Volume 2 • Issue 1 • 2020

Research Article

Journal of Orthopaedic and Trauma Care

Nightstick Fractures: Uniting Fractured Communities

MONIZ Sheldon*, Wall Benjamin, Frost Jeanette, Mattin Andrew and Frost Nicholas

Orthopaedics Registrar, Royal Perth Hospital, WA, Australia

***Corresponding Author:** MONIZ Sheldon, Orthopaedics Registrar, Royal Perth Hospital, WA, Australia.

Received: June 20, 2020; **Published:** June 29, 2020

Abstract

Objectives: Report the incidence and demographic features of isolated ulna shaft 'nightstick' fractures as a surrogate for interpersonal violence within the Western Australian community.

Design: This is a retrospective observational study. Cases were identified via an audit of hospital admission codes. Imaging was reviewed and isolated ulna shaft fracture was confirmed by a member of the study team.

Setting: Western Australia-Rural/Remote/Metropolitan locations

Participants: Adult patients with isolated transverse ulna shaft fractures admitted between 01 January 2008 and 31 December 2018 to a tertiary public hospital in Western Australia were included.

Main outcome measures: Ulna 'nightstick' fracture as a proportion of all forearm fractures; relative risk of injury based on metropolitan/ rural status, gender and Aboriginal or Torres Strait islander status.

Results: 406 patients (48 male, 358 female) met the criteria for inclusion in this study. The mean age at admission was 35 (range 18-81). 249 patients presented from metropolitan locations and 157 from rural or remote locations. There were 358 females and 48 males. 184 persons identified as Aboriginal or Torres Strait Islanders.

Conclusions: Ulna nightstick fractures represent 2% of fracture presentations in Western Australia. Women, those living in rural or remote locations and those identifying as Aboriginal or Torres Strait islander are at increased risk of this injury. We believe this reflects a disproportionate burden of interpersonal violence within these populations. Resources should be directed toward addressing the underlying causes of violence within our communities and supporting those who present with this injury.

Trial Registration: Western Australian Aboriginal Health Ethics Committee HREC917

Introduction

Isolated ulnar shaft fractures (colloquially termed 'nightstick' fractures, or previously 'parry' fractures) are usually the result of a direct blow to the forearm when it is raised to protect the face. (1, 2) Due to this injury mechanism, isolated ulnar shaft fractures have been used as an indicator of interpersonal violence within the community. (1) The term 'interpersonal violence' encompasses family and domestic violence as well as broader community violence. (3)

Over the past decade domestic violence has been recognized in Australia as a major public health issue.(4-6) This is despite the incidence of domestic and family violence being grossly underreported, meaning the true extent of the problem is likely even greater than the figures that are currently available.(6) A recent report from the Australian Institute of Health and Wellbeing (AIHW) estimated that one in six women and one in sixteen men in Australia are affected by domestic violence.(6-8)

There are major barriers to victims disclosing assaults or abuse including fear, denial, disbelief, having an emotional bond to the perpetrator, social isolation and a feeling that they will be disbelieved or services will not be able to help them. It can be justifiably speculated that people with isolated ulnar shaft fractures caused by interpersonal or domestic violence are likely to not only have suffered an isolated injury but also be subject to chronic and repeated acts of violence as well as emotional and psychological abuse.

An Australian Institute of Health and Wellbeing (AIHW) report in 2019 recorded an increasing incidence in violent offences against people including both family and non-family assaults. (6) In rural and remote areas, the incidence of domestic violence is estimated to be even higher in comparison to suburban areas. This difference is even more significant in the Indigenous Australian population (9-11).

