



Prince of Wales Hospital  
The Chinese University of Hong Kong



# Cardiac Surgery Report

2016 Cumulative and Current Outcomes

Division of Cardiothoracic Surgery  
Department of Surgery

## **Introduction.**

This is the updated report for the Division of Cardiac Surgery, Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, New Territories, Hong Kong. We began data collection as part of a quality assurance programme for patients undergoing cardiac surgery in our Institute from November 2005. Since that time we have moved purposefully from basic outcome analysis described in the first report to comprehensive 'international benchmarking'. One of our goals has been public transparency and previous reports have been published and are freely available on the internet.  
<https://www.surgery.cuhk.edu.hk/cardiothoracic/default.asp#reports>

In this regard and with a 'nod' to paper free publication, we have now moved to direct reporting on the internet and hope that this will become 'real time' as we try to refine the process of data collection and analysis. It is intuitive that cardiologist referring patients have a good knowledge of the outcomes of the surgical units they send patients to. Whilst our overall outcomes are reassuring for referring physicians, in this report we have also included some basic supplementary outcomes for units which form the majority base for our surgical referrals so they can compare case mix and have knowledge of our risk adjusted outcomes for their specific patient populations.

Our data collection, methodology and principles have remained. We have a single research person who contributes to data collection, validation of data accuracy and database maintenance financed by our own 'Team' with monies generated by donations and private work. It will be a challenge for us to maintain this in the future.

In terms of clinical activity our patient population continues to change. The risk of the patients we are operating on continues to increase as seen by the dramatic increase in aortic work both open and endovascular.

With these changes there is an inherent risk of increases in mortality and morbidity but we can be assured that all our outcomes fall well within 'international' norms and in most cases are actually better than expected. We remain committed and focused on safety and provision of quality care as a part of our future development and as stated following our international benchmarking project in the UK Society Blue Book in previous years:

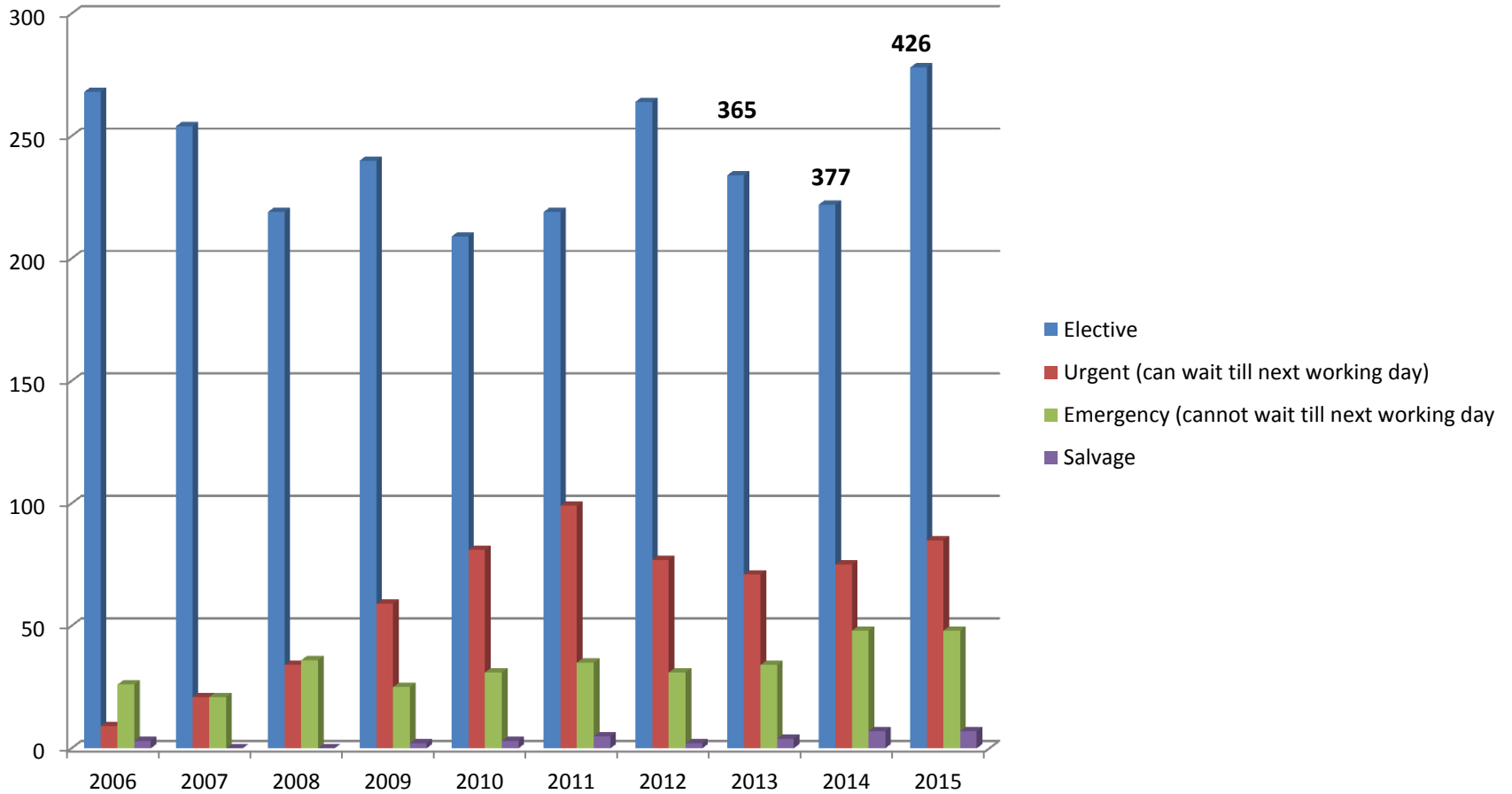
*'These data should provide reassurance for patients, clinicians, managers and commissioners of services at the Prince of Wales Hospital that the cardiac surgery programme is safe, and that the unit is actively looking to monitor and improve its standards.'*

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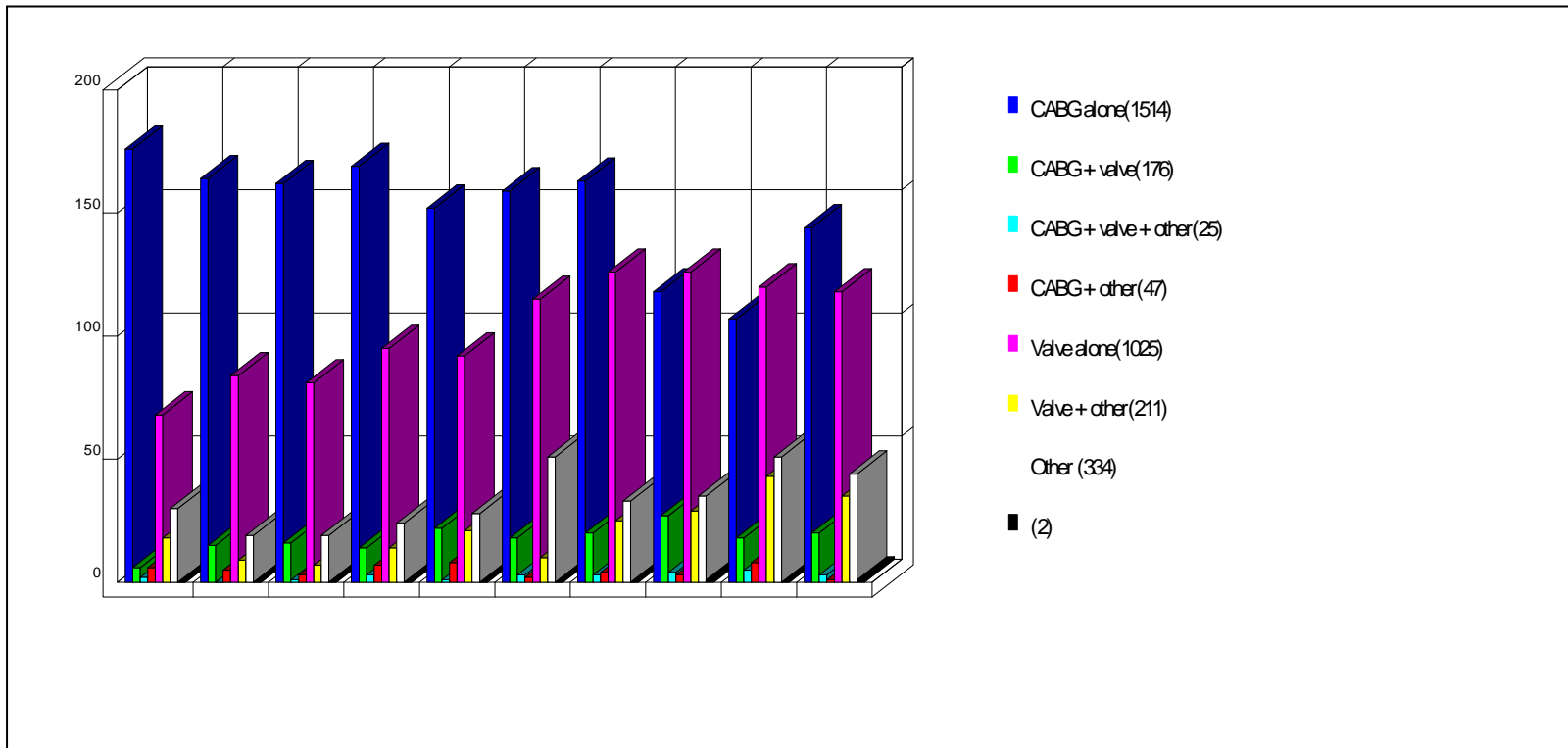
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- Includes:
  - **Cardiac Surgical Activity**
    - Volume/Case Mix changes
    - Case Priority changes
    - Hybrid Theatre Activity 2013-2015
  - **All case mortality using the logistic EuroSCORE as risk predictor**
    - Cumulative and for 2015
    - Funnel Plot, Control Limit Charts
    - Individual Referring Center Outcomes
  - **Isolated CABG mortality using the SCTS Complex Bayes Score as risk predictor**
    - Cumulative and for 2015
  - **Re-Operation for Bleeding**
    - Cumulative for all cases
  - **New Post-Operative Stroke**
    - 'Runs' Analysis 2006-current
  - **Blood Transfusion 'Runs' Analysis**
    - Cumulative and Comparative for 2015

