

Practice Variation in Detection of Coronary Allograft Vasculopathy (CAV) in Children: A Pediatric Heart Transplant Study

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Background/Hypotheses

- CAV is a leading cause of mortality after heart transplantation (Htx) and the major cause for retransplantation. Surveillance frequency & methodology vary widely between institutions, however angiography remains the mainstay of detection for CAV.

Hypotheses

- Angio surveillance for CAV will continue at the same frequency for pts as they advance in time post Htx
- Infant transplant recipients undergo less coronary angiography than older recipients
- Angio surveillance varies between pediatric Htx centers, with some sites performing q 1 year, some q 2 years, and some using angio only in symptomatic patients

Methods

- Coronary evaluation practices were reviewed among 51 PHTS institutions from January 2001 to June 2017 for primary Htx between 2001 and 2015.
- Coronary surveillance was categorized as non-invasive or invasive, and patient angiographies were categorized as surveillance or for new symptoms.
- CAV detection rate in each category was calculated for each year of follow up.
- An electronic survey was sent to centers, with queries regarding primary mode of surveillance for CAV, and additional questions were asked regarding clinical practices about management of CAV.

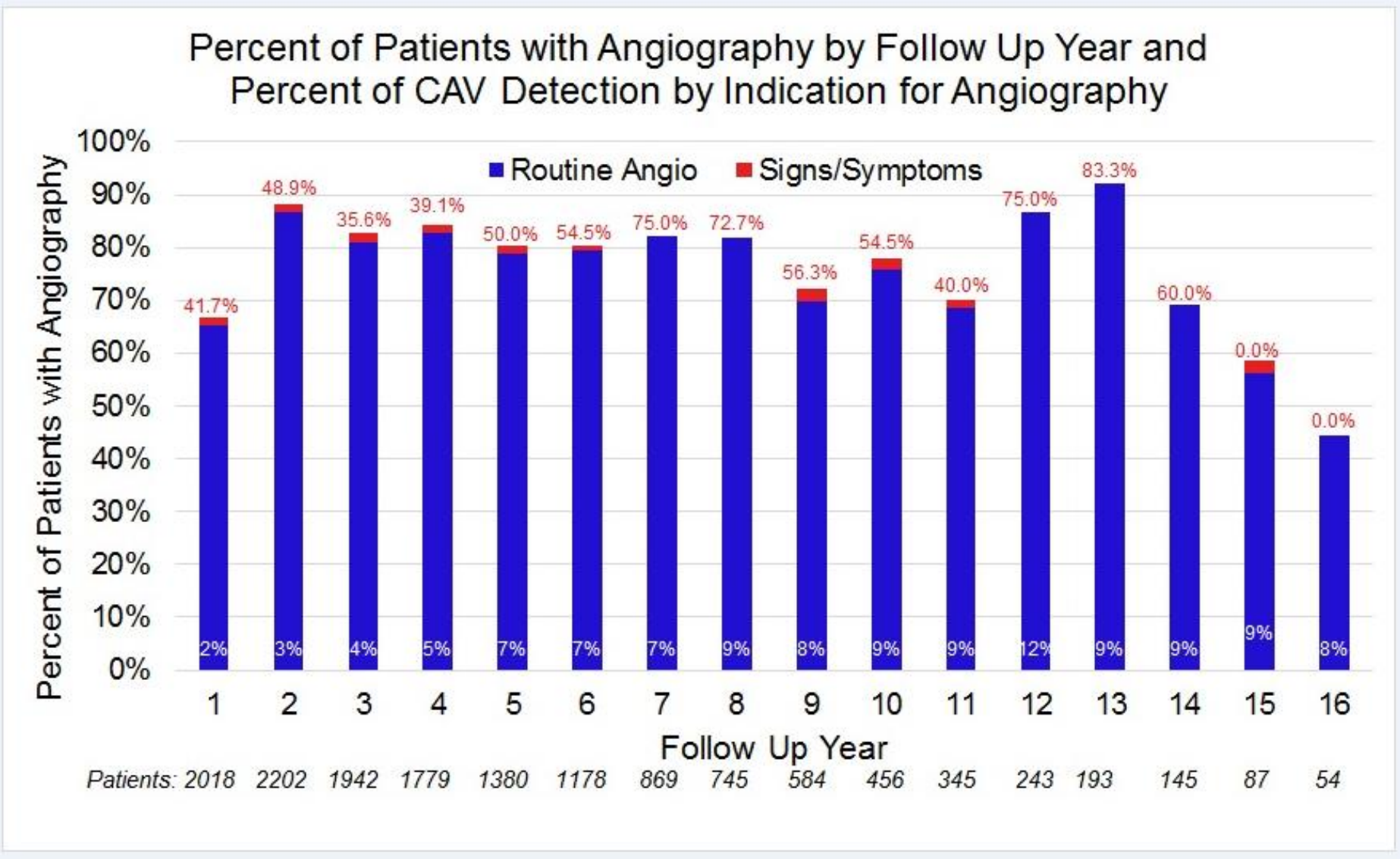
Results

Table .Clinical Characteristics

N = 3165		%
Male	1733	54.8
White Race	2241	70.8
Congenital HD	1387	43.8
PRA > 10% (953 missing)	524	23.7
Status 1A at Htx	2474	80.2
Ischemic Time (mins)	220.9 +/- 71.1	
Age at Htx	6.9 yrs +/- 6.2	
Age < 1 yr	902	28.5
Age 1-5	669	21.1
Age 6-10	450	14.2
Age > 10 yrs	1144	36.2
BMI < 25	2930	92.58
BMI 25 – 30	136	4.30
BMI ≥ 30	99	3.13

12,682 angiograms were performed in 3,165 unique patients transplanted from 2001-2015. Angiograms comprised 97% of all coronary evaluations. Six sites also perform intracoronary ultrasound.

Fig. 1 Angio by F/u Yr- Any New CAV



- The total % of ps undergoing an angiogram each yr post HTx is shown.
- Each yr is divided into routine angios (Blue) and angios done for symptoms (Red).
- Yearly incidence of CAV is indicated in white %.Red Numbers are % of those with abnormal angios w symptoms.
- Only 2% of all pts had angios for symptoms and 1% of all patients had new CAV detected with h/o symptoms (only 0.6% of all evaluations).

Non-invasive surveillance methods (19 sites) varied widely, but included resting echo (55%), dobutamine stress echo (37%), CT angio (1.3%), exercise stress test (1%), exercise stress echo (2%), and stress perfusion testing (0.33%).

