Atlantic Cardiovascular Patient Outcomes Research Team

CPORT- E Trial

Randomized trial comparing medical, economic and quality of life outcomes of non-primary PCI at hospitals with and without on-site cardiac surgery

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Motivation for Trial

- Sustain primary PCI program at no-SOS hospitals
- Improve access to PCI services
- Reduce pressure to create additional cardiac surgery programs
- Need for research to inform healthcare policy decisions by state and national organizations

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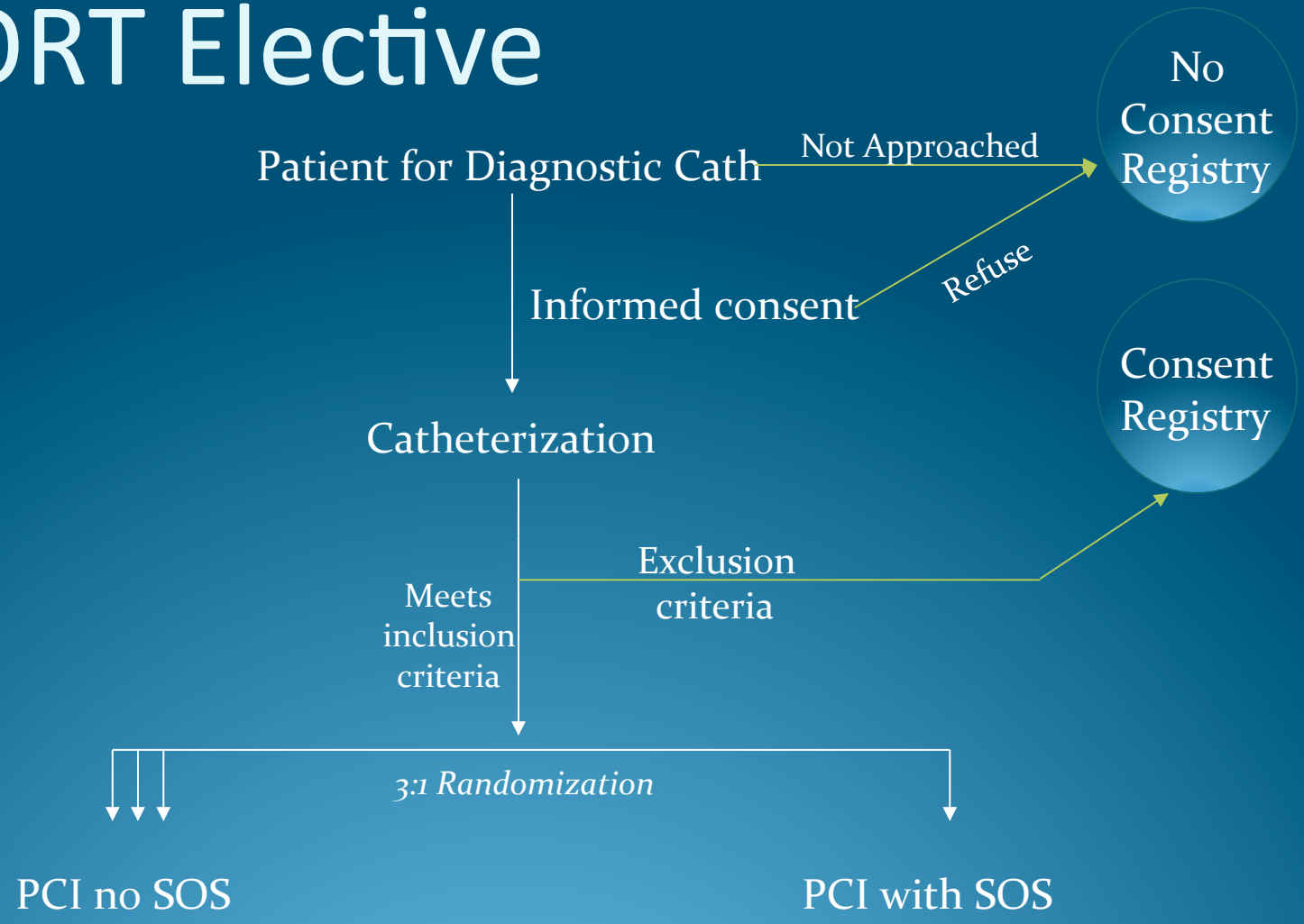
C-PORT Elective



Analysis by intention-to-treat

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Study Endpoints

- Non-inferiority trial
- Primary Endpoints
  - **All-cause mortality at 6 weeks**
  - MACE at 9 months
    - All-cause mortality
    - Q-wave myocardial infarction
    - Target vessel revascularization

