The Influence of Geography and Referral Timing on Hospital Outcome Following Emergency Surgery for Type A Aortic Dissection: Insights from a National Cohort

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Objectives

Type A aortic dissection (TAAD) is considered a 'time-critical' condition.

The time needed to establish diagnosis and transfer to a surgical centre may impact survival.

We analysed the impact of geography and time from TAAD diagnosis to surgery on hospital mortality in operated TAAD patients.

Methods

- **Inclusion criteria: consecutive patients undergoing emergency type A aortic dissection (TAAD) repair between 2008 – 2022**

- **Exclusion criteria: intramural haematoma and penetrating atherosclerotic ulcers**

- **Two eras:**
  - **2008 - 2014**
  - **2015 – 2022**

- **Study design: retrospective; data obtained from electronic patients' records**

- **Statistical analysis: SPSS v28**
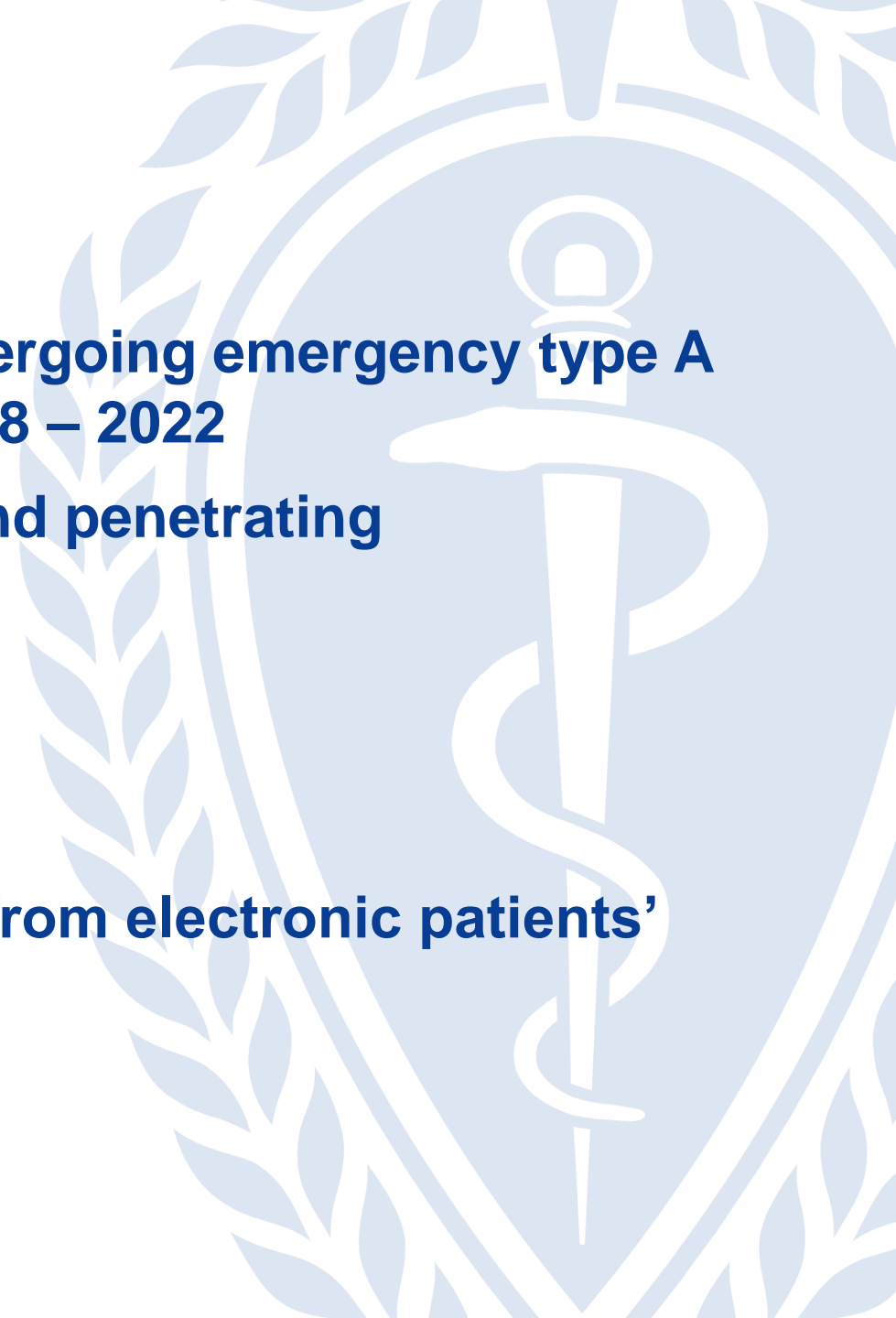
Methods – Definitions
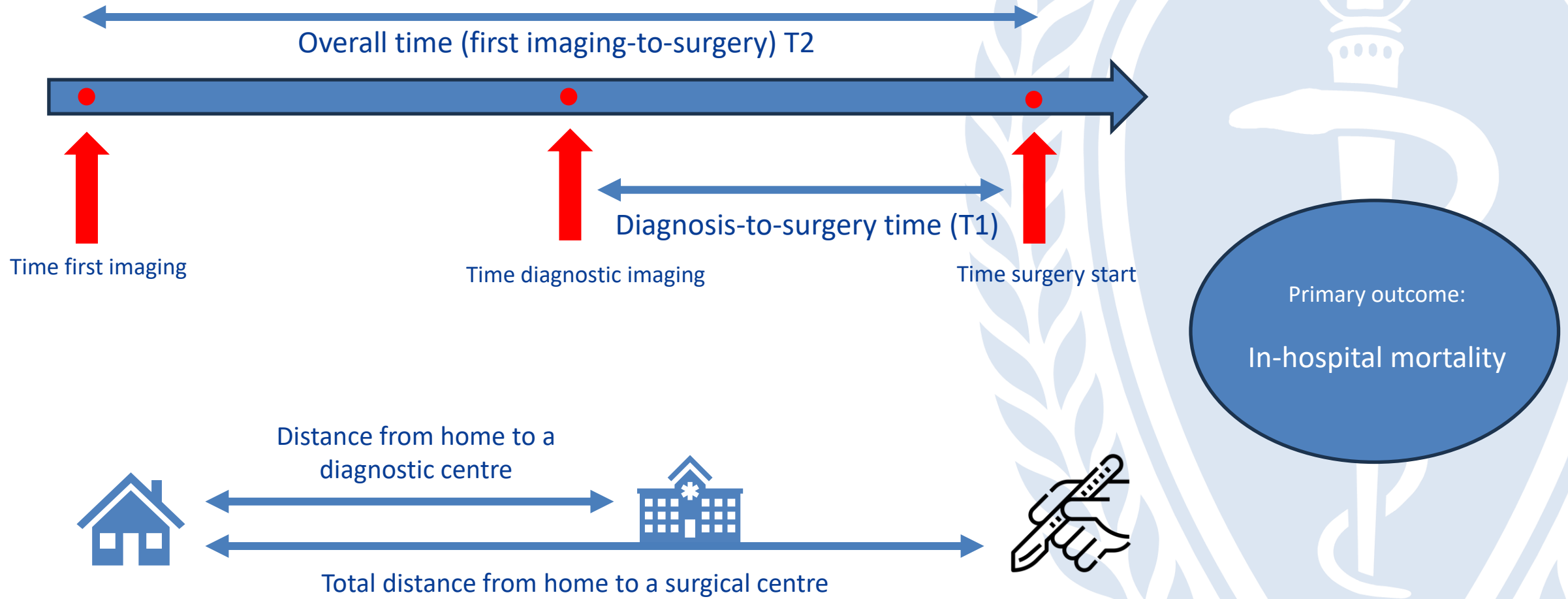
Results – Study population