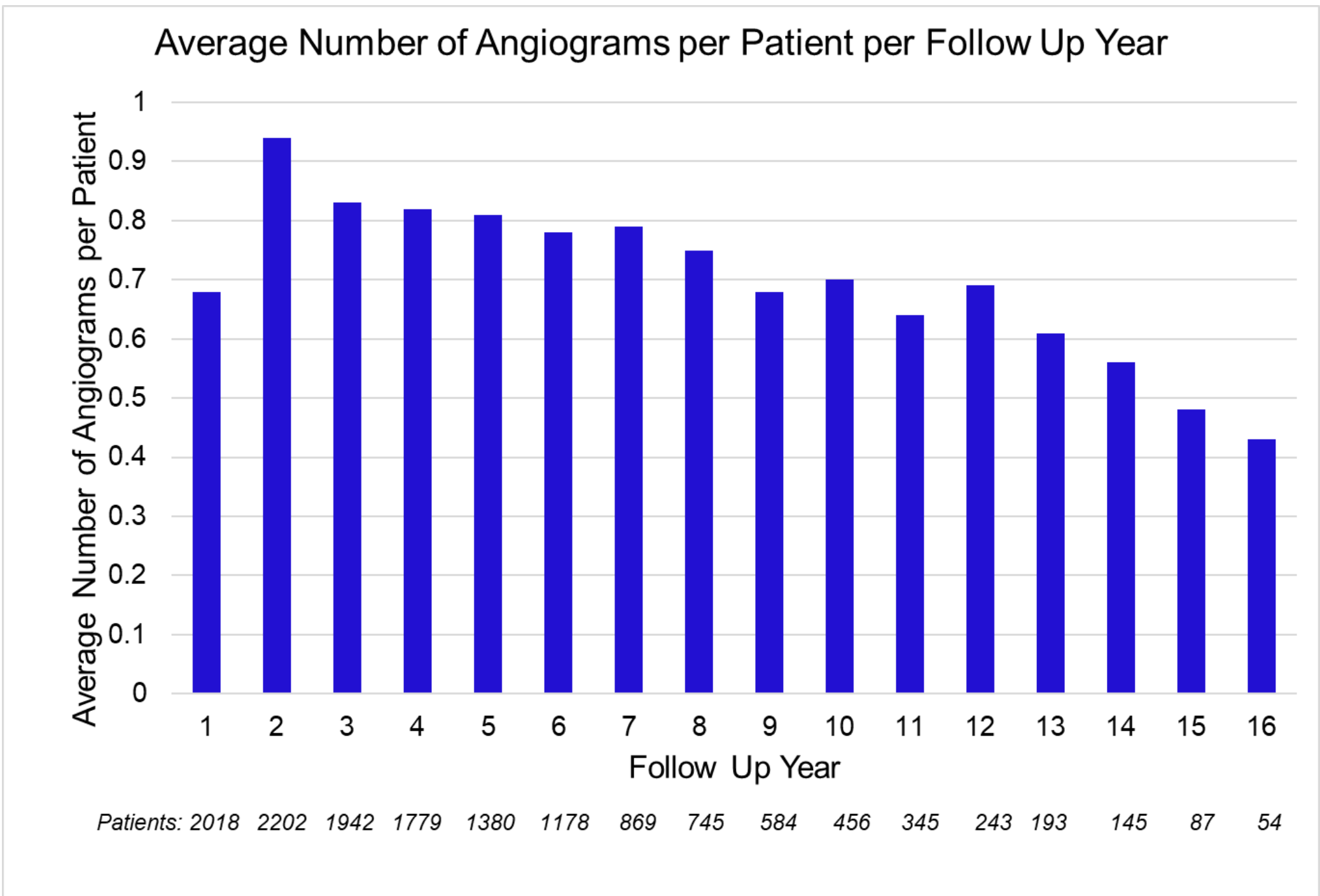
Electronic Survey Results:

- 51/58 PHTS responded to electronic email (88%)
- 33 sites do yearly angiography, 9 alternate every other year, 9 use other modalities
- 19 sites routinely use stress tests (more common with athletes, mostly ECG treadmills) to enhance annuals.