# Cardiac Surgical Activity 2006-2015

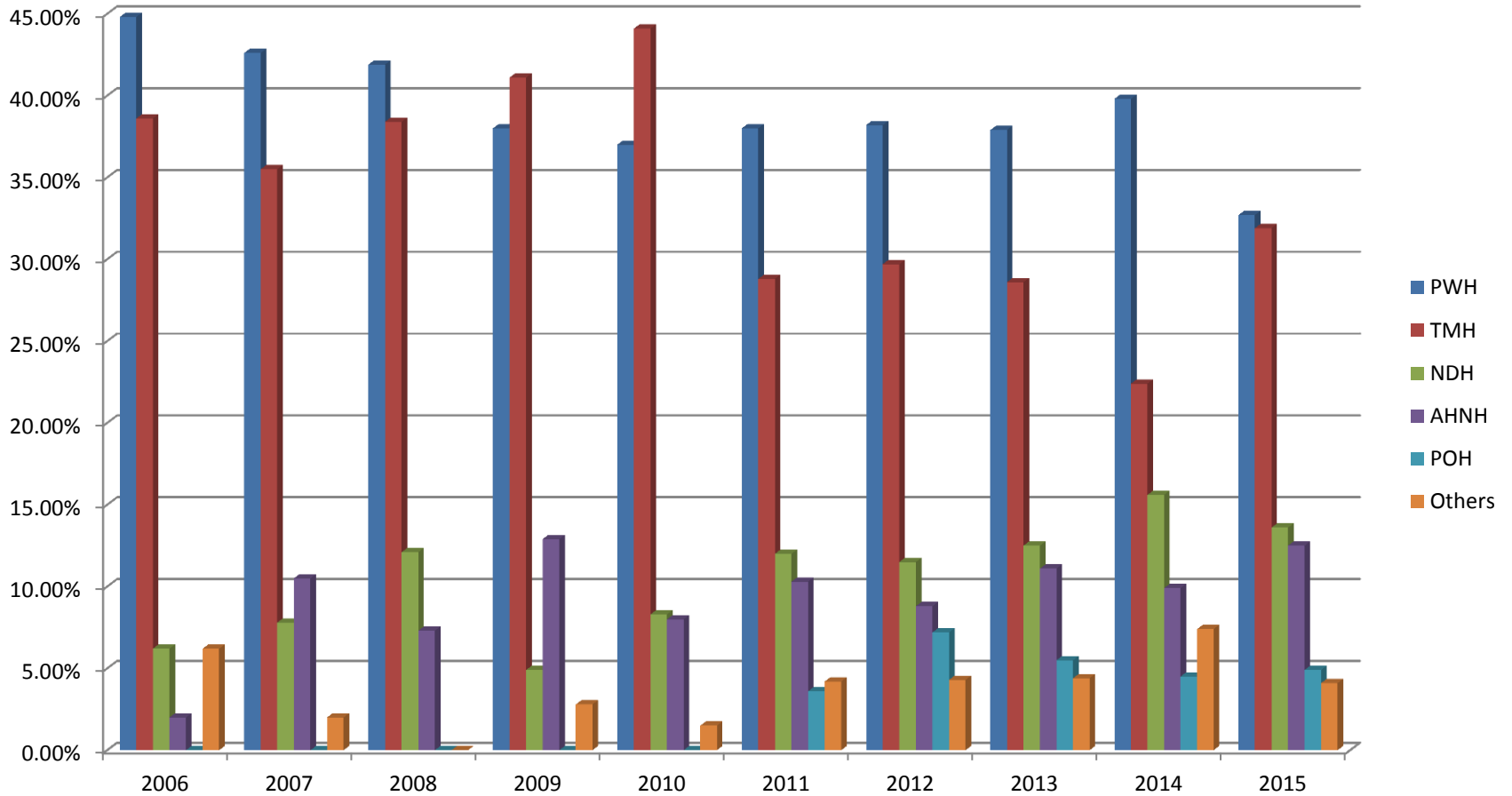


# Cardiac Surgical Case Mix 2006-2015

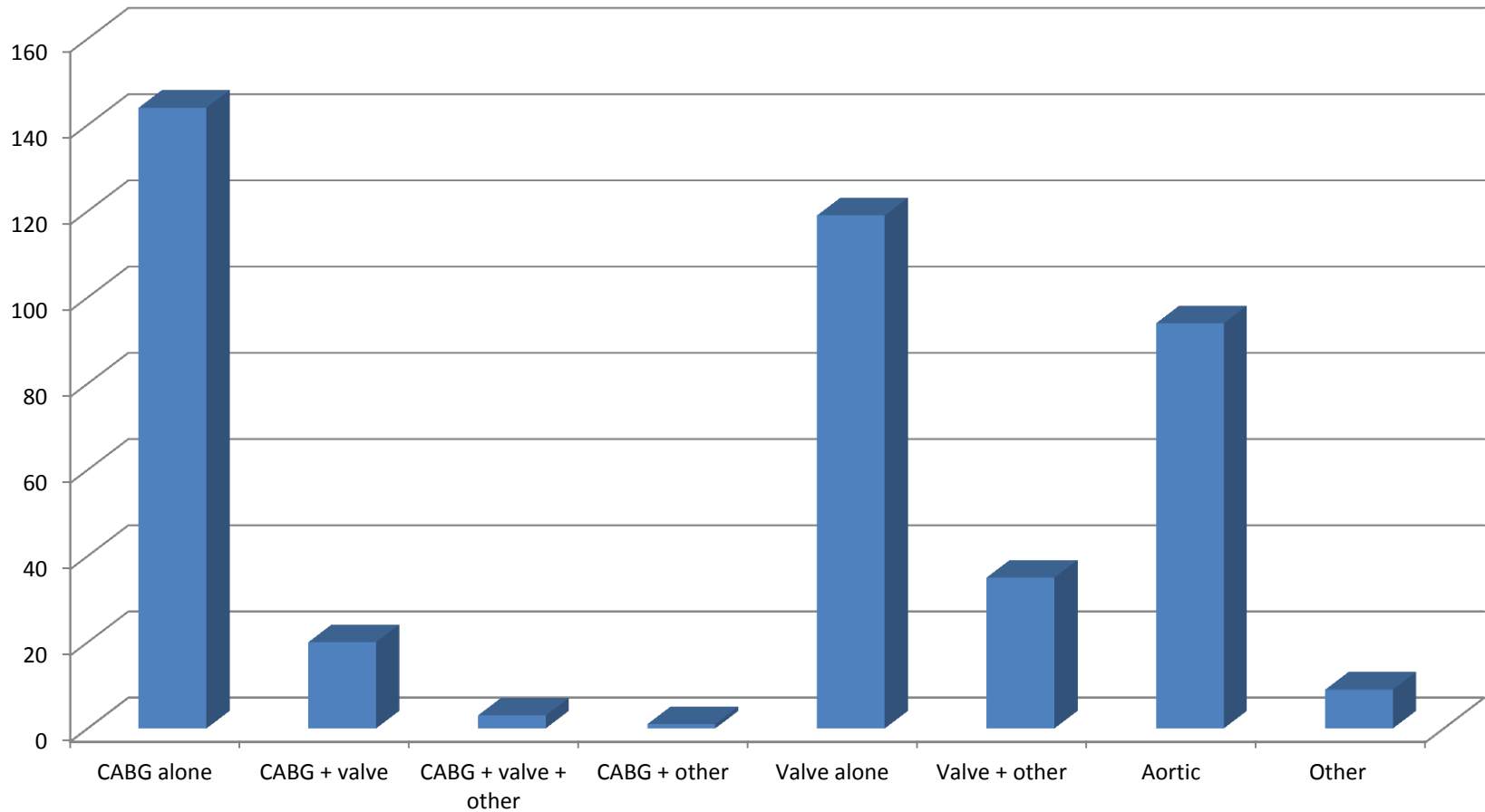


Reduction in Isolated CABG operation and increases in complex valve and aortic interventions

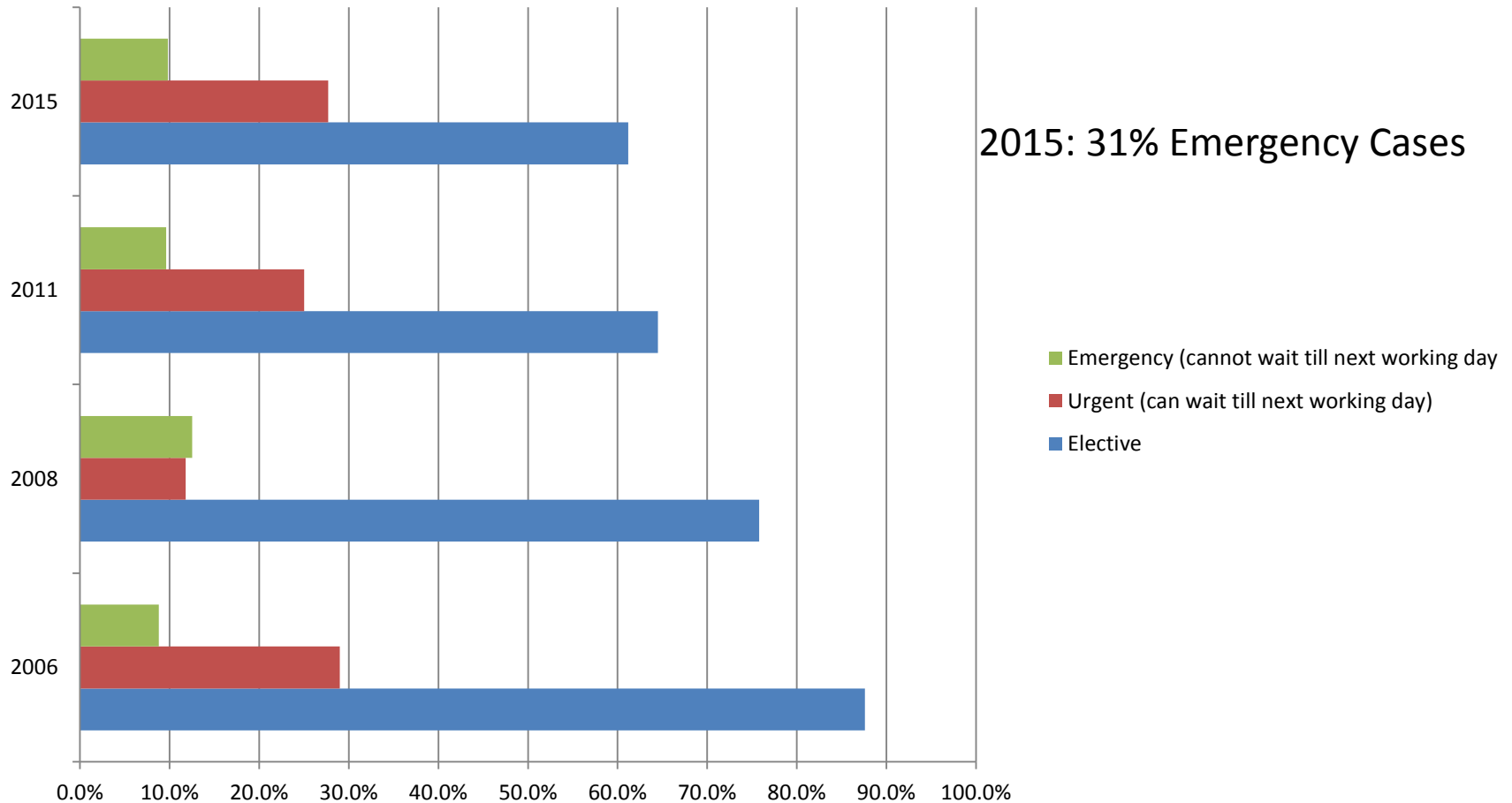
# Cardiac Surgical Referral Centers % of Cases : 2006-2015



