Transcatheter Aortic-Valve Implantation with or without on-site Cardiac Surgery (TRACS) trial

Background

Aortic valve interventions must be performed in Heart Valve Centres that declare their local expertise and outcomes data, have active interventional cardiology and cardiac surgical programmes on site, and a structured collaborative Heart Team approach.

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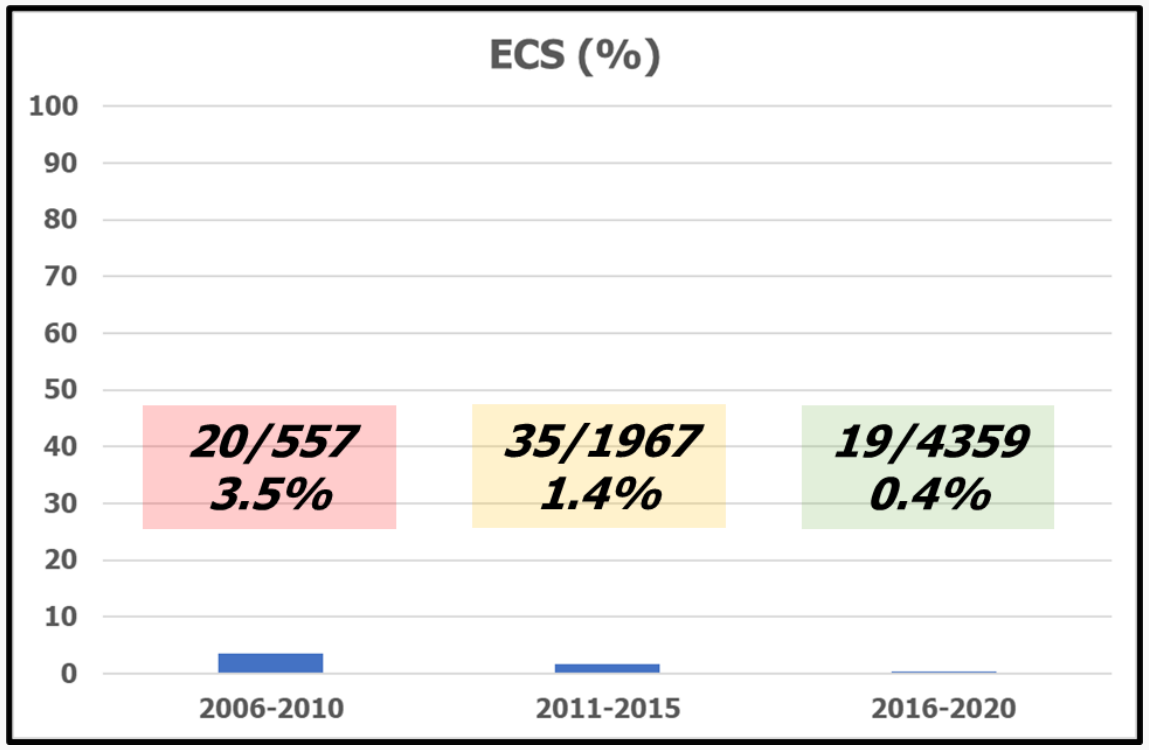
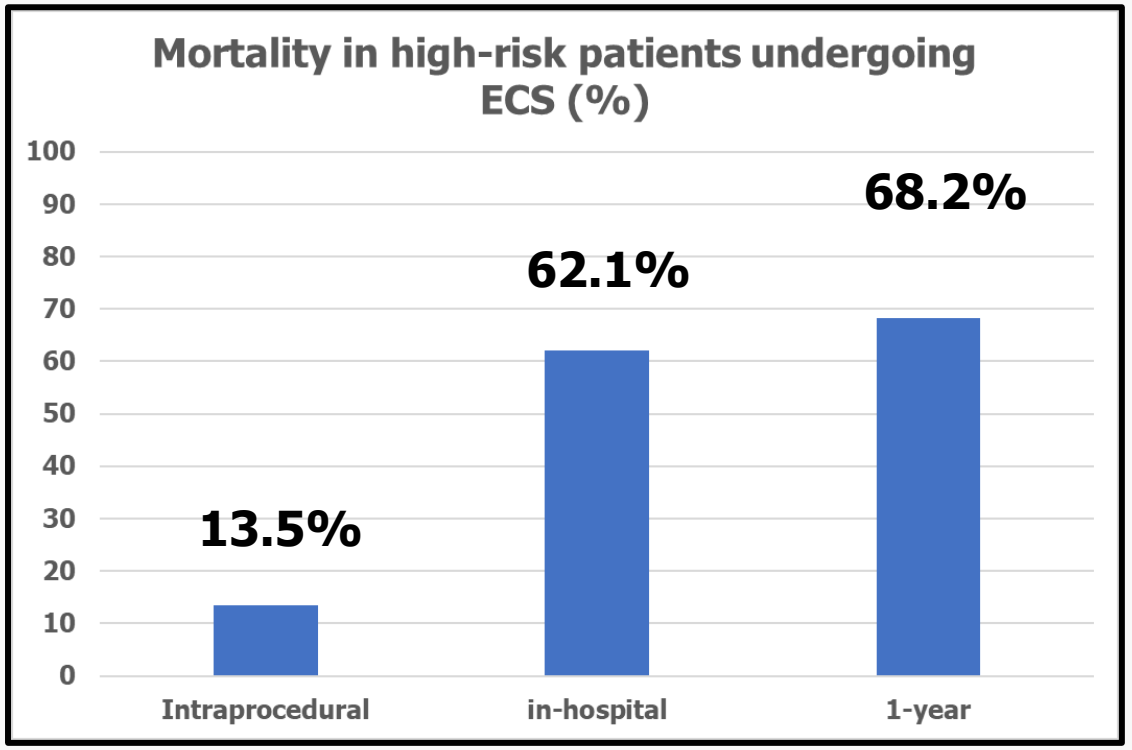
Lacking RCTs on the topic, current guidelines suggest to perform TAVI in centers with on-site cardiac surgery