Disclosures

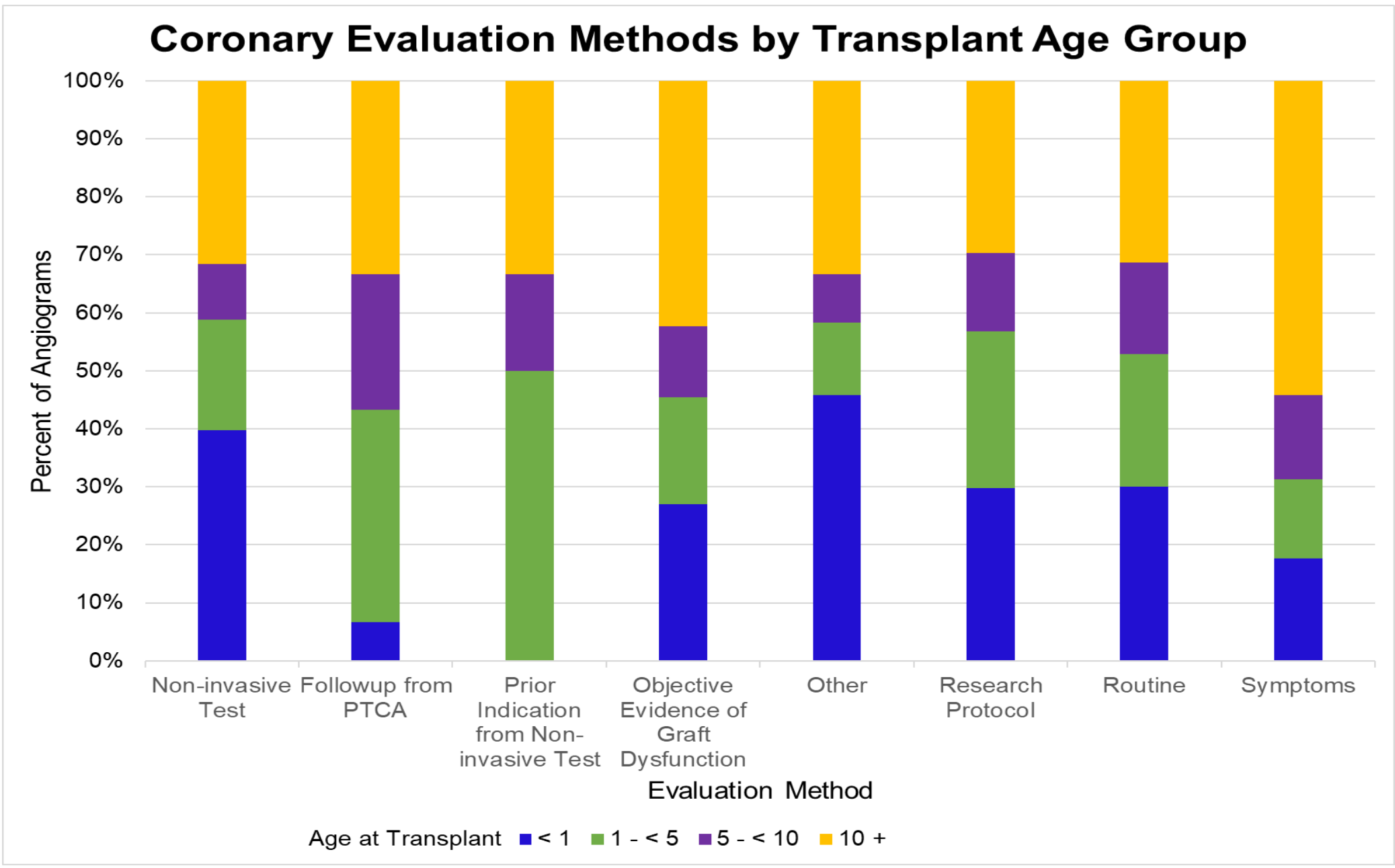
No authors have any relevant disclosures.