# Cardiac Surgical Case Mix 2015



# Change in Operative Urgency 2006-2015



Logistic EuroSCORE

Mean

7

8.46

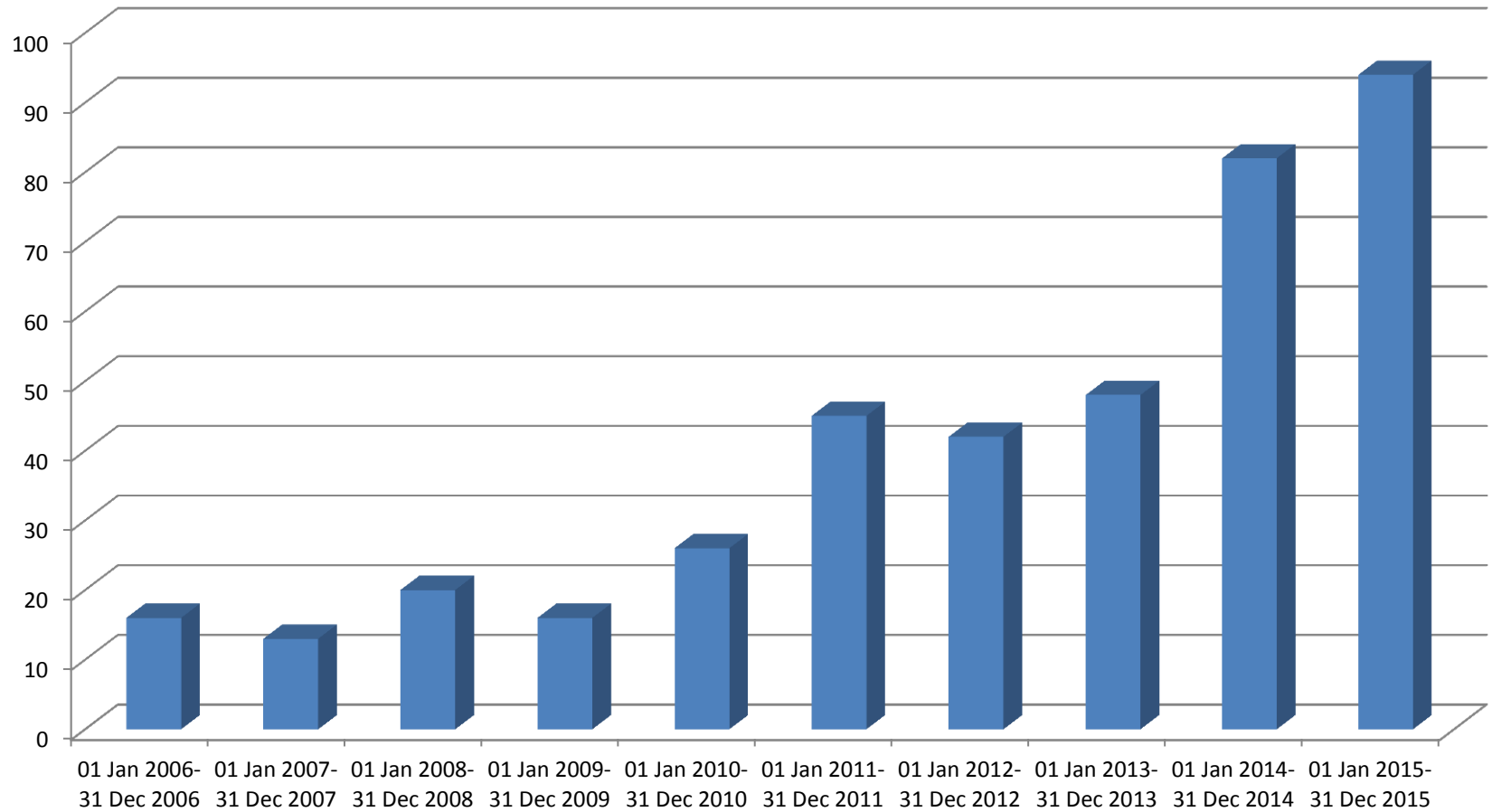
9.94

2008

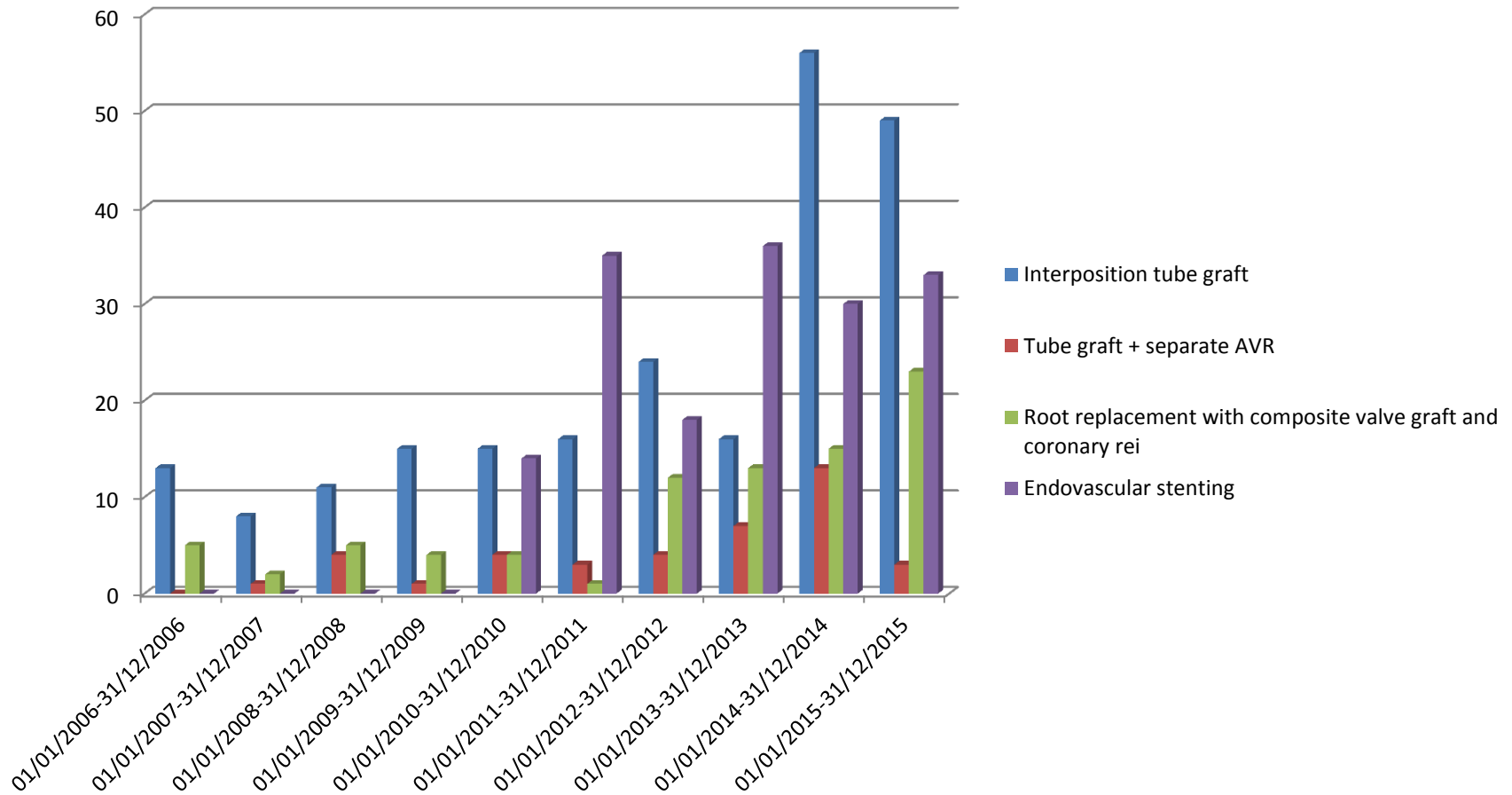
2011

2015

# Change in Number of Aortic Interventions 2006-2015

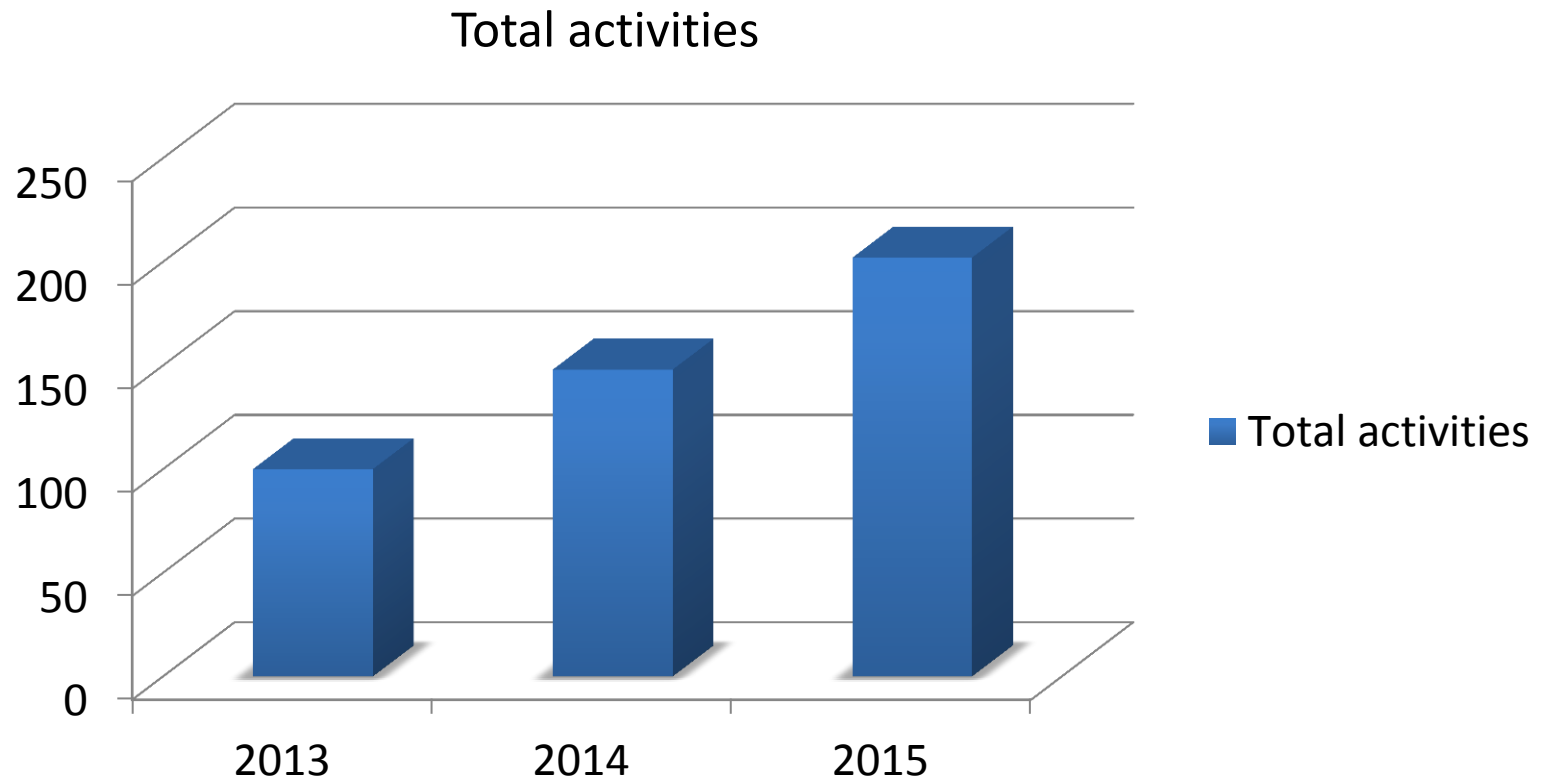


# Change in Type of Aortic Intervention 2006-2015



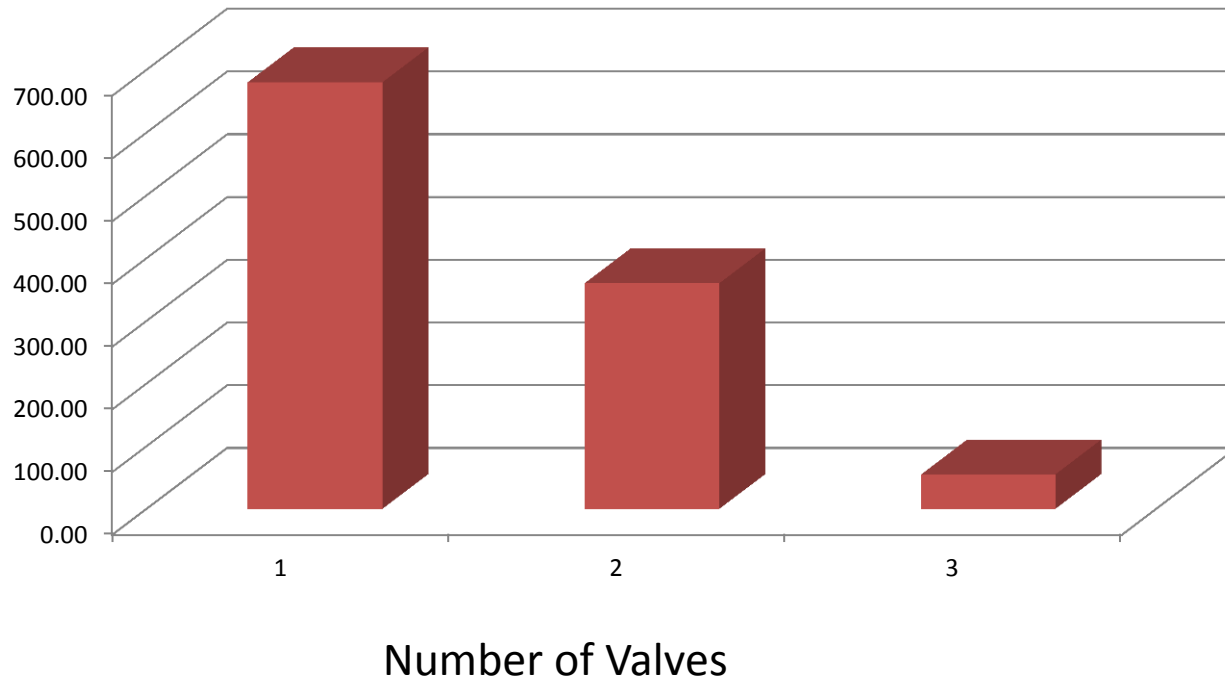
TEVAR Programme funded 2010

# Hybrid Theatre 507 Throughput



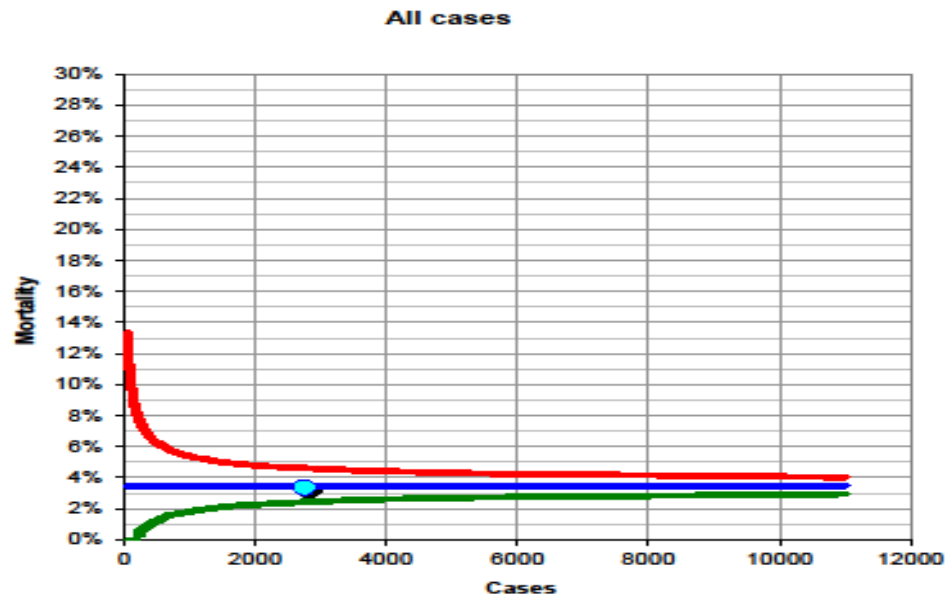
# Isolated Valve Surgery 2006-2015

Crude Mortality 2.8% (expected log EuroSCORE 6.2%)



211 patients had AVR/MVR +/- TVR with crude mortality of 4.2% (cf 6.9% UK SCTS: expected log EuroSCORE PWH 6.9%)

# Funnel Plot All Cases 2006-current (UK SCTS Alert Lines)



# Control Limit Plot

## All Cases 2006-Current

Number of cases  <----enter value here

Number of deaths  <----enter value here

Observed mortality **3.65%**

Performance **definitely better than expected**

Expected mortality  <----enter value here

(=average Euroscore  
for these cases)