Interpersonal violence can create devastating and lifelong consequences for victims and families, the effects on the mental and physical health of victims are well documented (12, 13). The true depth and extent of the consequences domestic violence has on various aspects of a person's life however, is impossible to measure. (12, 13)

Forearm fractures are relatively common, however studies of the epidemiology of diaphyseal fractures of the forearm are scant. (5) The incidence of diaphyseal fractures of the radius, ulna, or both is reported to be approximately 1 to 10 per 10,000 persons per year, with rates varying with age and gender. (5) Studies have shown a bimodal distribution with the highest incidence among young males aged 10 to 20 years (10:10,000) and females over age 60 (5:10,000). (5, 14, 15) These peaks are attributed to the higher incidence of risk taking behaviours/violence in young men and the incidence of osteoporosis/ bone fragility in post-menopausal women. (14, 15)

Isolated ulna shaft fractures are often considered a simple injury and are rarely associated with ligamentous disruption/dislocation of the joint.(2, 16) They can be divided into two main groups; either a stable or unstable fracture pattern, which is indicated by displacement.(2, 16, 17) Fractures are considered stable when the displacement is less than 50% of the cortical width and there is no injury to the interosseous membrane, therefore they do not require surgical fixation.(2, 16, 17) If significant displacement exists manipulation under anaesthesia, or, more commonly, open reduction and internal fixation, is indicated.(17, 18) While some isolated ulnar shaft fractures may be treated on an outpatient basis, many require referral and admission to a tertiary hospital for surgery.(1)

Interpersonal violence, and particularly domestic violence is a prevalent issue in Australian society which largely effects the most vulnerable members of our population including Indigenous Australian's, women and children. The significance of the issue in our community is deeply evident and the importance of change in order to help improve the lives of victims and families involved cannot be underestimated.

Due in part, to under-reporting by victims, data and knowledge surrounding the demographics of interpersonal violence within Western Australia is lacking.(6) A better understanding of the factors surrounding this critical issue is essential for it to be adequately addressed.(6) Estimates of the prevalence of interpersonal violence, and information about the demographics of at risk populations will be obtained from this retrospective review of hospital records.

We aim to contribute to and improve the overall understanding surrounding scale of interpersonal violence resulting in physical injury within Western Australia. We hope this will in turn, result in decreased prevalence and incidence of interpersonal violence as initiatives and policies can be created to target the at-risk areas.

To date, there has not been a published paper describing the incidence, demographic features and cost of isolated ulna shaft (nightstick). We believe such a publication would draw attention to the burden of violence (often including interpersonal violence) within our community. It is our intent that the findings of this project will further inform future collaborative initiatives for those experiencing high rates of interpersonal violence by identifying which demographic groups are at greatest risk.

Methods

This is a retrospective observational study.

Data was included from patients meeting the following criteria:

Inclusion Criteria

1. Diagnosed with and treated for isolated transverse ulna shaft fracture as a patient triaged through a public emergency department within the time period of 01 January 2008 to 31 December 2018.

Exclusion criteria

1. Multiple injuries
2. Diagnosis outside of the above dates
3. Age <18 years

Cases were identified with assistance from the Hospital Business Centre; identifying cases with the ICD codes S5220 and S5221.

The following data was collected and deidentified:

- Age/DOB
- Gender
- Ethnicity
- Post code of listed residence/Local government area
- Date of diagnosis
- Radiographic diagnosis
- Management (Non-operative/operative)
- Follow up type (RPH outpatient clinic/telehealth/local services)
- Account balance (Costing)

Eligible patients were identified via the above methods and criteria. Data collection occurred via retrospective chart review of physical medical records, with imaging results confirmed via the WA Health Department iCM and IMPAX software. The total number of forearm injuries treated during this period were identified by ICD codes and the proportion of isolated transverse ulna shaft injuries identified. The data collected included only that collected during routine clinical practice, and already available in the medical record and WA Health databases (IMPAX, iCM systems).

Correlation to rural status was completed using data from the Australian Bureau of Statistics (ABS) based on post code/local government areas. (19) Rural data statistics were extracted from the ABS publication "Census of population and housing 2016", which included basic demographic data across all the health regions. (19) This publication is in the public domain. No participant was contacted for the collection of additional information.

