

BARTS

BONE JOINT HEALTH

An international multi-centre
retrospective cohort analysis
on scaphoid fracture health
equity

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Why scaphoid fractures?



☐ Scaphoid fractures:

- ☐ are common injuries ¹

- ☐ incidence varies with **gender, ethnicity, and age** ¹

- ☐ when missed lead to **poor functional outcomes** ²

- ☐ likely have **centre-specific treatment** pathways leading to inequity in access to healthcare by **gender, ethnicity, and age** ³

- ☐ increased **healthcare costs** to treat when in non-union ⁴



Why do an OHDSI network study?

- ▣ Federated analyses are commonplace across the OHDSI network but..
- ▣ applying this in surgical research is novel.
- ▣ Surgery is a moderately complex intervention.
- ▣ It varies with:
 - ▣ centre-level effects
 - ▣ surgeon-specific effects
 - ▣ intervention-type effects





What did we want to find out?

Primary

- ▣ What is the **prevalence and incidence** of scaphoid fracture and scaphoid fracture sequelae in different international centres?

Secondary

- ▣ Can we **technically and feasibly** complete a cohort analysis on mapped surgical RHD?
- ▣ Are there any **patterns** in this data which may **inform future research**?



Cohorts



Scaphoid
Fracture

Scaphoid
Fracture ORIF



Scaphoid
Fracture Non-
Union



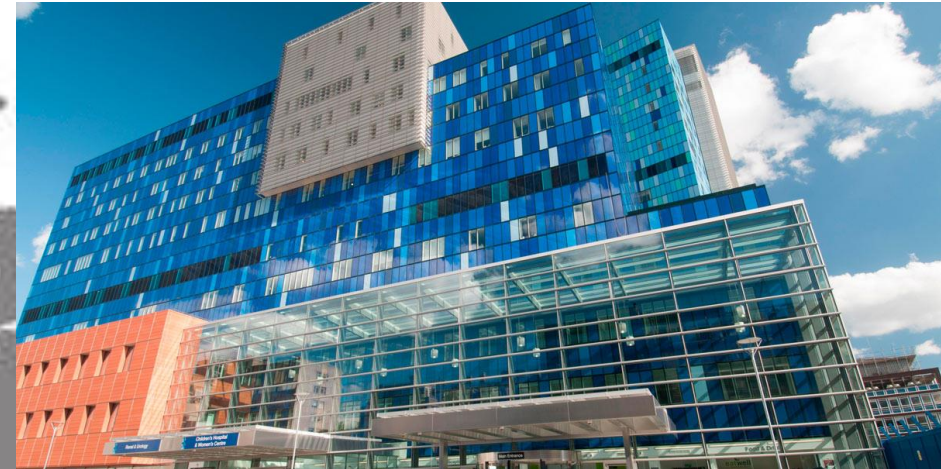
Scaphoid
Fracture Non-
Union ORIF



2,100,000 patients



2,600,000 patients



4,100,000 patients

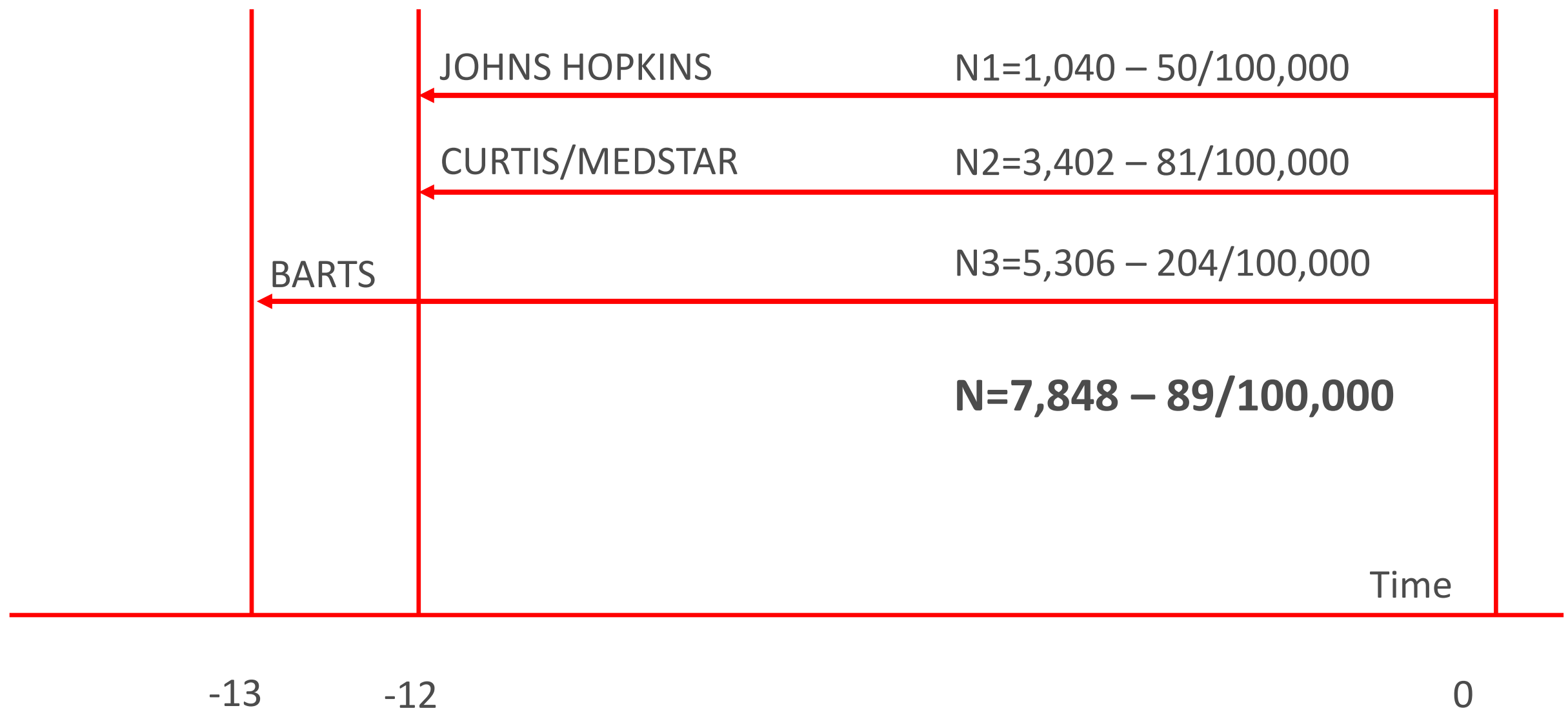
~ 8,800,000 patients



Period Prevalence



Retrospective
Observation

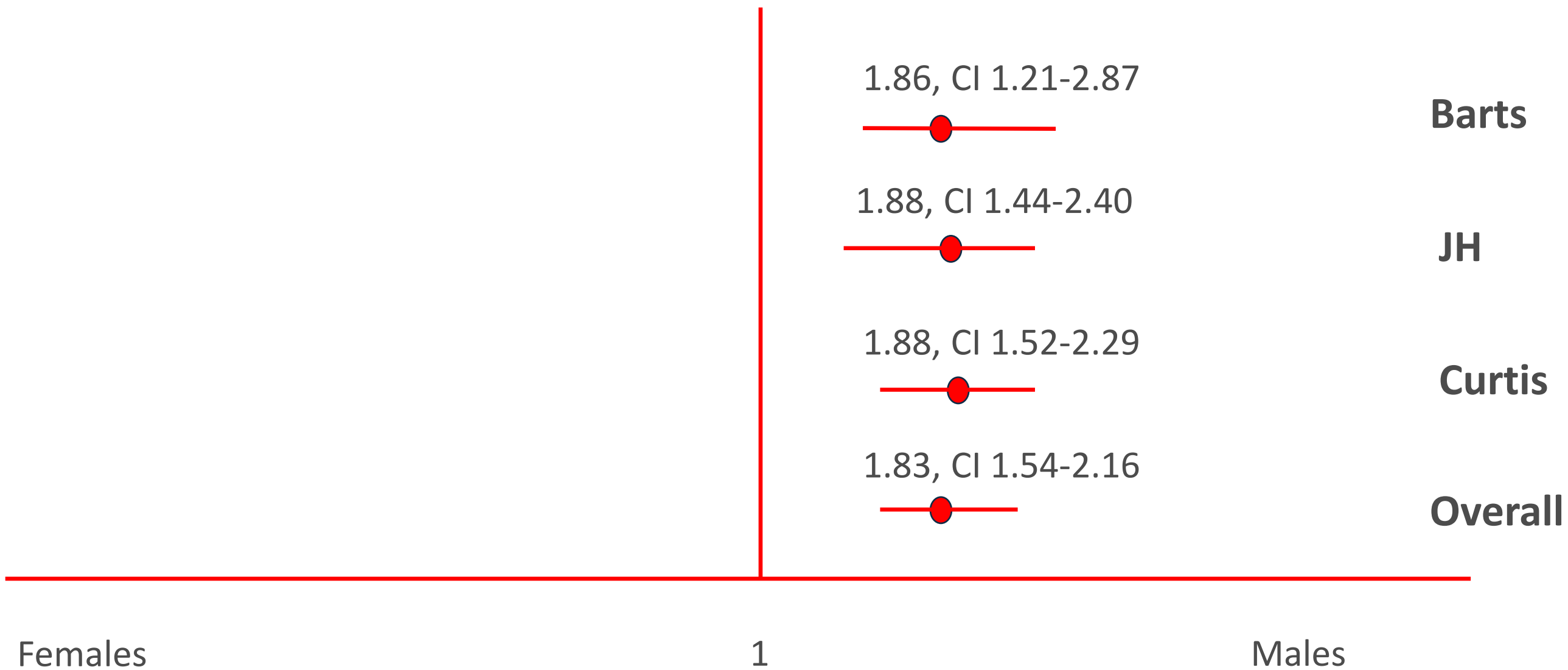




Stratified Rate Ratios

Sex – Scaphoid Fractures

*2.04, CI 0.2-7.2 – Van Tassel 2012





Stratified Rate Ratios

Sex – Scaphoid Fracture Non-Union



Almost 5 x more likely

RR 5.33, 95% CI 3.04-8.66



Almost 3 x more likely

RR 2.66, 95% CI 1.15-5.25



Almost 2 x more likely

RR 2.01, 95% CI 0.55-5.13





Stratified Rate Ratios

Gender – Scaphoid Fracture Non-Union

☞ Is this because:

☞ there is **undercoding or variable referral** of female non-unions?

☞ male gender is **associated with risk factors** for non-union?

☞ there are **differential care pathways** in each hospital?