- **357 patients – mean age at presentation 60±14 years**
  - **Men 70% (249/357)**
    - Mean age 58±14 years
  - **Women 30% (108/357)**
    - Mean age 64±14 years (p<0.001)

- Referred from **35 emergency departments** across **12 distinct geographic health regions**

- **3 surgical centres** performing Type A aortic dissection repair

- **Significant increase in volume** (127%) between early (2008-2014) and recent (2015-2022) eras.

Patients undergoing type A aortic dissection repair (N=357)
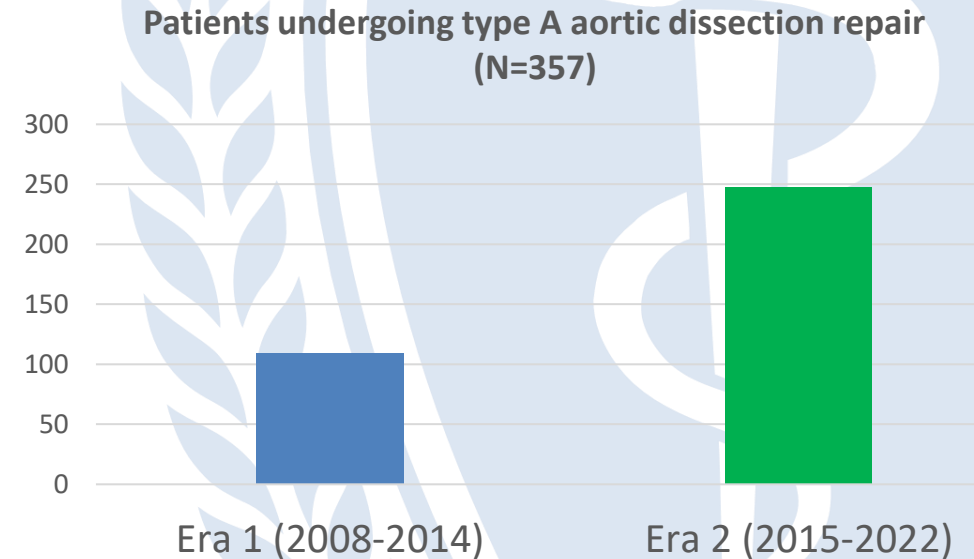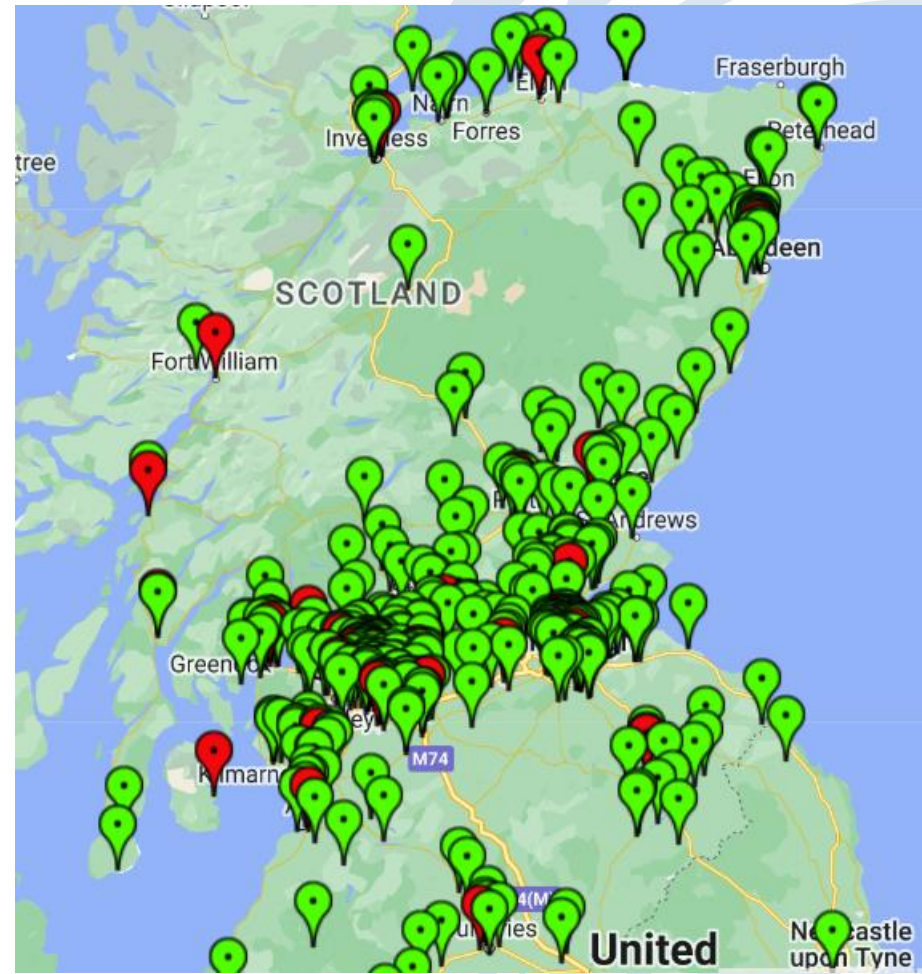
- **Green markers – patients' postcodes**
- **Red markers – referral centres**

Results – Referral timings

Median time (hrs) [IQR]	Era 2008-2014	Era 2015-2022	Overall
Diagnosis-to-surgery (T1)	5.8 [4.2-9.1]	4.5 [3.5-6.1]	5 [3.7-6.7]
Overall time-to-surgery (T2)	10.2 [6.1-33.6]	6.6 [4.8-17.1]	7.4 [5-21.5]

Median diagnosis-to-surgery (T1) (↓22%) and overall time (T2) (↓35%) were shorter in the recent era.

