Surveillance imaging is considered mandatory after Endovascular Aneurysm Repair (EVAR) but many patients are lost to follow-up and the benefit of surveillance is poorly understood. This study aimed to define attendance at post-EVAR surveillance, rates of deliberate removal from surveillance, and the impact of non-compliance with surveillance on re-intervention rate or mortality.

EVAR-SCREEN centres reported EVAR for non-ruptured infrarenal AAA from 1/1/2007 to 31/12/2010, censoring follow-up on 31/7/2014. The primary outcomes were re-intervention for endograft-related complication, AAA-related mortality or amputation, and all-cause mortality. Secondary outcomes included non-compliance with surveillance or deliberate withdrawal of the patient from the local surveillance protocol. Non-compliance was defined by an 18-month period in which no surveillance imaging was performed; and was reported using Kaplan-Meier analysis. Cox Proportional Hazards modelling was performed to identify predictors of poor compliance with surveillance.

1539 patients underwent EVAR in 10 EVAR-SCREEN centres. 5 years after surgery, 39.7% of patients (95% CI 37.2-42.5%) remained compliant with surveillance, while 21.4% (95% CI 18.8-23.9%) were deliberately removed from surveillance. Non-compliant patients were more likely to undergo re-intervention (5-year freedom from re-intervention 76.6% vs. 62.7% in compliant/non-compliant patients, p<0.001) but demonstrated equivalent all-cause mortality (5-year survival 65.6% vs 54.7%, p=0.505, log-rank test). Age (HR 1.027, 95% CI 1.003-1.052, p=0.026) and distance from hospital (HR 1.009, 95% CI 1.006-1.013, p<0.001) were independent predictors of non-compliance with surveillance.

The majority of patients are non-compliant with surveillance after EVAR. This is associated with greater re-intervention rate but not all-cause mortality.
Endovascular aortic repair is associated with activation of markers of radiation induced DNA damage in both operators and patients

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Standard dosimetry records cumulative radiation exposure in patients/operators during endovascular aortic repair (EVAR) but does not inform the biological consequences of this exposure. The aim of this study was to measure biomarkers of radiation exposure during EVAR.

Lymphocyte counts and dose area product (DAP) were recorded in patients/operators undergoing EVAR. Markers of DNA damage (c;H2AX and pATM) were measured peri-operatively in circulating lymphocytes during open, infra-renal (IEVAR) and complex (branched/fenestrated [BEVAR/FEVAR]) aortic repair. Inter-operator radiation sensitivity was determined by measuring c;H2AX/pATM in blood samples exposed to radiation (100-1000mGy).

The fall in patient lymphocyte count was greater after endovascular (n=118) compared with open repair (P<0.0001, n=35), with prolonged (~2-fold) count recovery after EVAR (P=0.007). There was ~5-fold increase in c;H2AX and pATM in patients immediately after IEVAR and BEVAR/FEVAR (P<0.005 for both;n=48), and in operators immediately after BEVAR/FEVAR (P<0.01 for both;n=14), but not IEVAR.

DAP correlated with c;H2AX rise (P<0.02) in patients after EVAR. The c;H2AX/pATM levels had normalised for all patients/operators after 24hrs. c;H2AX/pATM did not rise in either patients or operators after open surgery. Inter-operator (n=6) radiation sensitivity varied significantly (repeated measures 2way-ANOVA, P<0.007).

Our biodosimetry assays suggest DNA damage occurs in patients and operators after EVAR and may be more relevant for gauging the consequences of radiation exposure than standard dosimetry that currently dictates "safe" exposure levels. A better understanding of the processes that increase c;H2AX/pATM and their relation to the lifetime-attributable risk of cancer is important for both operator and patient safety.
Failure to rescue and mortality from abdominal aortic aneurysm repair is associated with hospital staffing and volume

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Failure-to-rescue (FTR) after complications, rather than the complications per say, drive surgical mortality. This study investigated if FTR underscores the variation in mortality of AAA repair patients and whether modifiable differences in trust structures are associated with FTR.

Elective or emergency AAA repair patients (2005-2010) were extracted from the English NHS Hospital Episode Statistics data warehouse (n=26841). Trusts in the risk adjusted top and bottom 20% of the Poisson distribution for 90-day death were classified as "highest" and "lowest" mortality. Complication and FTR rates were compared. Similarly trust level variables were compared between highest and lowest FTR categories, and tested for association with FTR.

FTR rates, but not complication rates, were significantly lower in Trusts with the lowest death rates after AAA repair. In multifactorial models, FTR rates after surgical complications were highest in the lowest tertile of AAA repair volume (Odds Ratio 1.264 [95% CI 1.038-1.540], p=0.0120) and consultant doctor staffing (1.350 [1.107-1.646], p=0.0031). FTR rates after medical complications were higher in the lowest tertile of AAA repair volume (1.618 [1.417-1.848], p<0.0001) and CT utilisation (1.227 [1.077-1.399], p=0.0022).