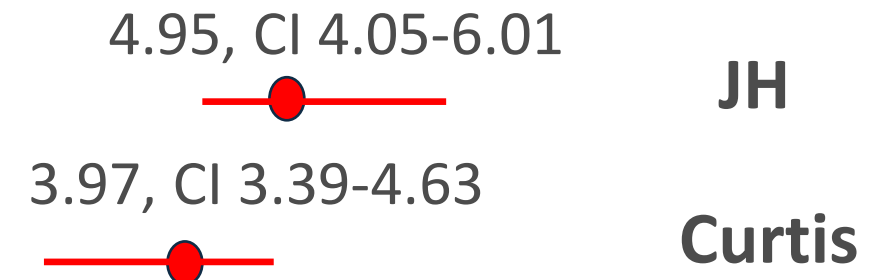


Strata-Specific Rate Ratios

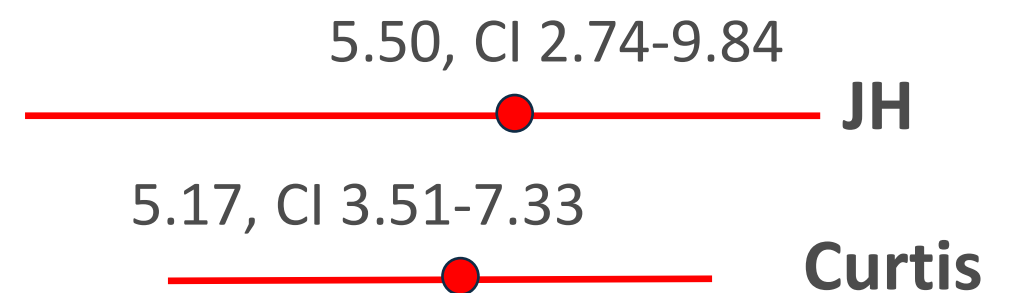
Ethnicity - 

*5.2, CI 3.88-6.81 – Van Tassel 2012

Scaphoid Fracture



Scaphoid Fracture Non-Union



Afro American

1

White





Strata-Specific Rate Ratios

Ethnicity - 

Scaphoid Fracture

1306

2402

JH
Curtis

Scaphoid Fracture Non-Union

183

405

JH
Curtis

Afro American

1

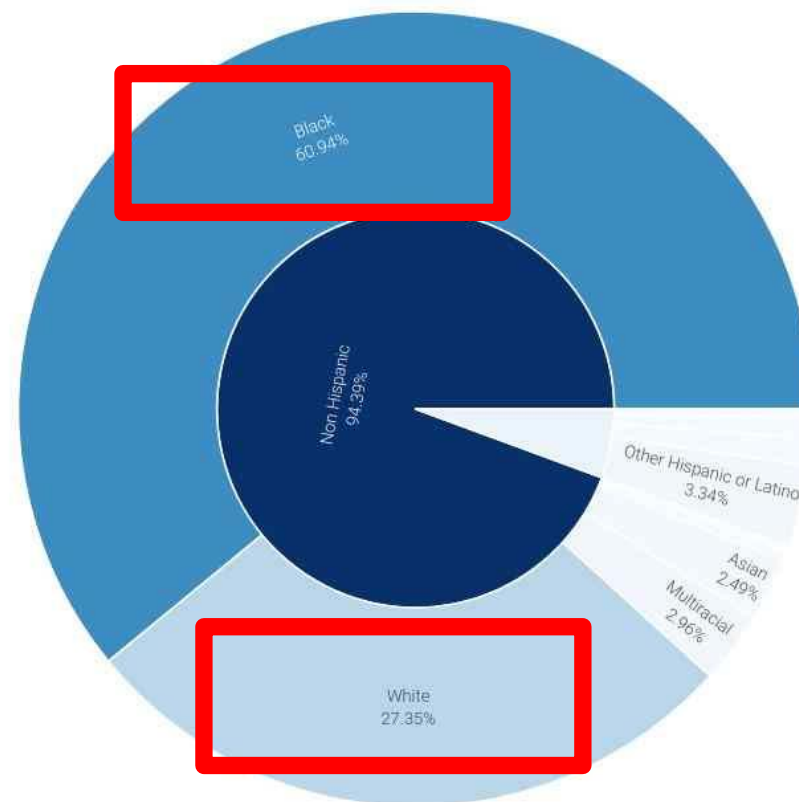
White





Racial / Ethnic makeup of Baltimore, MD

Hispanic & Non-Hispanic population distribution, across race and origin



Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021 5-Year Estimates

Ne

Stratified Rate Ratios

Ethnicity - 

Is this because:

Afro-American patients are **under-reported** in coded scaphoid injuries?

Afro-American patients have **lower non-union rates**?

Afro-American patients have **missed scaphoid injuries and non-unions**?

access to healthcare varies in US based health models?





Strata-Specific Rate Ratios

Ethnicity - 

Scaphoid Fracture

1.63, CI 1.46-1.81



Barts

Scaphoid Fracture Primary Operation

1.72, CI 1.17-2.44



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Scaphoid Fracture Non-Union

1.00, CI 0.37-2.18



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Scaphoid Fracture Non-Union Operation

0.50, CI 0.10-1.46



Barts

Asian

1

White



Stratified Rate Ratios

Ethnicity - 

- ▣ Asian patients are more likely to have a coded non-union fracture fixation following a coded scaphoid injury*
- ▣ Is this because:
 - ▣ referral for **surgery varies?**
 - ▣ **missed injuries** that are not coded in our database?
 - ▣ **patient-practitioner factors** which limit understanding of injury type/severity?