### Upper control limits

2 s.d.	<b>8.51%</b>
3 s.d.	<b>8.96%</b>
3.5 s.d.	<b>9.22%</b>
4 s.d.	<b>9.44%</b>

### Lower control limits

2 s.d.	<b>6.73%</b>
3 s.d.	<b>6.30%</b>
3.5 s.d.	<b>6.08%</b>
4 s.d.	<b>5.88%</b>

# Control Limit Plot

## All isolated CABG 2006-Current

<b>Number of cases</b>	<input type="text" value="1602"/>	<----enter value here
<b>Number of deaths</b>	<input type="text" value="27"/>	<----enter value here
<b>Observed mortality</b>	<b>1.69%</b>	
<b>Performance</b>	<b>definitely better than expected</b>	
<b>Expected mortality</b>	<input type="text" value="3.91%"/>	<----enter value here
<i>(=average Euroscore for these cases)</i>		
<b>Upper control limits</b>		
	2 s.d.	<b>4.93%</b>
	3 s.d.	<b>5.43%</b>
	3.5 s.d.	<b>5.68%</b>
	4 s.d.	<b>5.99%</b>
<b>Lower control limits</b>		
	2 s.d.	<b>3.00%</b>
	3 s.d.	<b>2.56%</b>
	3.5 s.d.	<b>2.31%</b>
	4 s.d.	<b>2.12%</b>

# Control Limit Plot

## All Cases 2015

**Number of cases**  <----enter value here

**Number of deaths**  <----enter value here

**Observed mortality** 2.58%

**Performance** definitely better than expected

**Expected mortality**  <----enter value here

(=average Euroscore

for these cases)

### Upper control limits

2 s.d.	12.91%
3 s.d.	14.55%
3.5 s.d.	15.26%
4 s.d.	16.20%

### Lower control limits

2 s.d.	7.04%
3 s.d.	5.87%
3.5 s.d.	5.16%
4 s.d.	4.69%

# Control Limit Plot isolated CABG 2015

**Number of cases**  <----enter value here

**Number of deaths**  <----enter value here

**Observed mortality** 1.39%

**Performance** as expected

**Expected mortality**  <----enter value here

(=average Euroscore  
for these cases)

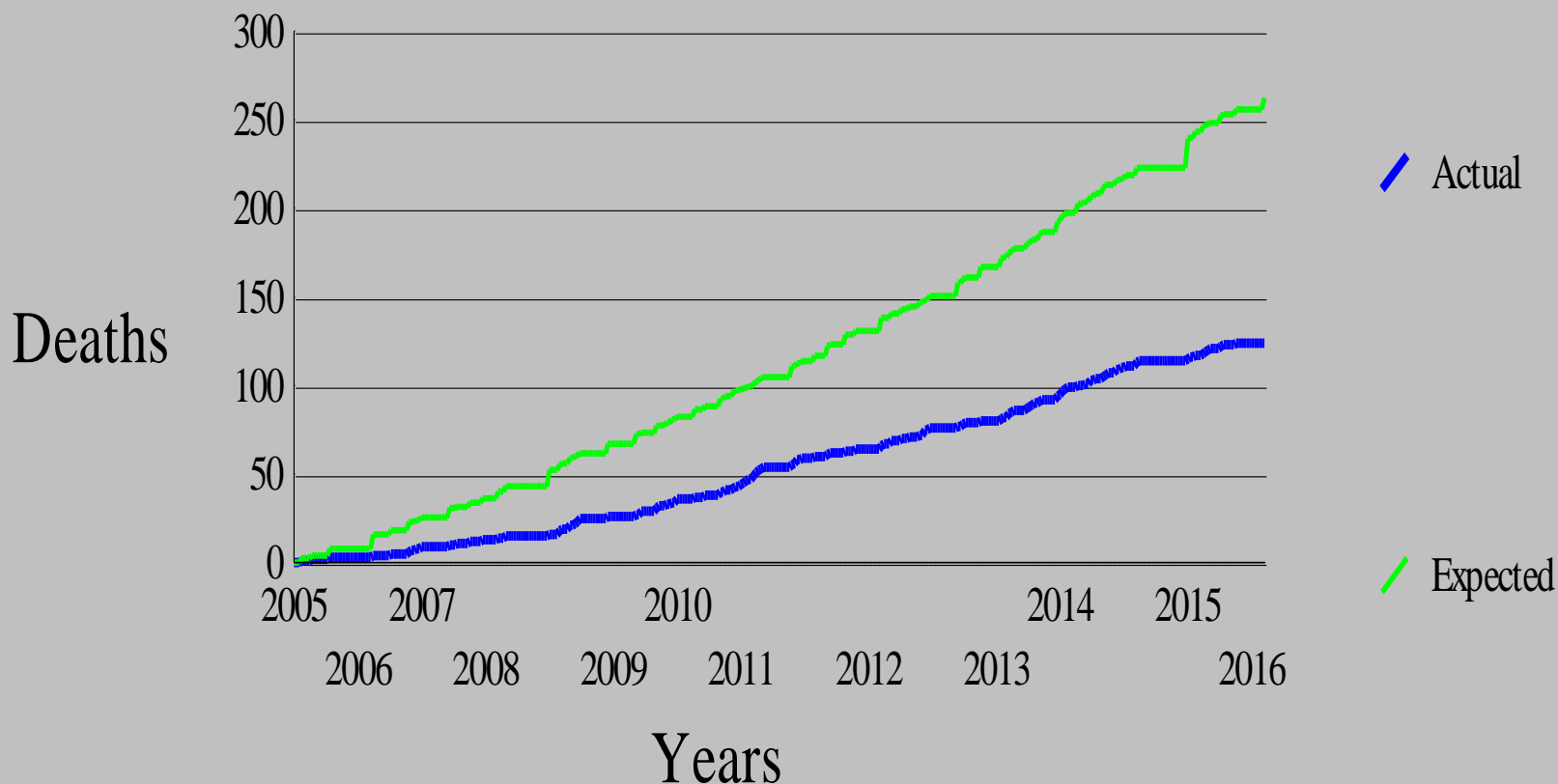
## Upper control limits

2 s.d.	6.94%
3 s.d.	9.03%
3.5 s.d.	9.72%
4 s.d.	11.11%

## Lower control limits

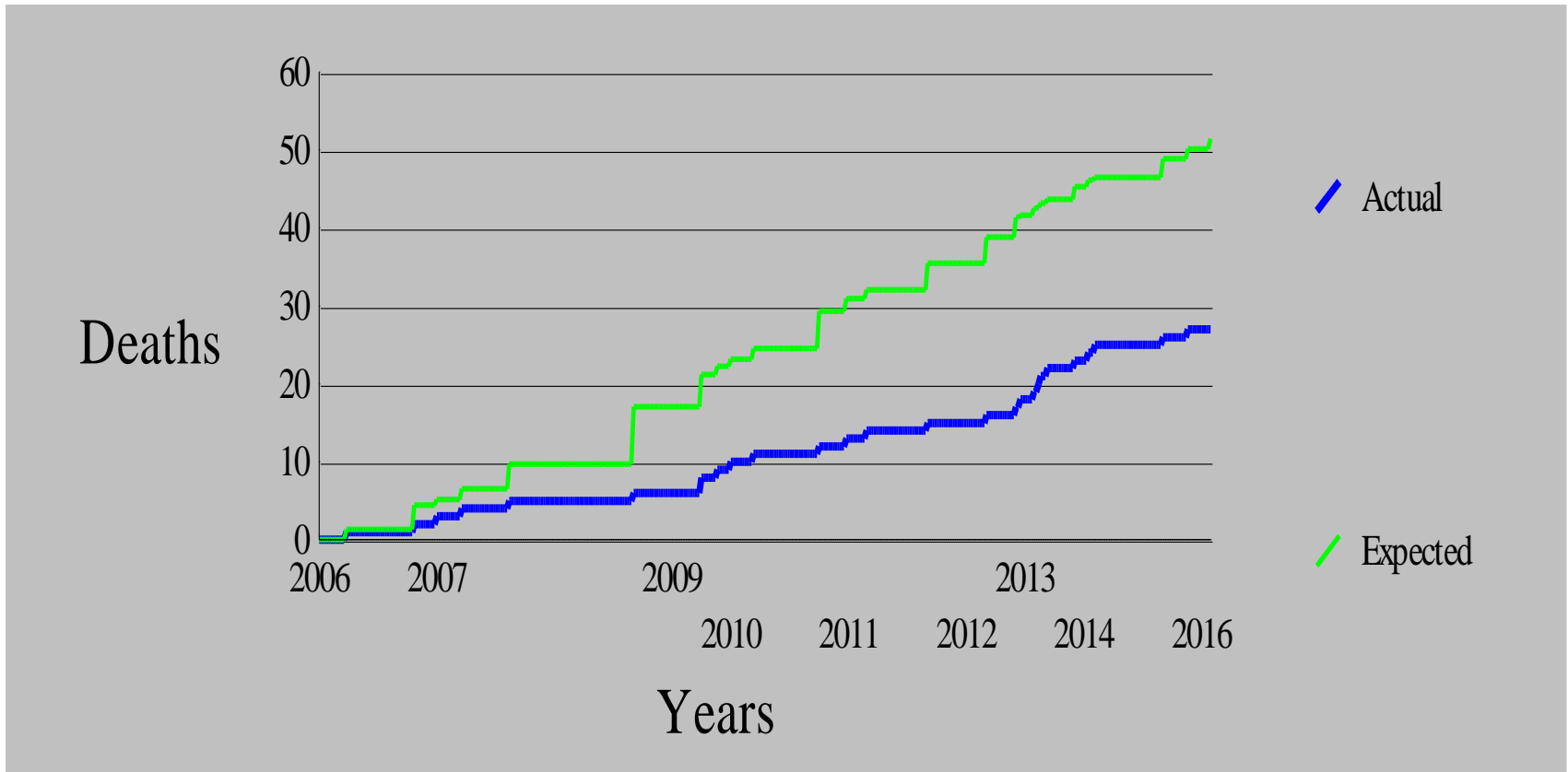
2 s.d.	0.69%
3 s.d.	0.00%
3.5 s.d.	0.00%
4 s.d.	0.00%