Background





In the current TAVI era:

- **The need for emergent cardiac surgery is anecdotical (0.4%)**
- **ECS does not change outcome in high-risk patients**
- **The NNT is 625, then ECS saves a live any 156.250 TAVI in high-risk patients**

Eur J Cardiothorac Surg 2023

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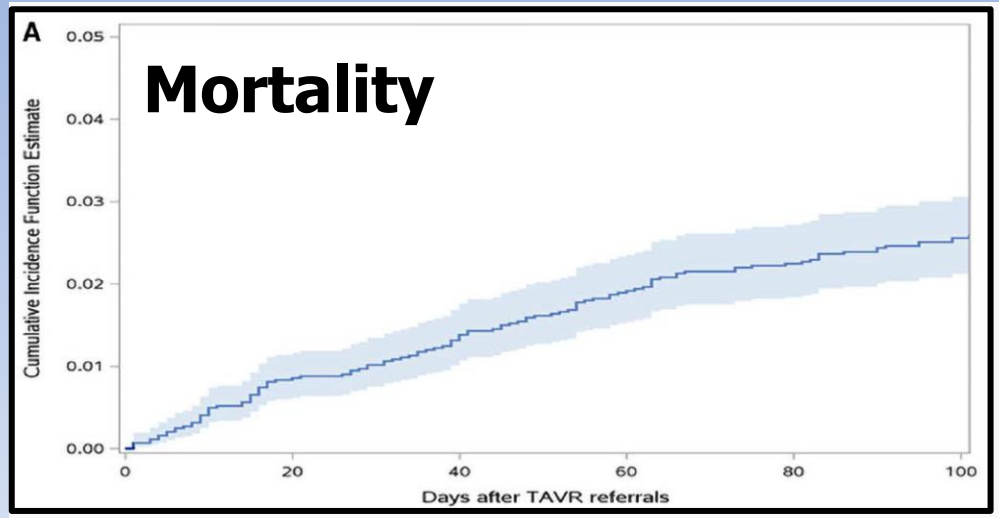
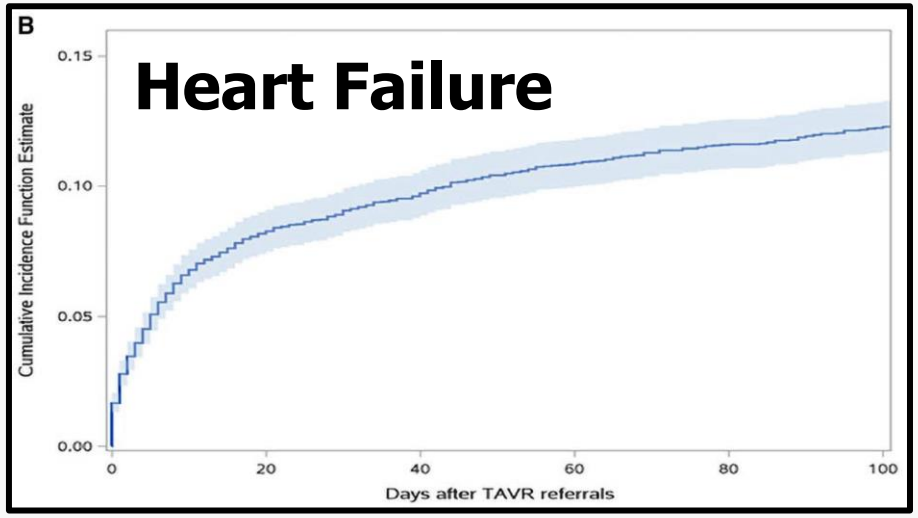
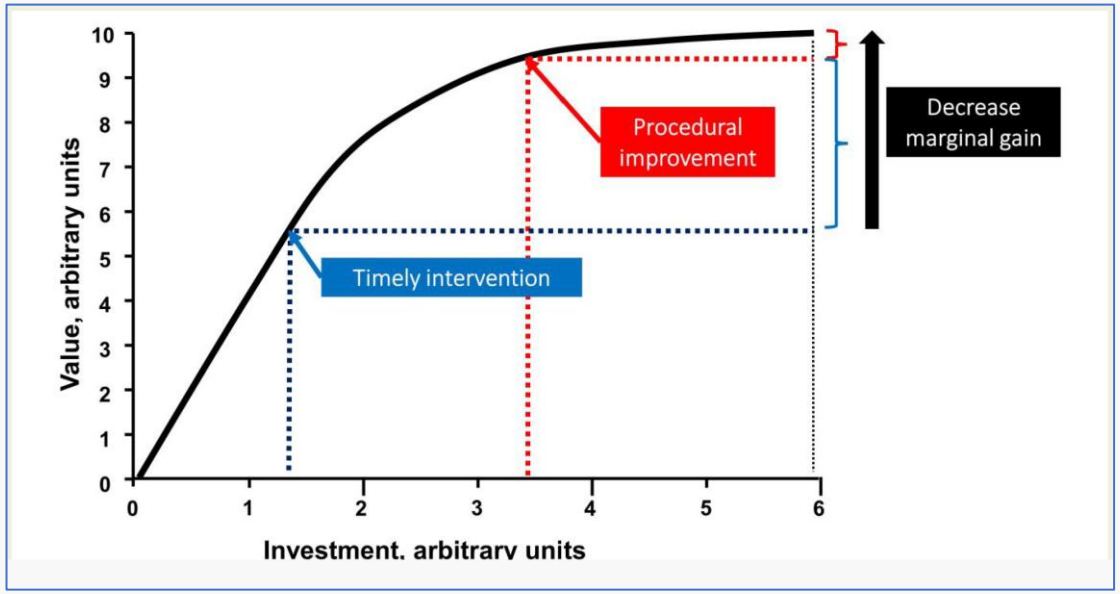