*Assuming 6 week mortality to be 0.8% and 9 month MACE to be 12%, a sample size of **18360** was selected to define a non-inferiority margin of 0.4% for mortality and 1.8% for MACE with a one-sided test for non-inferiority using α=0.05 and β=0.80 for both primary endpoints.*

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Inclusion and Exclusion Criteria

Patient

Inclusion

- Age ≥ 18 years
- Informed consent
- ≥ 50% stenosis
- All target lesions approachable at no-SOS hospital

Exclusion

- Unprotected LM
- EF < 20%
- MD-judged high risk

Devices

Inclusion

- Balloon, stent
- Distal protection
- Covered stent
- Cutting balloon - in-stent restenosis

Exclusion

- Atherectomy
- Cutting balloon- de novo lesion

Institution

Inclusion

- ≥ 200 PCI/year
- 24/7 Primary PCI
- Complete formal development program
- Interventionalist meets AHA/ACC competency

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Study Definitions

- Target Vessel Revascularization (TVR) = any unplanned PCI or CABG after randomization
- Bleeding = any blood transfusion except for CABG
- Vascular repair = access site surgery, ultrasound compression or thrombin injection

American College of Cardiology National Cardiovascular Data Registry Cardiac Catheterization Module v3.02 Data Definitions(10)pression or thrombin

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Participating Centers

60 Centers

Center Annual PCI Procedure Volume
150 (99,216)

median (25^{th},75^{th} percentile)

Median Participation Duration
2.2 years

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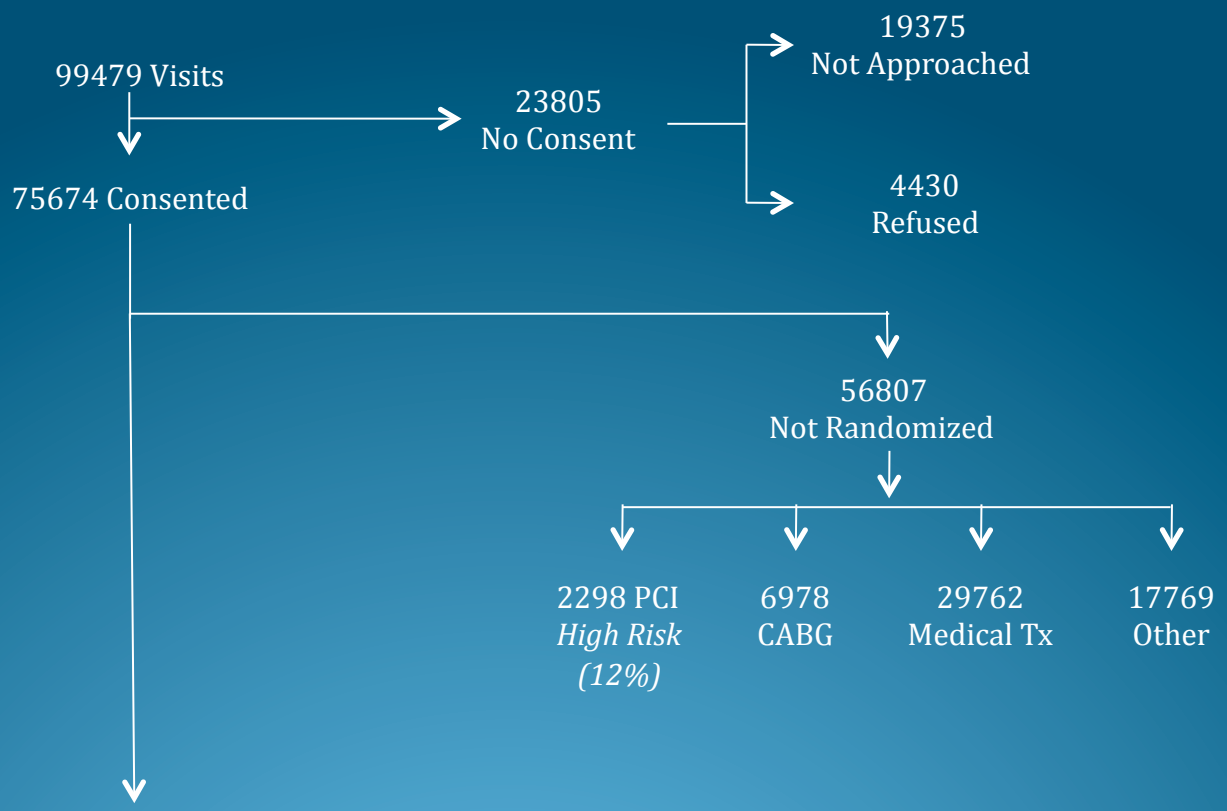