In summary...this study adds



1. Largest cohort study of scaphoid fractures internationally with ~7500 scaphoid fractures
 - a. Aim to improve cohort size by running with multiple centres in coming months
2. International and centre-level effects for scaphoid fracture management
3. Comparable injury rates to previous prospective cohort studies
4. Coding for ethnicity in common data models exists and can be improved
5. Proves the technical feasibility of conducting international federated network analyses in surgery
6. Offers opportunity for further targeted research looking at implementation science, functional outcomes research, and interventional trials



Limitations



1. Proportion of under and over coding of injury as is normal with any observational study
 1. Mitigated by comparison with previous studies
 2. Data Quality Checks done
 3. Prospective implementation science work to ensure better coding
2. Complication data is patchy at present but good for Barts
3. Cannot analyse types of scaphoid fracture...yet
4. Cannot link to surgical device...yet





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2 – Garala K, Taub NA, Dias JJ. The epidemiology of fractures of the scaphoid. *Bone Joint J.* 2016;98-B(5):654-659. doi:10.1302/0301-620X.98B5.36938

3 – Wells ME, Nicholson TC, Macias RA, Nesti LJ, Dunn JC. Incidence of Scaphoid Fractures and Associated Injuries at US Trauma Centers. *J Wrist Surg.* 2021 Apr;10(2):123-128. doi: 10.1055/s-0040-1720963. Epub 2020 Nov 11. PMID: 33815947; PMCID: PMC8012097.

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**Registered with Local Clinical Governance at each site