| Median time (hrs) [IQR]	Diagnosis in a surgical region	Diagnosis outside a surgical region	P value
Diagnosis-to-surgery (T1)	3.9 [2.6-5.2]	5.3 [4-7]	<0.001
Overall time-to-surgery (T2)	5.7 [4.1-16.1]	7.9 [5.4-22.7]	0.02

- Patients from health regions without a surgical centre had longer median diagnostic-to-surgery and overall times compared to patients from regions with a surgical centre
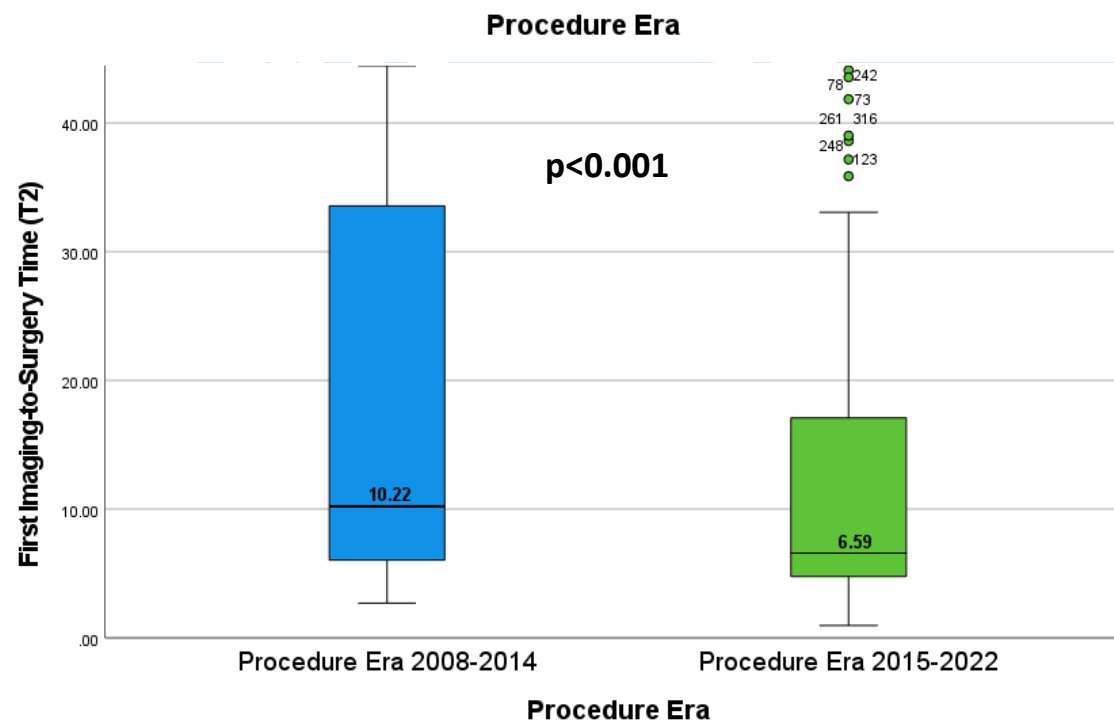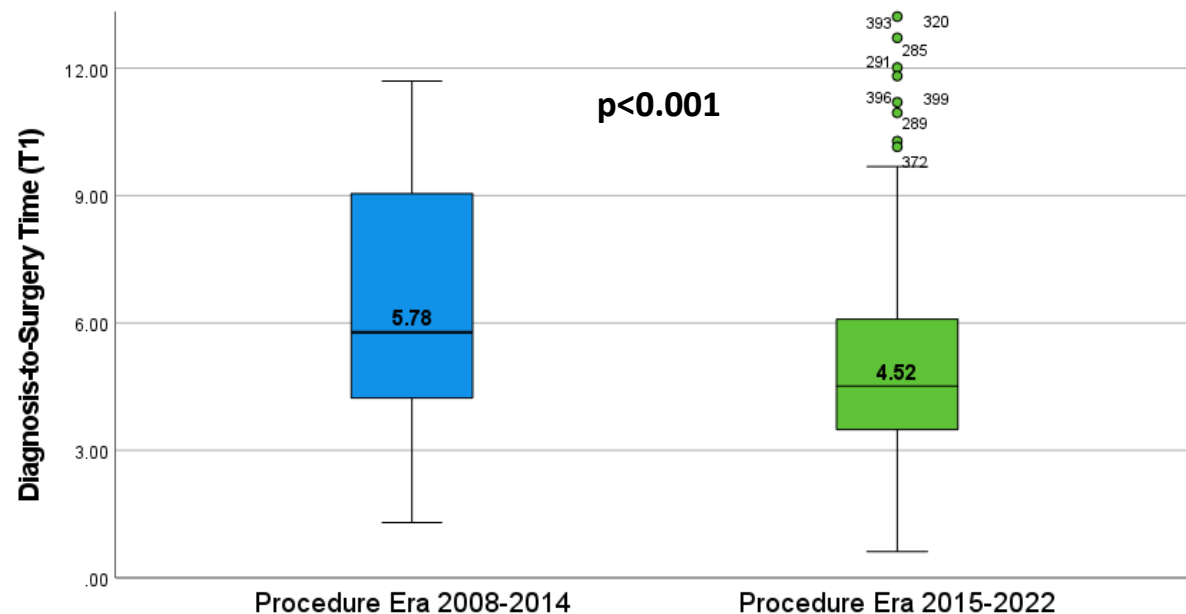
Results – Impact of time and geography on in-hospital mortality

