source and is not endorsed by BMJ. Maps are provided without any warranty of any kind, either express or implied.

**Competing interests** None declared.

**Patient consent for publication** Not applicable.

**Provenance and peer review** Not commissioned; internally peer reviewed.

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

#### ORCID iDs

Allison E Berndtson <http://orcid.org/0000-0002-7299-453X>

Laura Adams <http://orcid.org/0000-0001-6227-6764>

#### REFERENCES

- Liepert AE, Berndtson AE, Hill LL, Weaver JL, Godat LN, Costantini TW, Doucet JJ. Association of 30-ft US-Mexico border wall in San Diego with increased migrant deaths, trauma center admissions, and injury severity. *JAMA Surg* 2022;157:633–5.
- Palacio CH, Cruz B, Vanier C, Cano J, Scott BG. The mechanism and pattern of injuries of Undocumented immigrants crossing the Texas-Mexico border along the Rio Grande valley. *Inj Epidemiol* 2021;8:58.
- Ramey WL, Walter CM, Zeller J, Dumont TM, Lemole GM, Hurlbert RJ. Neurotrauma from border wall jumping: 6 years at the Mexican-American border wall. *Neurosurgery* 2019;85:E502–8.
- Williams EE, Haaland CB, Haines LN, Dwight KD, Gonzalez AGV, Doucet JJ, Schwartz AK, Kent WT, Costantini TW. Falling from new heights: traumatic fracture burden and resource utilization after border wall height increase. *Surgery* 2023;174:337–42.
- Tenorio A, Brandel MG, Produturi GR, McCann CP, Wali AR, Bravo Quintana J, Doucet JJ, Costantini TW, Ciacci JD. Novel Association of blunt cerebrovascular injuries with the San Diego–Mexico border wall height extension. *World Neurosurgery* 2023;177:e710–5.
- Nicholson T, Polmear M, VanTienderen R, Adler A, Blair J. Cost of Orthopaedic injuries sustained during Unscheduled crossings of the U.S.-Mexico border treated at a single level 1 trauma center. *JOrthoBusiness* 2022;2:5–11. Available: <http://www.jorthobusiness.org/index.php/jorthobusiness/issue/view/5>.
- Tenorio A, Brandel MG, Produturi GR, McCann CP, Doucet JJ, Costantini TW, Ciacci JD. The impact of the Mexico-San Diego border wall extension on spine injuries: a retrospective cohort review. *J Travel Med* 2022;29.

- 8 Polmear MM, Nicholson TC, Blair JA, Thabet AM, Adler AH, Rajani R. Injuries sustained with falls from height in crossing the United States-Mexico border at a level I trauma center: A prospective cohort study. *J Am Acad Orthop Surg Glob Res Rev* 2023;7.
- 9 Southwest land border encounters | U.S. customs and border protection. Available: <https://www.cbp.gov/newsroom/stats/southwest-land-border-encounters> [Accessed 27 Aug 2023].
- 10 Singer A, Bryan SL. Border patrol encounters at the Southwest border: fact sheet. Fact Sheet.
- 11 Flores G. The impact of medical interpreter services on the quality of health care: a systematic review. *Med Care Res Rev* 2005;62:255–99.
- 12 Karliner LS, Jacobs EA, Chen AH, Mutha S. Do professional interpreters improve clinical care for patients with limited English proficiency? A systematic review of the literature. *Health Serv Res* 2007;42:727–54.
- 13 Kundu S, Costantini TW, Doucet JJ, Berndtson AE. Who is informed of trauma informed care? patients' primary language and comprehensiveness of initial trauma assessment. *J Trauma Acute Care Surg* 2023;94:45–52.
- 14 Gallagher RA, Porter S, Monuteaux MC, Stack AM. Unscheduled return visits to the emergency Department: the impact of language. *Pediatr Emerg Care* 2013;29:579–83.
- 15 Kohnke L, Moorhouse BL, Zou D. Chatgpt for language teaching and learning. *RELC Journal* 2023;54:537–50.
- 16 Department of Homeland Security. Determination pursuant to section 102 of the illegal immigration reform and immigrant responsibility act of 1996. 2023. Available: [https://public-inspection.federalregister.gov/2023-22176.pdf?utm\\_campaign=pi+subscription+mailing+list&utm\\_source=federalregister.gov&utm\\_medium=email](https://public-inspection.federalregister.gov/2023-22176.pdf?utm_campaign=pi+subscription+mailing+list&utm_source=federalregister.gov&utm_medium=email)