Fig 2 Average Angios/Pt/Yr



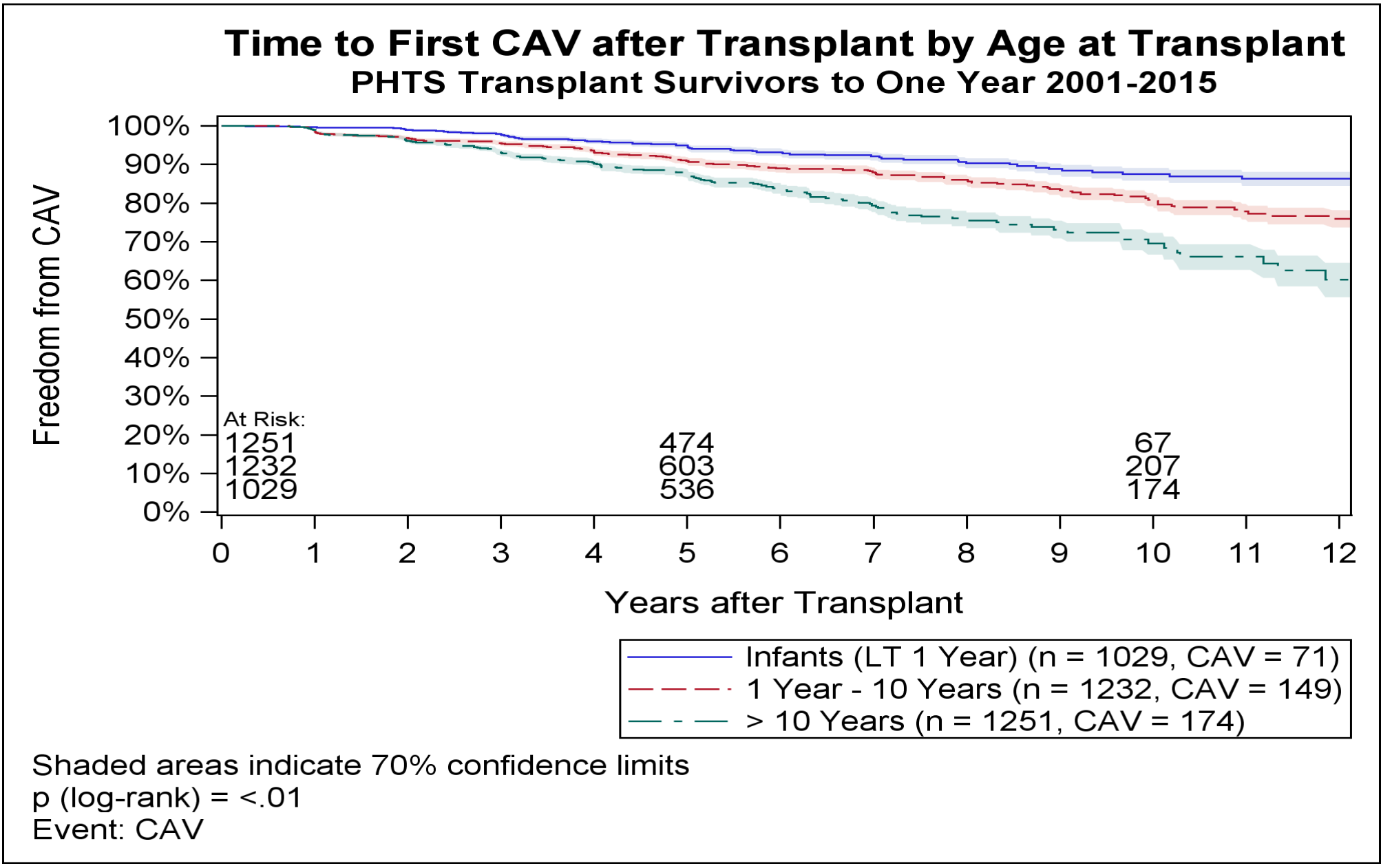
- This Figure suggests that as patients get further out from heart tx, they tend to have less frequent coronary angiography, ie patients receive annual angios in the early years 1-5, then less often by years 11-15.