- **Waiting time is associated to mortality and readmission for HF**
- **A timely intervention is the key to maximize clinical benefit from TAVI**



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Hypothesis

- **A shared indication by experienced Heart Team plus planning and intervention performed by experienced operators are the most effective strategies to minimize complications, independently by the presence or not of on-site cardiac surgery**
- **Shifting patients from hub to spoke centers could reduce waiting times to TAVI and events while on the waiting list**

Study design

- **The TRACS is an all-comer, prospective, randomized, multicenter, open-label trial with blinded adjudicated evaluation of outcomes (PROBE)**
- **The TRACS trial will involve centers without on-site cardiac surgery**
- **Participating centers and their operators must follow selective criteria for eligibility**

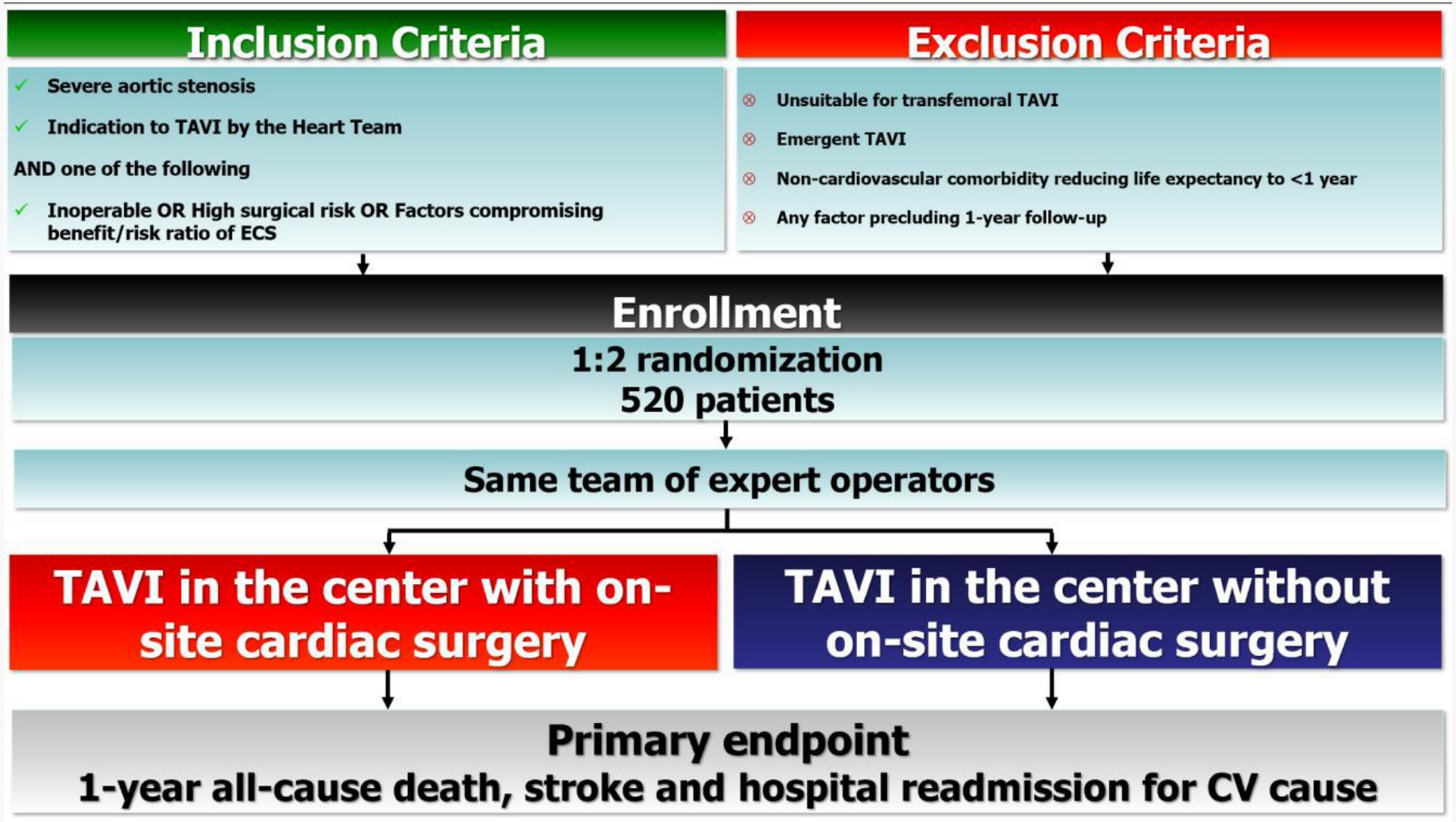
Requirements for participating centers

1. Availability of standard operating procedure with a cardiac surgery department for an established, weekly Heart Team discussion
2. Availability of standard operating procedure for rapid transfer of patients with procedural complications to cardiac surgery with a maximum delay of 60 minutes (maximum distance between centers without cardiac surgery and referring center 90 km)
3. Five-year experience in screening, selection, and management of TAVI patients
4. At least 2 certified operators or a dedicated inter-center team performing TAVI procedure (see below section “requirements for study TAVI operators”)
5. At least 3-year experience in performing TAVI procedures in a center with on-site cardiac surgery, with participation (as equipe) in at least 100 TAVI procedures
6. At least 5-year experience in advanced cardiac imaging including transesophageal echocardiography and cardiac computed tomography
7. On-site vascular surgery
8. On-site electrophysiology laboratory (permanent pace-maker implantation)