Death rates after elective and emergency AAA repair are more influenced by FTR rates than complications rates. FTR appeared to be affected by structural and process factors within hospitals that could provide targets for quality improvement. The volume of AAA repairs undertaken remains a significant determinant of outcome for both FTR and death rates.
Endovascular repair for acute thoraco-abdominal aneurysms

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Open repair for acute thoraco-abdominal aneurysm (TAAA) is associated with high morbidity and mortality and is restricted to young fit patients. We report the outcome of endovascular repair (EVAR) for acute TAAA and assess the applicability of the T-Branch off-the-shelf (OTS) device for this group of patients.

Interrogation of a prospective database identified 39 patients (27 men; mean age: 72±8 years; 10 rupture, 29 symptomatic; 14 mycotic) who underwent EVAR for acute TAAA between September 2012 (our first non-elective T-Branch case) and November 2015. Mean aneurysm diameter was 80±20mm. Twenty patients had extent I-III and 19 had extent IV aneurysms. Median follow-up was 11 months.

Surgeon-modified fenestrated EVAR was used in 24 patients, two were treated with chimney/periscope EVAR, and 13 (33%) were suitable for T-Branch. A total of 127 target vessels (TV) were targeted for preservation (3.2/patient) and two occluded within 30-days. The 30-day mortality was 26%. Two patients developed paraplegia and both died. Actuarial survival at 12 and 24 months was 71% and 53%, respectively. Actuarial freedom from re-intervention at 12 and 24 months was 77% and 71%, respectively.

EVAR for acute TAAA is associated with acceptable early and mid-term results compared with open repair. Only one-third of acute TAAA patients were suitable for the T-Branch device. Further advances in device design are required to treat the majority of acute TAAA patients with OTS technology.
The Threshold for Aortic Aneurysm Repair and its Association with Aneurysm-Related Mortality: Lessons from International Discrepancies in Practice

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There remains considerable international variation in the threshold for abdominal aortic aneurysm (AAA) repair. This study examined whether differences in the prevalence or diameter for AAA repair might be associated with international discrepancy in AAA-related mortality.

Frequency data for intact AAA repair were extracted from English Hospital Episode Statistics and the USA Nationwide Inpatient Sample, 2005-12. AAA diameter at repair was extracted from the English National Vascular Registry (2014), and the USA National Surgical Quality Improvement Programme (2013). AAA-related mortality was determined from USA Center for Disease Control and English Office of National Statistics 2005-12. Prevalence for AAA of given diameter was extracted from the English National AAA Screening Programme 2009-14. International comparisons were performed after age/gender standardisation or conditional regression.

29,300 English patients underwent intact AAA repair compared to 278,921 USA patients from 2005-12. Intact AAA repair was significantly more common in the USA (OR 2.058; 95%CI 2.033-2.083; p<0.0001) and AAA-related mortality significantly more common in England (OR 3.596; 95% CI 3.549-3.644; p<0.0001). The mean diameter for repaired AAA was larger in England (6.37cm vs 5.83cm, p<0.001). English screening data revealed that AAAs at the mean diameter for repair in the USA were almost twice as prevalent as AAAs at the mean diameter for repair in England (48 vs 76 per 100,000).

A greater rate of AAA repair at lower mean diameter was associated with lower AAA-related mortality in the USA. The international discrepancy in AAA-related mortality is concerning, and potentially explicable by surgical activity.
Outcomes are worse for RAAA patients who present at the weekend

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It is widely debated whether hospital treatment at the weekends compared to weekdays is associated with poorer outcomes. Previous findings have shown that patients admitted during weekends are at increased risk of dying compared to weekday admissions. We specifically compared survival of patients with repair of ruptured abdominal aortic aneurysm on weekdays and weekends.

Between January 2006 and December 2015 241 patients underwent emergency endovascular or open repair of ruptured abdominal aortic aneurysms. Patients were divided into two groups by day of operation. Group 1 had weekday surgery and Group 2 underwent weekend operations, defined as intervention between Friday 5pm and Monday 9am. The 30-day mortality and longer-term survival were compared between the two groups.

The 30-day mortality of patients in Group 1 was less than those patients in Group 2, 20.1% and 31.1% respectively (p=0.06). The median long-term survival for Group 1 was statistically better at 581 days (IQR 78-1642 days) compared to 280 days (IQR 5-1447 days) for Group 2 (p=0.02).

Outcomes for RAAA appear to be worse for patients who present at weekends than for those who present in the week. The explanation for this difference is likely to be multifactorial and requires further study. Current arrangements for the emergency care of RAAA at weekends in the UK may be inadequate.