# CUSUM All Case Mortality 2006-Current (3575 cases): Crude Mortality 3.6%



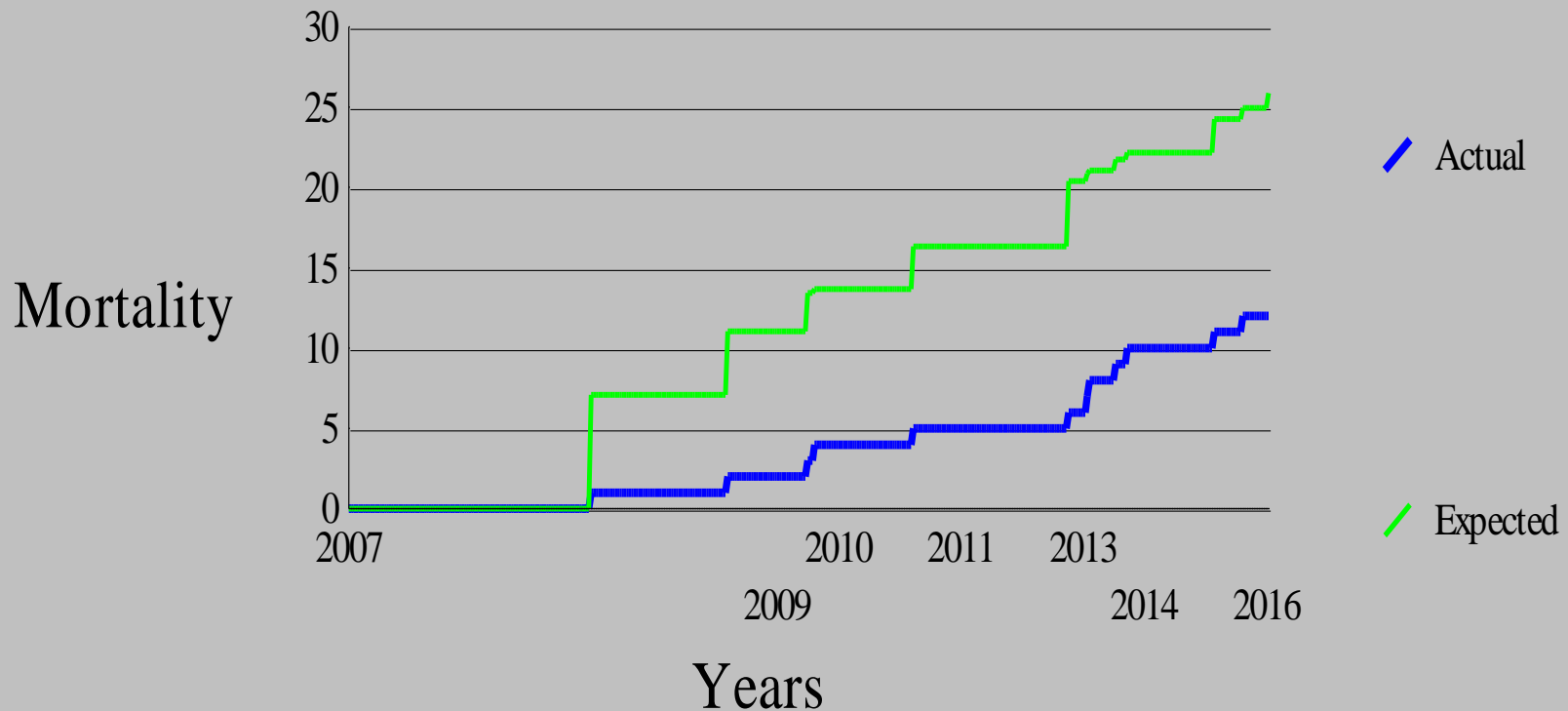
Logistic EuroSCORE as predictor

# CUSUM CABG Mortality 2006-Current (1602 cases): Crude Mortality 1.7%



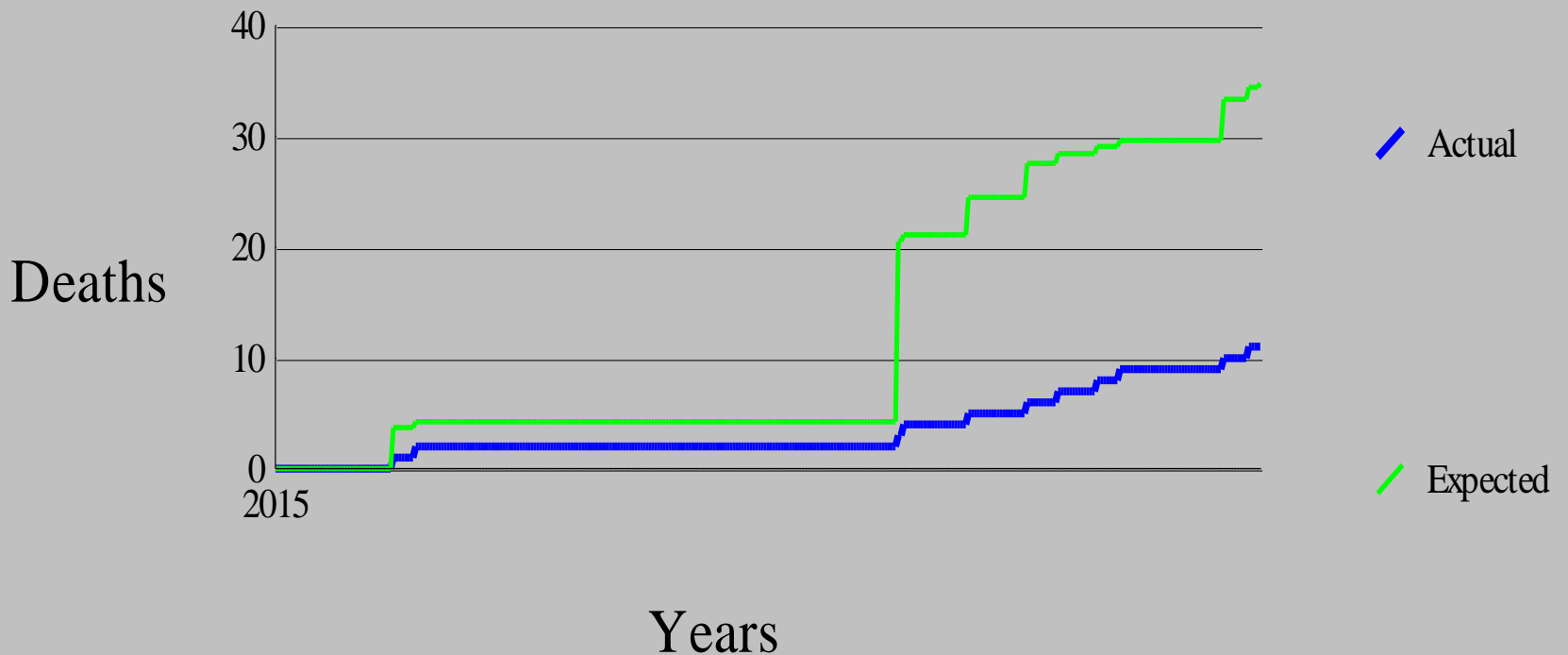
SCTS Complex Bayes as predictor

# CUSUM Elective CABG Mortality 2006- Current (1196 cases) Crude Mortality: 0.9%



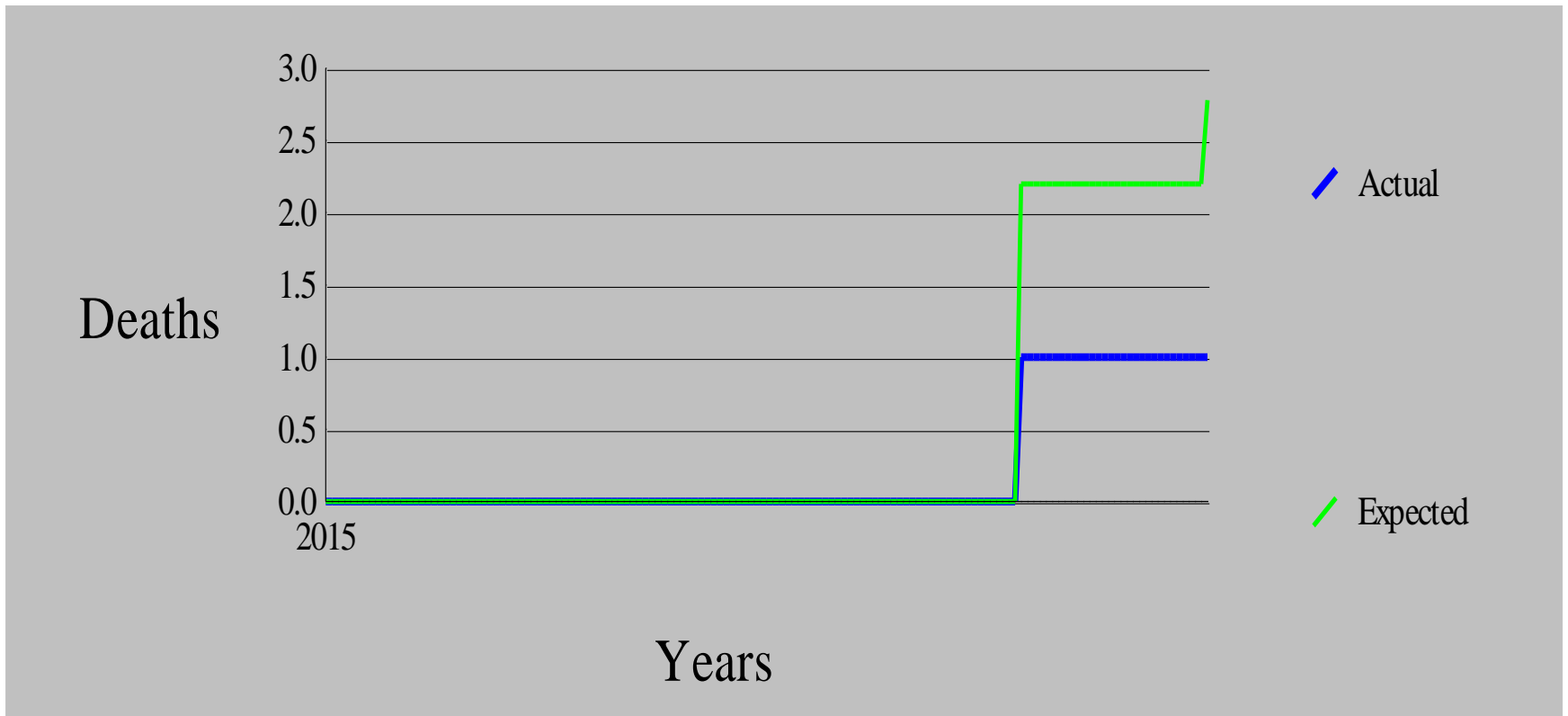