Results

A total of 406 patients (48 males, 358 females) met the criteria for inclusion in this study. The mean age at admission for fracture was 35 (range 18-81). Of the 406 patients, 184 identified as Aboriginal or Torres Strait Islander within this cohort. Number of cases per local government area was 249 within the metropolitan area, 11 in the Goldfields, 23 in the Wheatbelt, 15 in the South West, 22 in the Pilbara, 13 in the Midwest and 47 in the Kimberley. Of the rural patients 84 of the 131 patients identified as ATSI with 59 of these patients being female, of the rest of the rural patients only 9 of the 47 where female. The prevalence of isolated ulna shaft fractures (per 100,000) within each region was: Metropolitan 12, Goldfields 18, Wheatbelt 30, South West 7, Pilbara 33, Mid-West 20, Kimberley 129. For patients who sustained an isolated ulna shaft fracture the average cost of treatment per patient was $13948.

Picture 1: *Incidence of cases in Western Australia.*

Picture 2: *Incidence of male (blue) vs female (red) cases in Western Australia.*

Picture 3: *Incidence of ATSI (blue) vs non-ATSI (red) cases in Western Australia.*

Picture 4: *Incidence of ATSI (blue) vs non-ATSI (red) cases in Metropolitan Western Australia.*

	Cases	Population	Prevalence Per 100,000	Rural Risk
Perth Metro	249	2022044	12.31	1.00
Goldfields	11	61900	17.77	27.41
Wheatbelt	23	75000	30.66	3.26
South West	15	231552	6.47	10.22
Pilbara	22	66300	33.18	35.68
Mid West	23	67800	19.17	5.53
Kimberley	47	36230	129.72	21.16

Table 1: *Prevalence and associated risk of isolated ulna shaft fracture by WA region.*

Discussion

This dataset identifies several groups as being at a particularly high risk for isolated ulna shaft fractures. These include females, those identifying as Aboriginal & Torres Strait Islander, and those living in rural and remote location in Western Australia. The results of this study have a range of implications for both individuals and communities.

According to the most recent Australian census data, females represented 50% of the Western Australian population, in comparison in our study females represent 89% of patients with isolated ulna shaft fracture. This equates to approximately the incidence in females being 5x more than males. From this it can be suggested that females are much more vulnerable to interpersonal violence in Western Australia compared to males.

From our results, 46% of all patients with isolated ulna shaft fractures identified as ATSI, compared to just 3% of the Australian population according to the most recent census data.(19) Aboriginal and Torres Strait Islanders (ATSI) are therefore found to be largely over-represented in those presenting with isolated ulnar shaft fractures. With our knowledge of the close link between isolated ulna shaft fractures and interpersonal violence, the stark extensiveness of this issue of in ATSI people becomes glaringly evident. Drawing attention to this issue is an important first step in the development of collaborative initiatives which aim to reduce such violence and enhance the health and welfare of ATSI people. It also further highlights that ASTI people face morbidity and compromised wellbeing far in excess of that of the non-Indigenous community. This knowledge has the ability to aid in the development of programs to help facilitate 'Closing the gap'

Of the total population within Western Australia it is estimated that approximately 79% of the total population resides within the metropolitan region.(19) Of the total number of isolated ulna shaft fractures in this study, only 30% occur in individuals from the Perth metropolitan region. This means that 70% of isolated ulna shaft fractures have occurred in the 21% of the Western Australian population who reside in rural and remote regions. From this we can infer that the issue of interpersonal violence is exceedingly more prevalent in rural and remote communities. When specifically looking at the ATSI population, nearly all of these injuries have occurred within a rural or remote setting.

Whilst it is widely accepted that domestic violence is a widely prevalent issue throughout Australia, this data demonstrates just how significant the burden is for women, for ATSI people, and for those living within rural and remote Western Australia specifically.

By increasing the awareness of health professionals in recognising patient groups who are most vulnerable to domestic violence, this may in turn prompt treating health professionals to complete a more comprehensive patient assessment, both physically and psychologically, in patients presenting with isolated nightstick fractures.

It is hoped that the findings of this study can lead to the creation and implementation of culturally sensitive and appropriate programs and outreach groups to target those most at risk of interpersonal violence. This would create the potential to have a significant impact on reducing the overall rate of interpersonal violence in those most vulnerable, as well as providing much needed assistance to victims and their families.