Requirements for participating operators

1. At least 5-year experience in coronary interventions
2. More than 75 PCIs by year
3. Experience in the use of tools for the retrieval of intravascular foreign bodies
4. Experience in pericardiocentesis
5. Experience in ultrasound-guided puncture of the femoral artery
6. Experience in suture-mediated closure of femoral artery access
7. Experience in the management of peripheral vascular complications
8. At least 2-year experience in TAVI procedures as first and second operator
9. At least 50 TAVI procedures as first operator
10. More than 20 TAVI by year.

Study Flow


Inclusion Criteria
Severe aortic stenosis
Indication to TAVI by the Heart Team
AND one of the following
Inoperable OR High surgical risk OR Factors compromising benefit/risk ratio of ECS
Exclusion Criteria
Unsuitable for transfemoral TAVI
Emergent TAVI
Non-cardiovascular comorbidity reducing life expectancy to <1 year
Any factor precluding 1-year follow-up
Enrollment
1:2 randomization
520 patients
Same team of expert operators
TAVI in the center with on-site cardiac surgery
TAVI in the center without on-site cardiac surgery
Primary endpoint
1-year all-cause death, stroke and hospital readmission for CV cause

Inclusion criteria

- **Severe aortic stenosis**
- **Indication to TAVI confirmed by the Heart Team**

AND one of the following

- **Inoperable**
- **High surgical risk**
- **At least one factor compromising benefit/risk ratio of ECS**

Factors compromising benefit/risk ratio of ECS

- Porcelain aorta or severely atherosclerotic aorta
- Frailty/Reduced physical performance
- Cognitive impairment, dementia or Parkinson disease
- Severe liver disease/cirrhosis
- Hostile chest
- Internal mammalian artery or other critical conduit(s) crossing midline and/or adherent to posterior table of sternum
- Severe pulmonary hypertension and/or severe right ventricular dysfunction
- Age ≥85 years
- Severe Chronic Obstructive Pulmonary Disease (COPD)