SCTS Complex Bayes as predictor

# CUSUM All Case Mortality 2015 (426 cases): Crude Mortality 2.8%



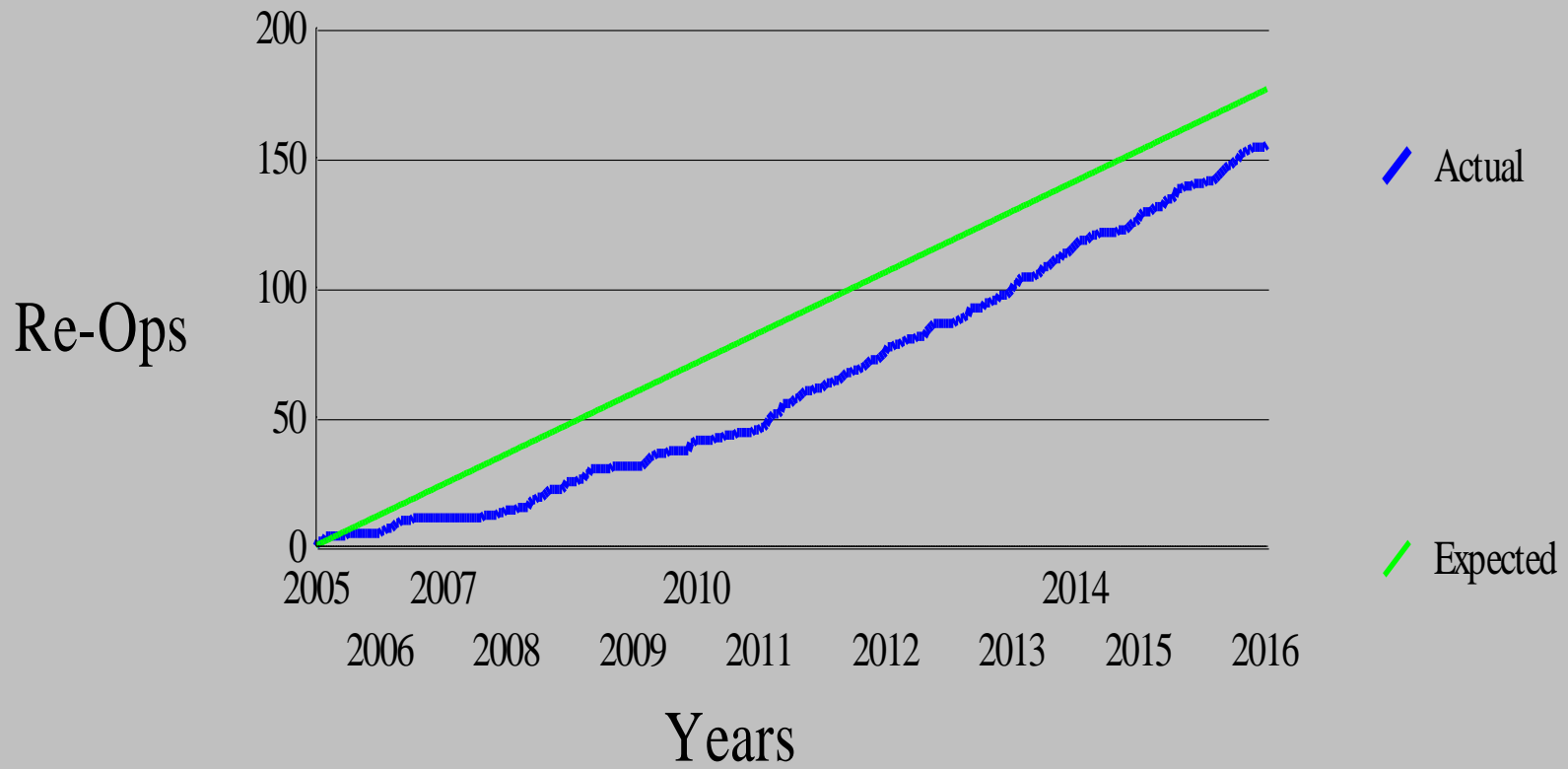
Logistic EuroSCORE as predictor

# CUSUM CABG Mortality 2015 (144 cases): Crude Mortality 1.3%

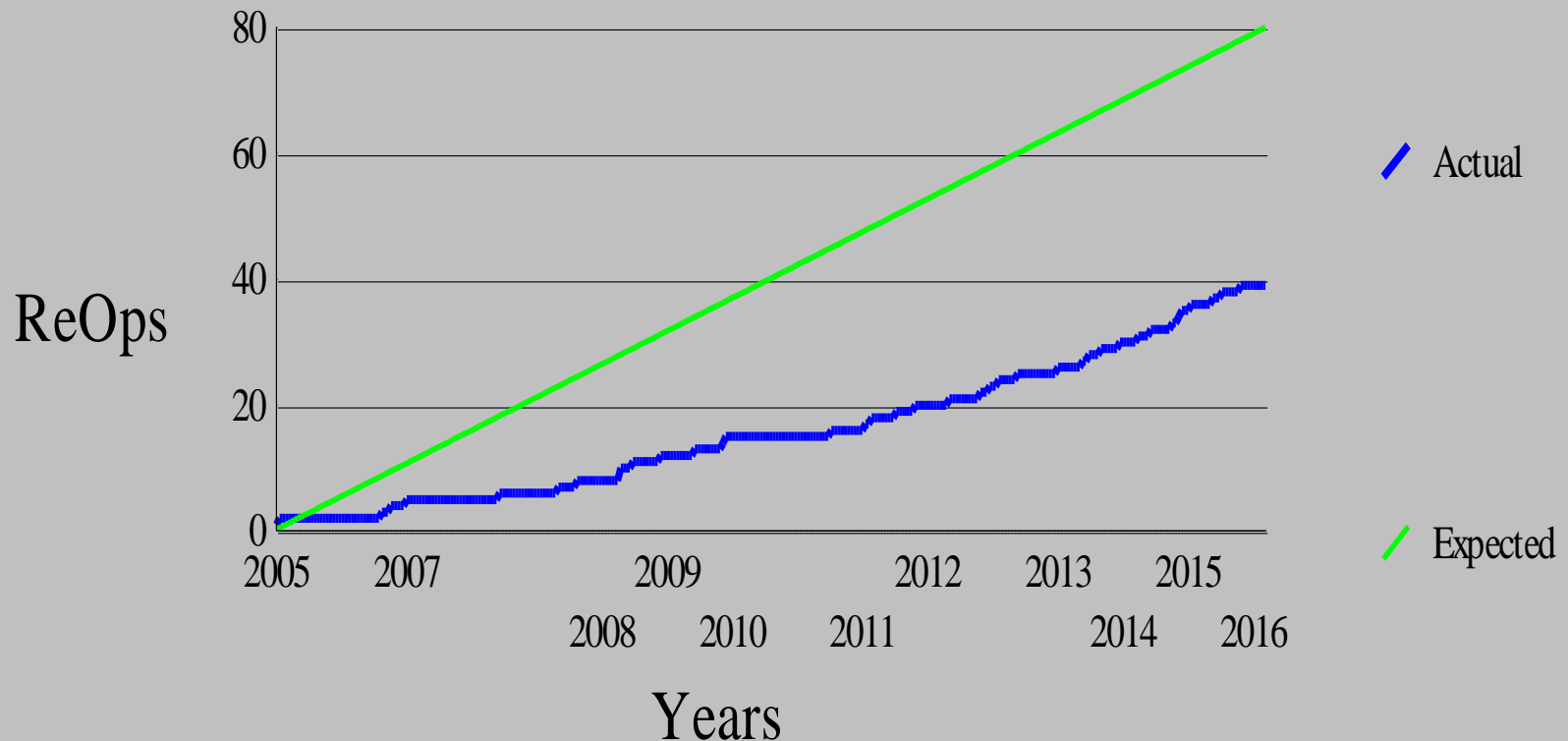


SCTS Complex Bayes as predictor

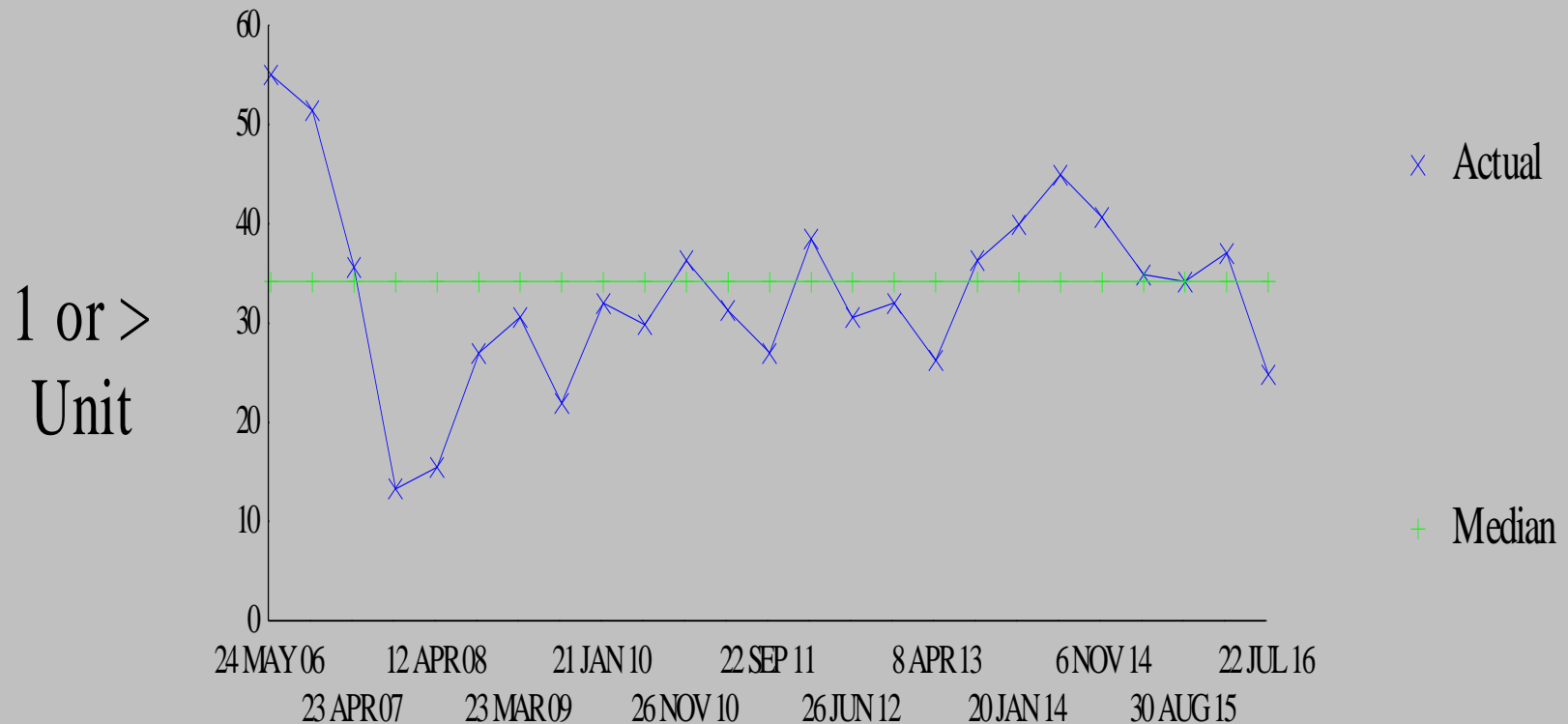
# CUSUM Re-Operation for Bleeding 2006-Current (3575 cases): Crude Rate 4.4 %