	Survivors	Non-survivors	p value
Time from diagnostic scan to surgery (T1) (median, IQR)	5 hrs (3.8-6.6 hrs)	4.9 hrs (3.5-6.8 hrs)	0.68
Time from first-imaging to surgery (median, IQR)	7.4 hrs (5-22.8 hrs)	7.1 hrs (5.2-16.1 hrs)	0.72
Distance from home to referral centre (median, IQR)	7 miles (4-16 miles)	8 miles (4-18 miles)	0.20
Distance from home to surgical centre (median, IQR)	32 miles (14-58 miles)	36 miles (16-69 miles)	0.46

- Overall, in-hospital mortality was 26% [93/357].

- Survival at a mean follow-up of 4.3 years was 66% [236/357].

- A trend for decreasing mortality with time was seen between eras.

- Diagnostic to surgery and overall times as well as distances from patients' homes to referring or treatment centres were similar between survivors and non-survivors.

Hospital mortality after type A dissection repair (N=357)

Era 1 (2008-2014): 30%
Era 2 (2015-2022): 24%
p=0.24
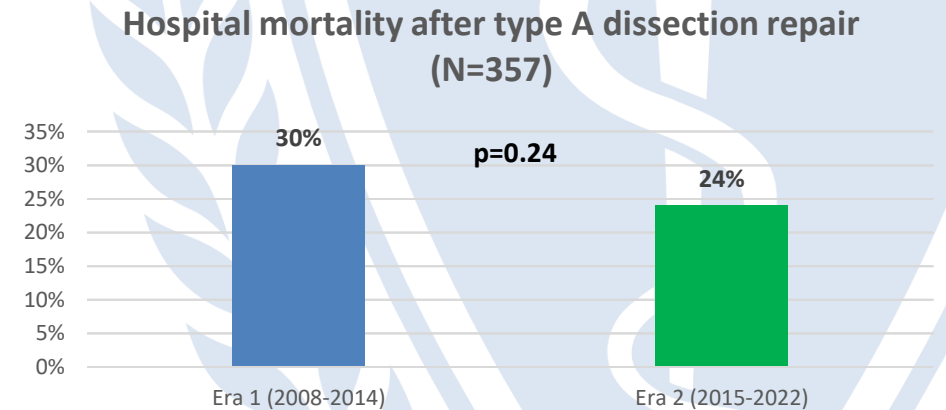
Results – Factors associated with in-hospital mortality – logistic regression

Covariate	Odds Ratio [95% CI]	P value
Age (years)	**1.05 [1.03 – 1.07]**	**<0.001**
Gender (male vs female)	0.94 [0.57 – 1.57]	0.89
Pericardial effusion on diagnostic CT scan	**1.80 [1.11 – 2.90]**	**0.02**
Time from diagnostic scan to surgery (T1)	0.99 [0.97 - 1.02]	0.87
Time from first-imaging to surgery (T2)	1.00 [0.99 – 1.01]	0.60
Referral from within surgical region (vs outwith)	0.87 [0.54 – 1.39]	0.55
Out-of-hours presentation	1.03 [0.64 – 1.66]	0.89

Conclusions

Over a 14-year period, the **time from diagnosis to surgery** in Type A aortic dissection **has decreased**.

The interval between initial or diagnostic imaging and surgery **was not associated with in-hospital mortality** in our study.

Geographical factors did not seem to impact mortality, but patients from within surgical regions had **faster access to treatment**.

Hospital mortality was instead associated with **patient and disease specific factors** such as **age** and **pericardial effusion** during diagnostic CT scan.