This study has highlighted the enormous level of discrepancy within the Western Australian population in regard to those most at risk of interpersonal violence. By targeting problems in a culturally sensitive manner to these at risk groups in areas of high prevalence we hope that the overall level of interpersonal violence can be reduced and that victims can be better supported.

Conclusions

This project has identified demographic factors that place individuals and communities at increased risk for isolated ulnar shaft fractures, therefore allowing us make conclusions about which groups in our population are most vulnerable to interpersonal violence. These include identifying as ATSI, living in a rural or remote location, and being female.

Recognition by health professionals that those presenting with isolated ulnar shaft fractures may benefit from a more thorough psychosocial assessment and assistance in dealing with any ongoing risk of violence, as well as psychological and physical trauma that has already occurred. It also includes the possibility that through improved awareness of the issue, initiatives are able to be developed to reduce violence and its effects on individuals and communities.

This project may serve to inform further research into the factors that make the identified vulnerable groups more likely to be the victims of violence, and therefore also identifying the appropriateness and likely success of initiatives aimed at combating the issue.

References

1. Miller TR, Cohen MA, Rossman SB. (1993). Victim costs of violent crime and resulting injuries. Health Affairs.12(4): 186-97.
2. Dymond I. (1984). The treatment of isolated fractures of the distal ulna. The Journal of bone and joint surgery British volume.66(3):408-10.
3. Krug EG, Mercy JA, Dahlberg LL, Zwi AB. (2002). The world report on violence and health.The lancet. 360(9339):1083-8.
4. Jónsson B, Bengnér U, Redlund-Johnell I, Johnell O. (1999). Forearm fractures in Malmo, Sweden: changes in the incidence occurring during the 1950s, 1980s and 1990s. Acta orthopaedica Scandinavica.70(2):129-32.
5. Bengnér U, Johnell O. (2019). Increasing incidence of forearm fractures: a comparison of epidemiologic patterns 25 years apart. Acta Orthopaedica Scandinavica. 1985;56(2):158-60.
6. Welfare AIoha. Family, domestic and sexual violence in Australia: continuing the national story.
7. Alffram P-A, Bauer GC. (1962). Epidemiology of fractures of the forearm: a biomechanical investigation of bone strength. JBJS.44(1):105-14.
8. Walker M, Baltra-Ulloa J, Prehn J. (2018). Intersectionality, Indigeneity, Gender, and Violence. Global Dialogue.8(1):23-4.
9. Wakerman J, Bourke L, Humphreys J, Taylor J. (2017). Is remote health different to rural health?.
10. Tham R, Ward B. (2016). Rural health systems: Spotlight on equity and access. Understanding the australian health care system.139-52.
11. AIHW. Indigenous injury deaths 2011–12 to 2015–16. Australain Institue of Health and Welbeing AIHW; 2020 26/02/2020. Report No.: 130.
12. Mertin P, Mohr PB. (2001). A follow-up study of posttraumatic stress disorder, anxiety, and depression in Australian victims of domestic violence. Violence and Victims. 16(6):645.
13. Fraser K, Fraser K. Domestic violence and women's physical health: Citeseer; 2003.
14. Wigg AE, Hearn TC, McCaul KA, Anderton SM, Wells VM, Krishnan J. (2003). Number, incidence, and projections of distal forearm fractures admitted to hospital in Australia. Journal of Trauma and Acute Care Surgery.55(1):87-93.

15. Sanders K, Seeman E, Ugoni A, Pasco J, Martin T, Skoric B, et al. (1999). Age-and gender-specific rate of fractures in Australia: a population-based study. Osteoporosis International. 10(3): 240-7.
16. Ha KI, Hahn SH, Chung MY, Yoon YC. (1987). Nightstick Fracture. Journal of the Korean Orthopaedic Association.22(3): 756-60.
17. Sauder DJ, Athwal GS. (2007). Management of isolated ulnar shaft fractures. Hand clinics. 23(2): 179-84.
18. Ali M, Clark D, Tambe A. (2019). Nightstick Fractures, Outcomes of Operative and Non-Operative Treatment.
19. Statistics ABo. Census of Population and Housing: Census Dictionary Australia 2016. ABI; 2016.