# CUSUM Re-Operation for Bleeding CABG 2006- Current ( 1602 cases): Crude Rate 2.4 %

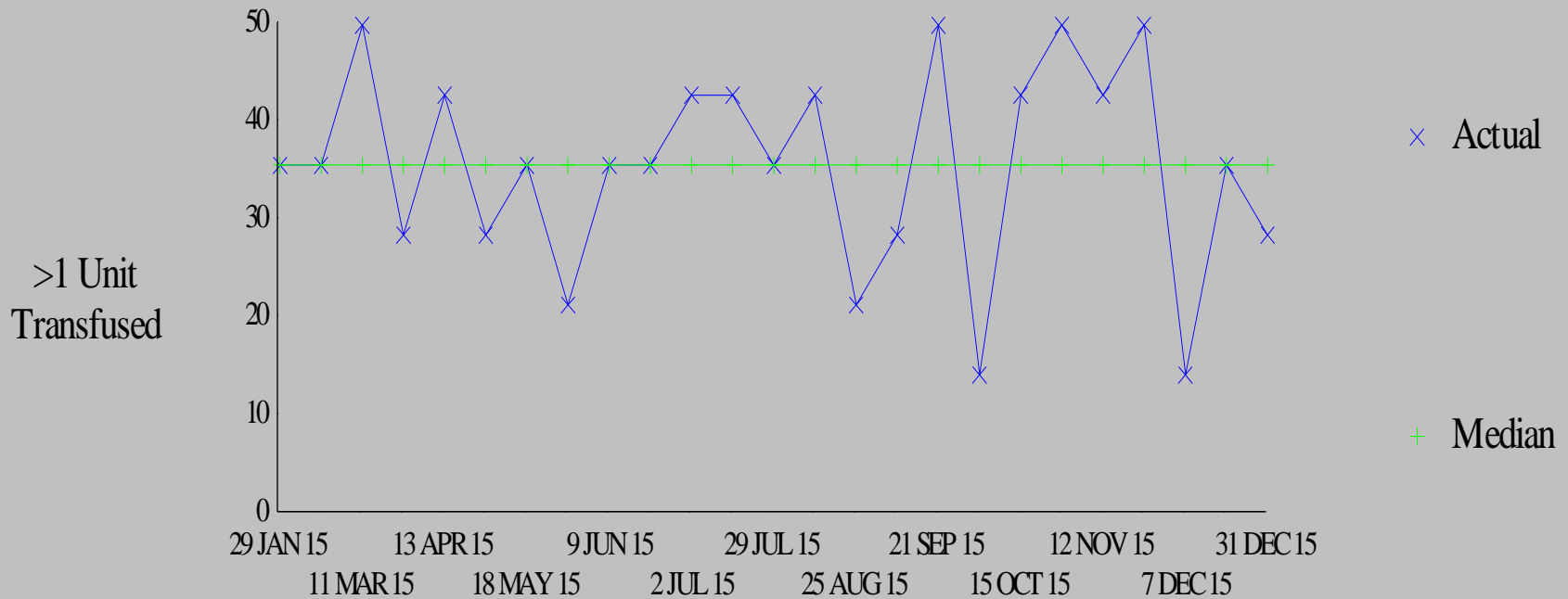


# Runs Analysis for ICU Blood Transfusion 2006-2016 (3575 cases)



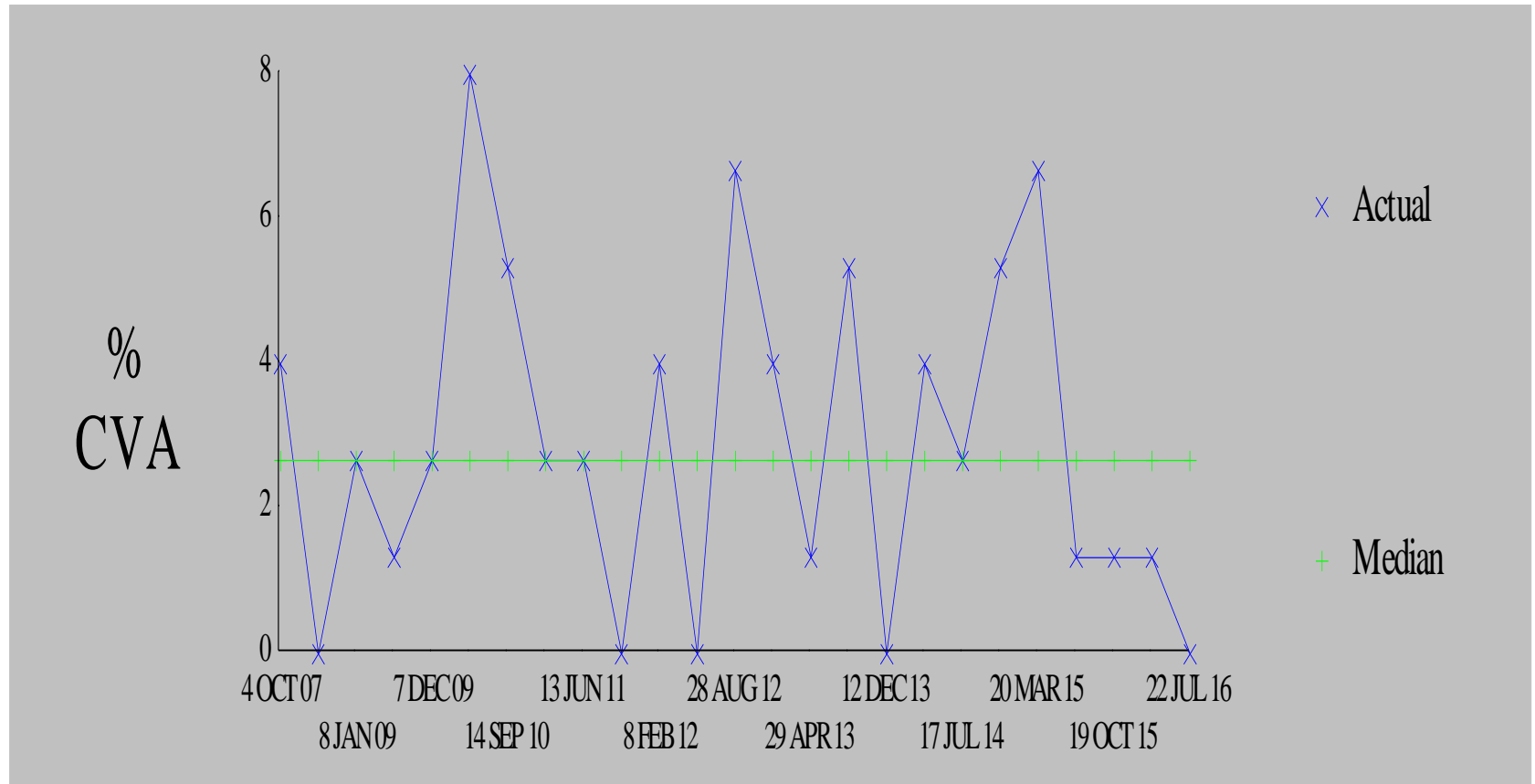
70% Transfusion Free

# Runs Analysis for ICU Blood Transfusion 2015 (All Cases)

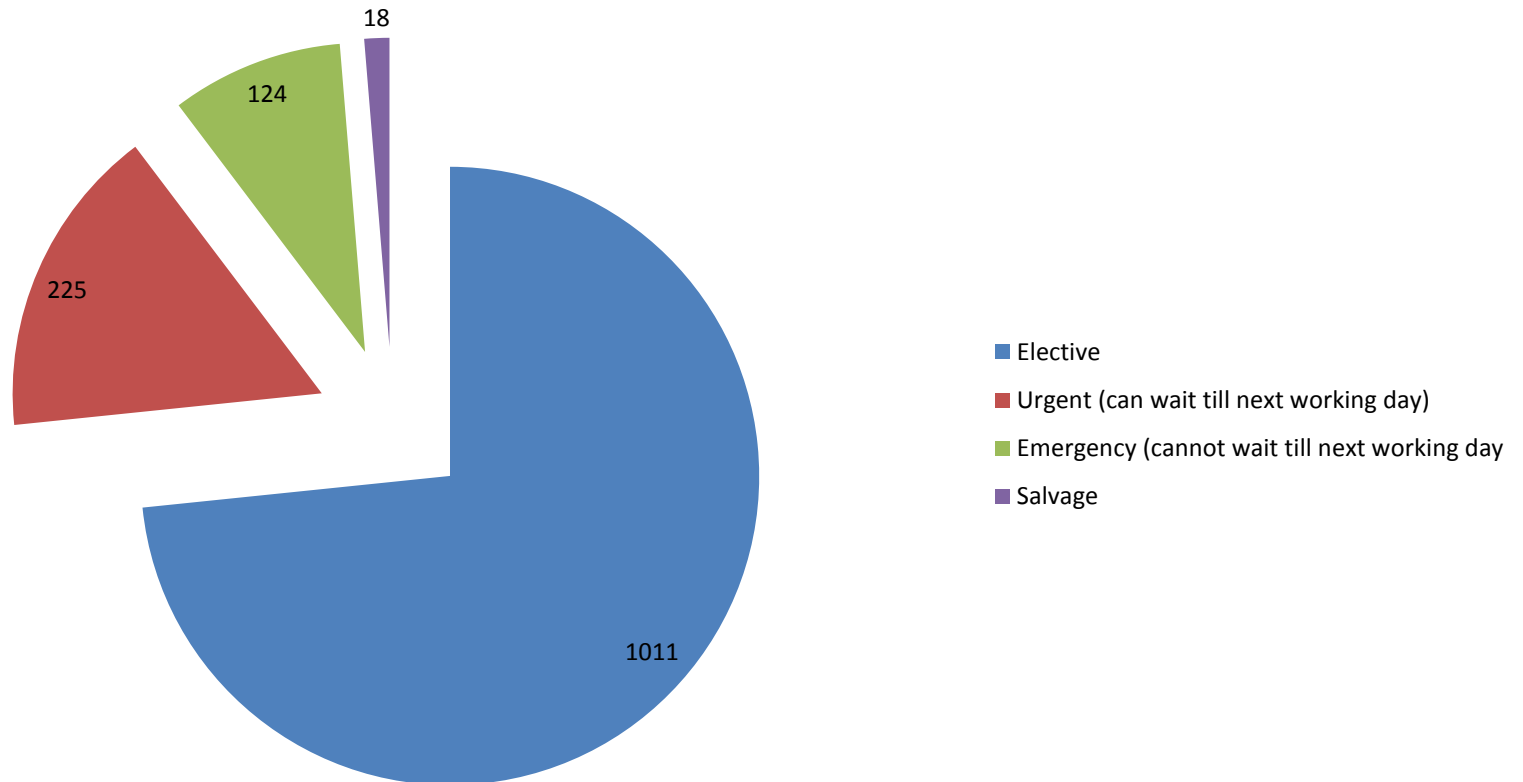


70% Transfusion Free

# Runs Analysis New Post-Operative Stroke 2006-Current (crude rate 2.6%)

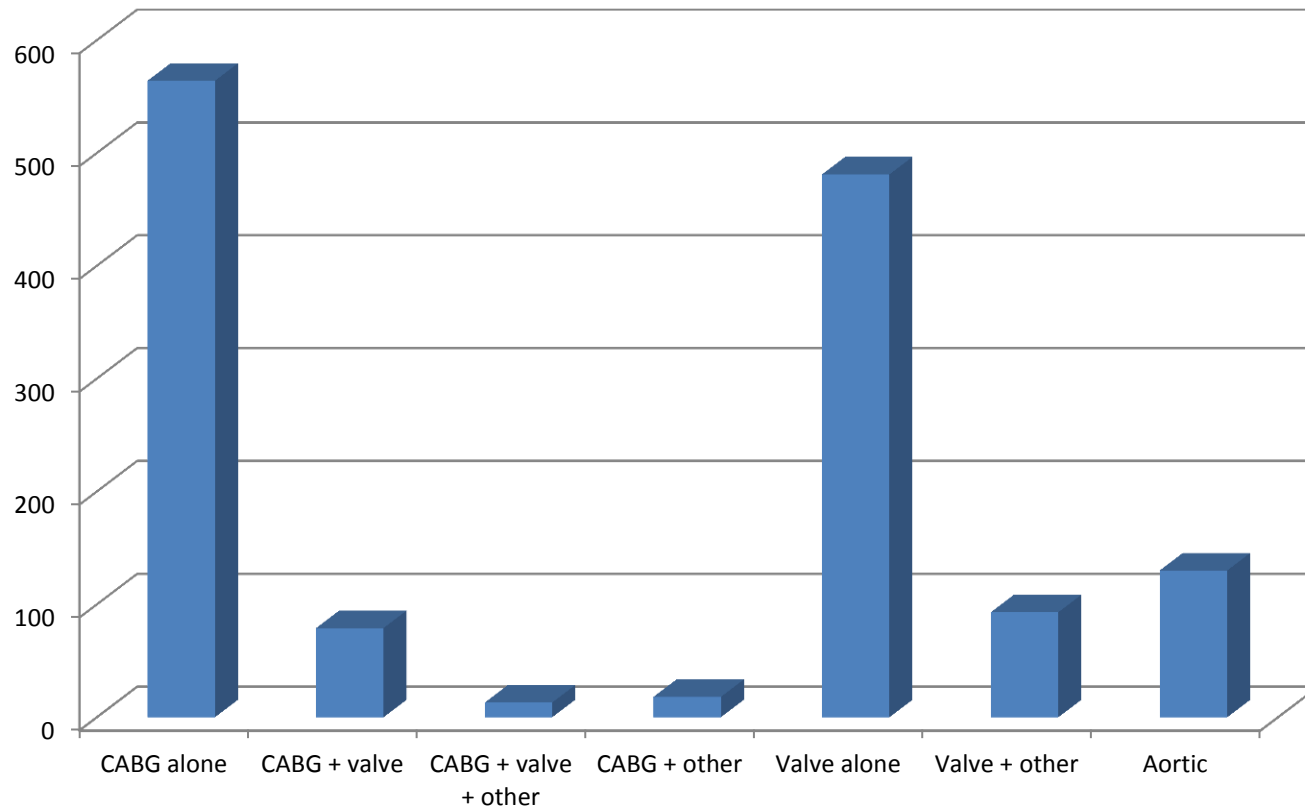


# Supplementary Reports: PWH Referrals 2006-current



Number of Cases Referred

# Supplementary Reports: PWH Referrals 2006-current



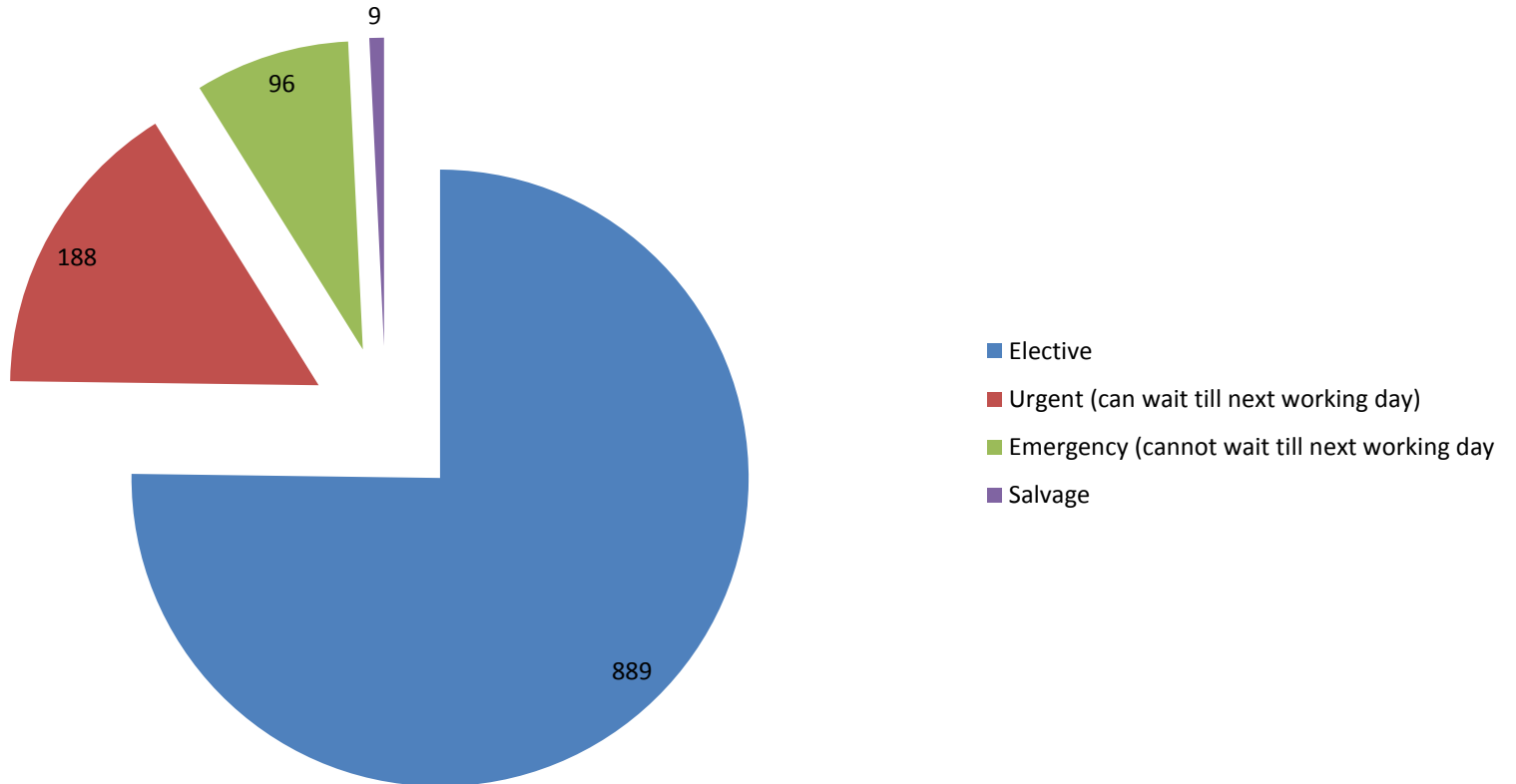
Procedures Performed

# Supplementary Reports: PWH Referrals 2006-current

<b>Number of cases</b>	<b>1379</b>	<i>&lt;----enter value here</i>
<b>Number of deaths</b>	<b>36</b>	<i>&lt;----enter value here</i>
<b>Observed mortality</b>	<b>2.61%</b>	
<b>Performance</b>	<b>definitely better than expected</b>	
<b>Expected mortality</b> <i>(=average Euroscore for these cases)</i>	<b>8.10%</b>	<i>&lt;----enter value here</i>
<b>Upper control limits</b>		
2 s.d.	<b>9.57%</b>	
3 s.d.	<b>10.37%</b>	
3.5 s.d.	<b>10.80%</b>	
4 s.d.	<b>11.17%</b>	
<b>Lower control limits</b>		
2 s.d.	<b>6.67%</b>	
3 s.d.	<b>5.95%</b>	
3.5 s.d.	<b>5.66%</b>	
4 s.d.	<b>5.29%</b>	