Fig. 3 Surveillance Practice for CAV- Infants, Children, Teenagers



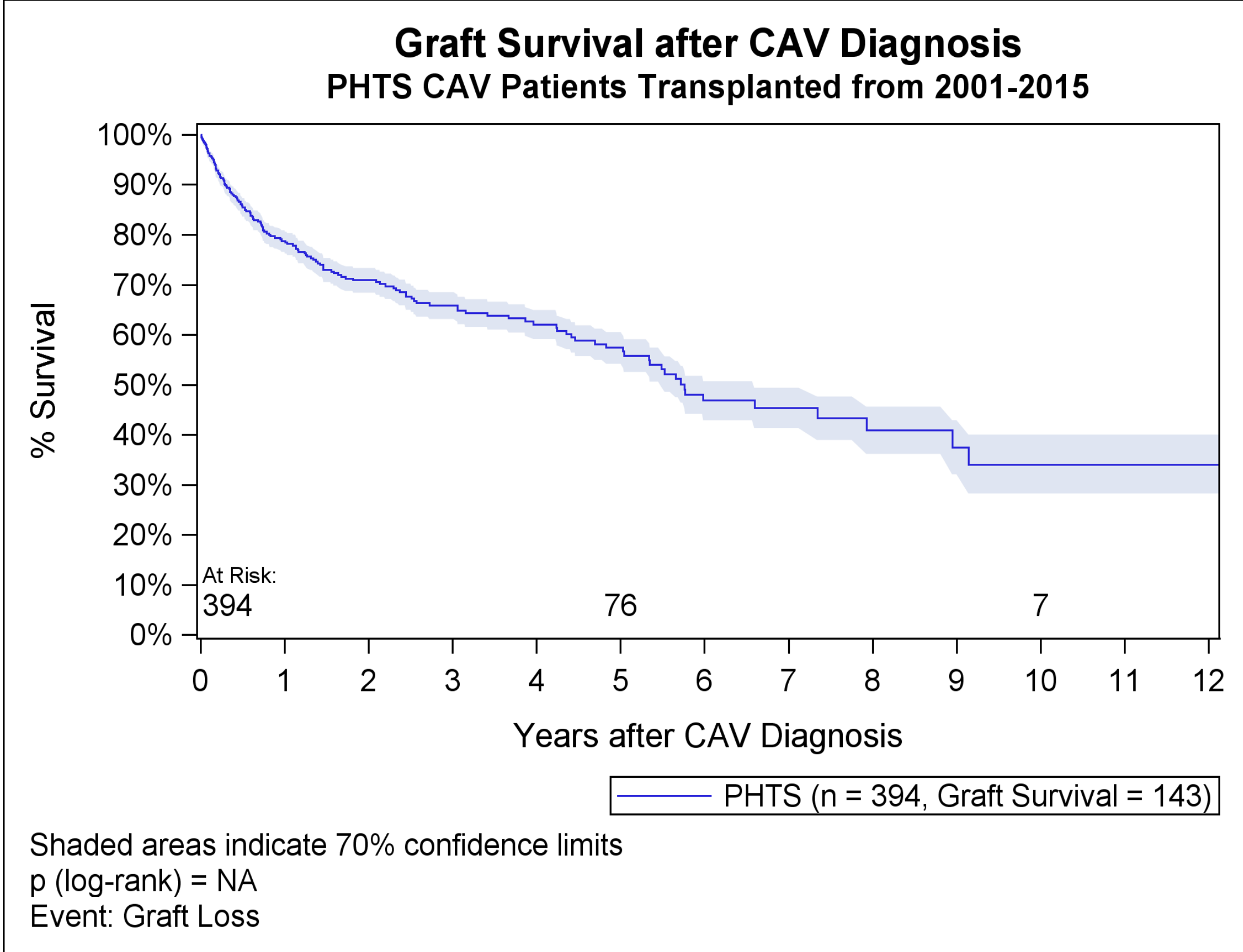
- Institutional routine is the most common indication for angiography, and is undertaken in all age groups in similar fashion.
- Angiography for symptomatic patients or those with evidence of graft dysfunction is predominantly in older patients, suggesting that infants have less angio for symptoms

Fig. 4 Time to First CAV by age at HTx



Ten year freedom from CAV for 1 yr survivors was 79.9%. Infants freedom from CAV was superior to children > 10y, at the time of Htx (P<0.01).

Fig. 5 Survival after any CAV Diagnosis



Once any CAV develops, graft survival was 57.4% at 5 years, and worse for severe CAV.

Fig 5 confirms that any CAV is a serious problem with severe CAV resulting in death/graft loss often within 1 yr of diagnosis, thus sensitive/specific methods for surveillance remain critical.

Conclusions

- Angiography predominates for CAV surveillance in pediatric Htx recipients, with most centers performing yearly angios during the first 5 years post Htx, and decreasing surveillance in later years.
- Risk stratifying younger age groups, and perhaps other low risk patients may be a reasonable approach, since infant tx patients had less CAV at 10 yrs post Htx. Once CAV is detected, graft loss is significant.
- Greater understanding of practice variation in prophylaxis and treatment may aid in standardizing approaches to CAV management in the pediatric population

Clinical Implications

- Should low risk patients have fewer angiograms?
- Should young infants not have angiography?
- Should some patients be risk stratified with noninvasive functional studies instead of angio?
- Patients receive angiography less frequently as they get further out from Htx, at a time when CAV incidence increases.
- These important questions warrant further study in a collaborative PHTS prospective approach

References

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