Exclusion criteria

1. Unsuitable for transfemoral TAVI
2. Emergent TAVI
3. Non-cardiovascular comorbidity reducing life expectancy to <1 year
4. Any factor precluding 1-year follow-up
5. Refusal of informed consent

The role of the Heart Team

Diagnosis of severe aortic stenosis

(including clinical history, transthoracic echo, coronary artery angiography, computed tomography)

Heart Team discussion about surgical aortic valve replacement vs. TAVI

Indication to surgery

Indication to TAVI

Heart Team discussion about the eligibility for the study)

Not eligible

Eligible

Discussion of the study with the patient

Written informed consent, inclusion, randomization

Study arms

RANDOMIZATION TO TAVI WITHOUT ON-SITE SURGERY

- **After randomization, study TAVI operators of the participating center will schedule the patient for TAVI in their hospital without on-site surgery**

RANDOMIZATION TO TAVI WITH ON-SITE SURGERY

- **After randomization, the patient will be immediately inserted in the waiting list of the referring center with on-site surgery. Study TAVI operators of the participating center will perform the TAVI procedure in the hospital with on-site surgery according with the waiting list schedule of the latter. TAVI procedure will be performed in agreement with current guidelines and institutional standards.**

Primary Efficacy Endpoint

One-year cumulative occurrence of all-cause death, stroke and hospital readmission for cardiovascular causes

To test if the outcome of TAVI procedures performed by experienced operators in the center without on-site cardiac surgery is non inferior to that of TAVI procedures performed by the same team in the center with on-site cardiac surgery

Secondary Endpoints

- All-cause death
- Cardiovascular death
- Myocardial infarction
- Hospital admission for cardiovascular cause
- Hospital admission for heart failure
- Cerebrovascular accident
- Hospital admission for pneumonia (±respiratory insufficiency)
- Need of balloon aortic valvuloplasty for emergent condition
- Quality of life as measured with the Eq-5D scale
- Time spent on the waiting list before TAVI

Primary Safety Endpoint

Death due periprocedural complications actionable by emergent cardiac surgery

To test if mortality due to periprocedural complications actionable by emergent cardiac surgery differ between the TAVI procedures performed in center without on-site cardiac surgery and the TAVI procedures performed by the same team in the center with on-site cardiac surgery

Periprocedural complications actionable by emergent cardiac surgery

- **Severe aortic regurgitation with clinical instability**
- **Valve embolization into left ventricle**
- **Valve migration with concomitant e refractory haemodynamic instability**
- **Aortic dissection**
- **Aortic perforation**
- **Aortic rupture**
- **Annular rupture**
- **Left ventricle perforation**
- **Coronary obstruction (that cannot be managed by percutaneous intervention)**
- **Ventricular septal perforation**
- **New damage (chordae papillary muscle, or to the leaflet) to the mitral valve apparatus or dysfunction (e.g., restrictions due to THV) of the mitral valve.**

Other Safety Endpoint

- **Cardiac tamponade**
- **Bleeding**
- **Kidney failure (requirement of renal replacement therapy)**
- **Severe aortic regurgitation (aortic regurgitation grade III according to current guidelines)**
- **Multiorgan failure (failure of at least 2 organ systems)**
- **Vascular access site and access related complications**
- **Conduction disturbances and arrhythmias**
- **Endocarditis**
- **Valve thrombosis**
- **Valve malpositioning**
- **Valve embolization**
- **Ectopic valve deployment**
- **TAV-in-TAV deployment**

Sample Size calculation

The occurrence of the primary endpoint will be computed from the randomization. Therefore, adverse events occurring between randomization and TAVI procedure will be considered. The primary endpoint is the 1-year occurrence of all-cause death and hospital readmission for cardiovascular cause. The estimated rate of the primary endpoint is around 30%, considering the study population characteristics and the inclusion of adverse events before TAVI. Overall, 520 (173 control arm and 347 experimental arm) patients are required to exclude a difference in favor of the control group of more than 10% (alpha=5% and ß=80%)