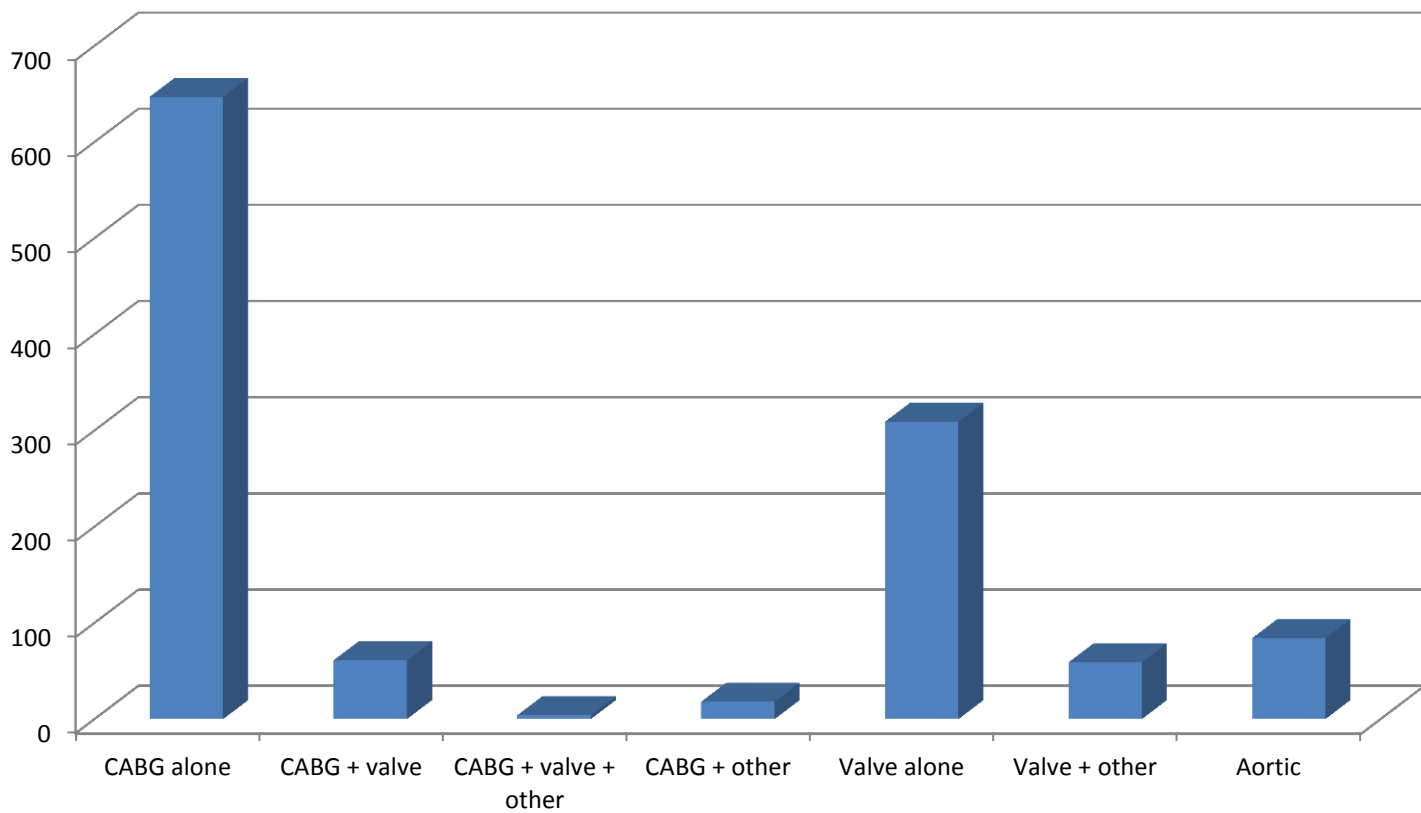
Mortality Control Plot

# Supplementary Reports: TMH Referrals 2006-current



Number of Cases Referred

# Supplementary Reports: TMH Referrals 2006-current



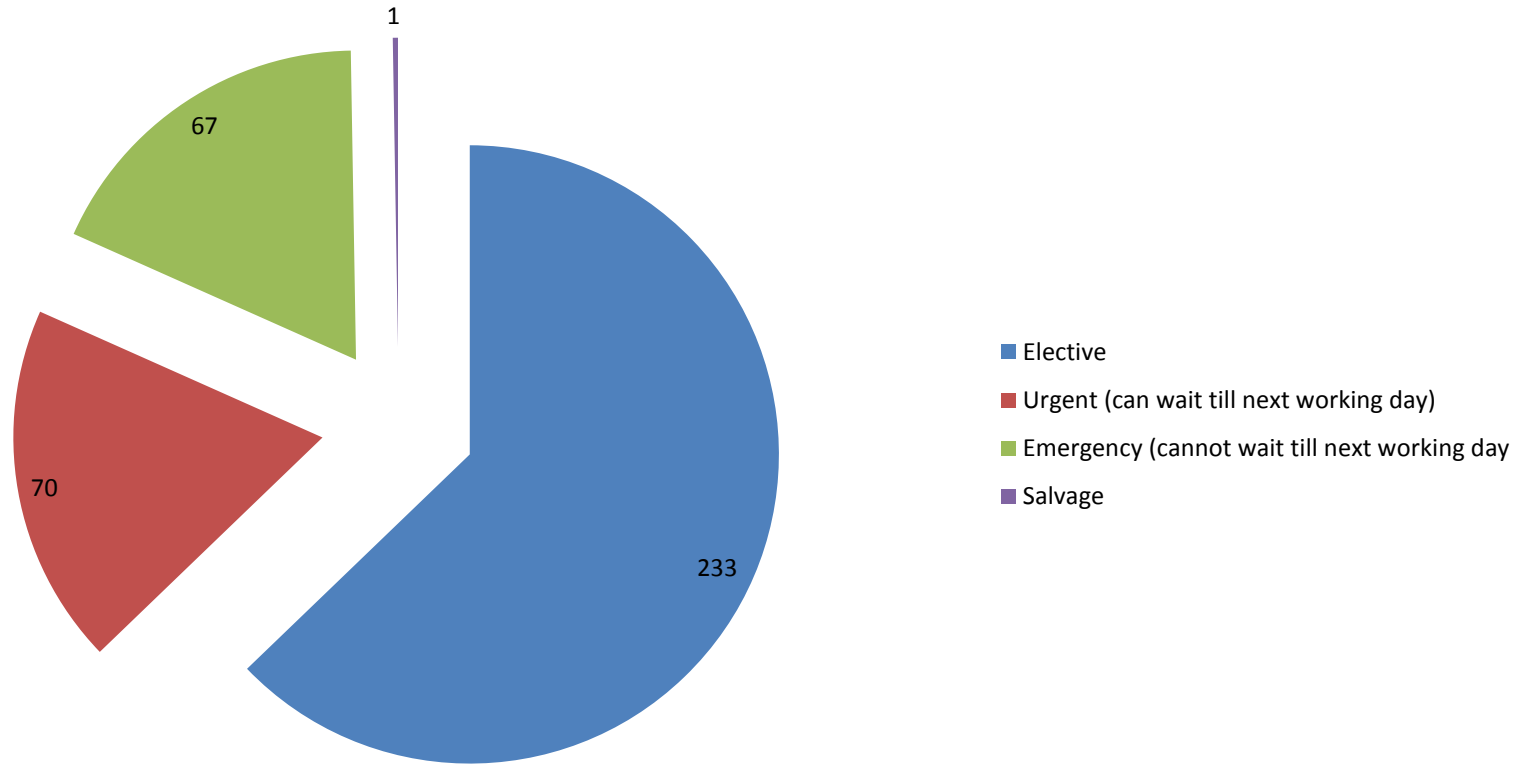
Procedures Performed

# Supplementary Reports: TMH Referrals 2006-current

<b>Number of cases</b>	<b>1182</b>	<i>&lt;----enter value here</i>
<b>Number of deaths</b>	<b>40</b>	<i>&lt;----enter value here</i>
<b>Observed mortality</b>	<b>3.38%</b>	
<b>Performance</b>	<b>definitely better than expected</b>	
<b>Expected mortality</b> <i>(=average Euroscore for these cases)</i>	<b>6.80%</b>	<i>&lt;----enter value here</i>
<b>Upper control limits</b>		
2 s.d.	<b>8.29%</b>	
3 s.d.	<b>9.05%</b>	
3.5 s.d.	<b>9.48%</b>	
4 s.d.	<b>9.90%</b>	
<b>Lower control limits</b>		
2 s.d.	<b>5.41%</b>	
3 s.d.	<b>4.74%</b>	
3.5 s.d.	<b>4.40%</b>	
4 s.d.	<b>4.06%</b>	

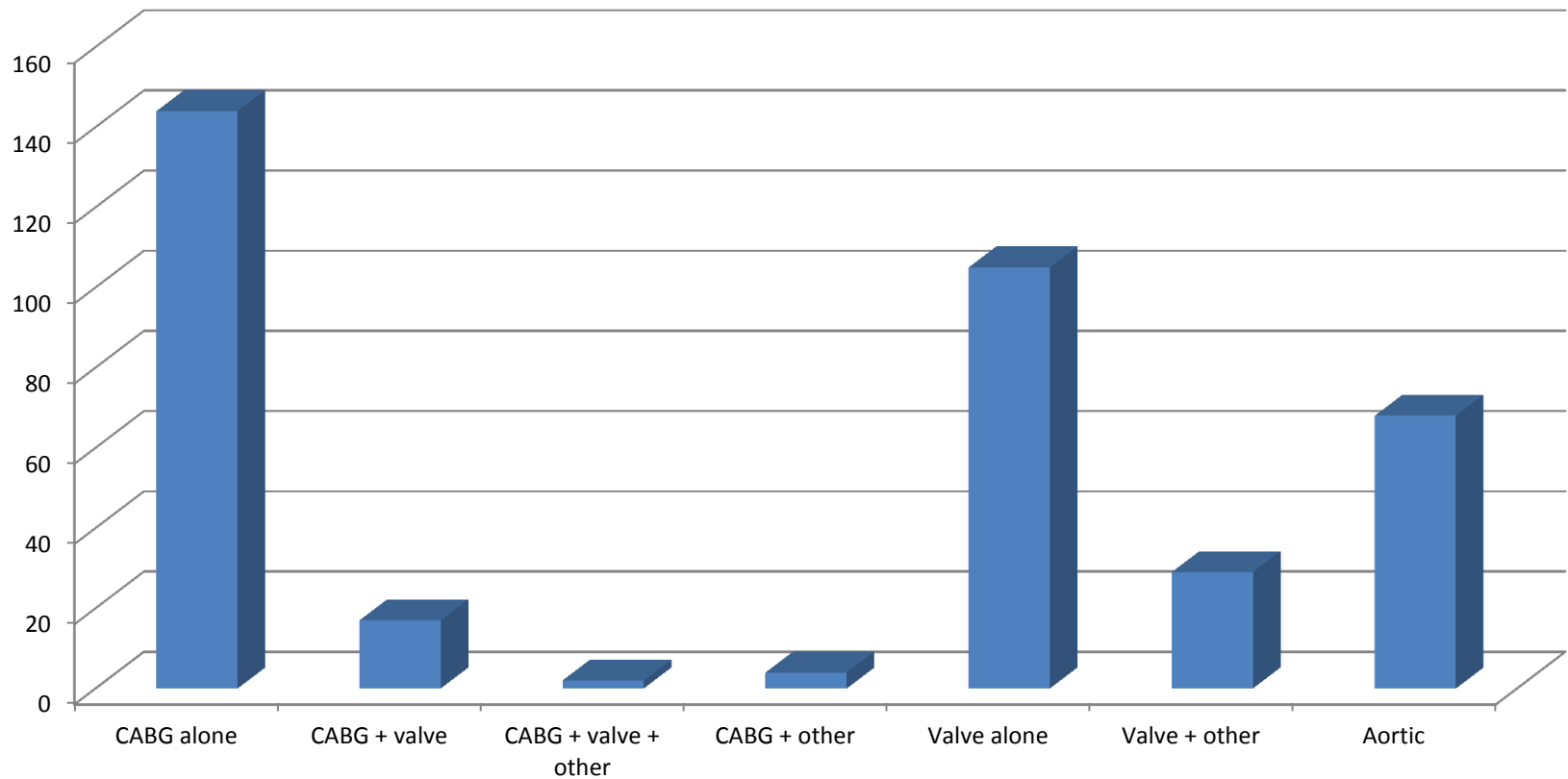
Mortality Control Plot

# Supplementary Reports: NDH Referrals 2006-current



Number of Cases Referred

# Supplementary Reports: NDH Referrals 2006-current



Procedures Performed

# Supplementary Reports: NDH Referrals 2006-current

<b>Number of cases</b>	<input type="text" value="372"/>	<----enter value here
<b>Number of deaths</b>	<input type="text" value="19"/>	<----enter value here
<b>Observed mortality</b>	<b>5.11%</b>	
<b>Performance</b>	<b>slightly low - probably normal</b>	
<b>Expected mortality</b> <i>(=average Euroscore for these cases)</i>	<input type="text" value="9.36%"/>	<----enter value here
<b>Upper control limits</b>		
2 s.d.	<b>12.37%</b>	
3 s.d.	<b>14.25%</b>	
3.5 s.d.	<b>15.05%</b>	
4 s.d.	<b>15.86%</b>	
<b>Lower control limits</b>		
2 s.d.	<b>6.45%</b>	
3 s.d.	<b>5.11%</b>	
3.5 s.d.	<b>4.57%</b>	
4 s.d.	<b>4.03%</b>	

Mortality Control Plot