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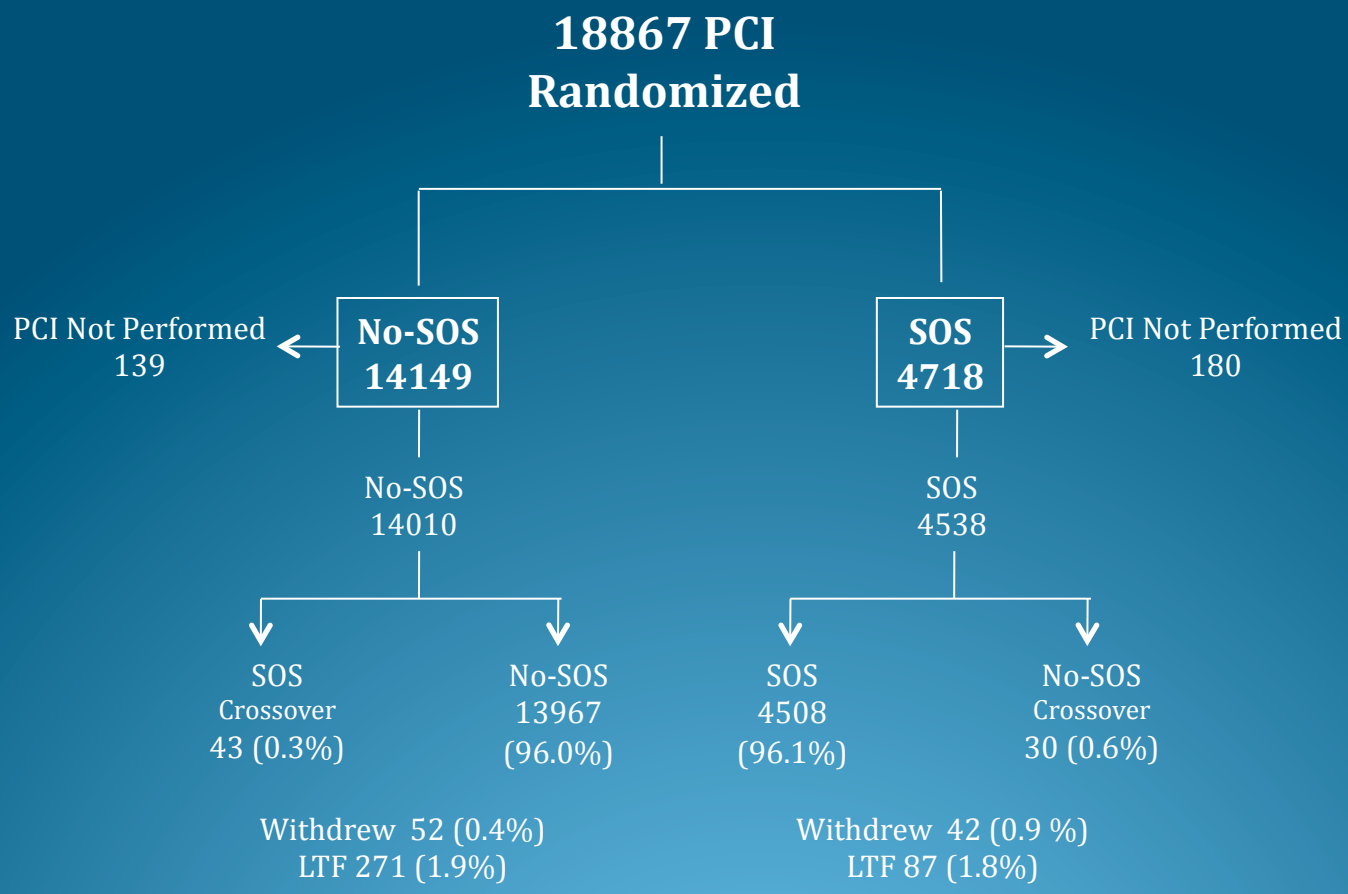

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	No-SOS	SOS	p-value
Age (years) (mean+/-SD)	64+/-12	64+/-12	0.42
Male Gender (%)	64.0	63.2	0.37
Race/Ethnicity (%)			
Caucasian	79.1	80.2	0.33
Africa-American	11.8	11.3	
Hispanic	5.6	5.6	
Asian	2.1	1.9	
Hypertension (%)	84.6	85.3	0.29
Hypercholesterolemia (%)	82.2	82.2	0.95
Smoking (Current & Former) (%)	61.6	62.7	0.20
Diabetes (%)	39.0	39.7	0.41
Family History of CAD (%)	56.7	57.9	0.17
Heart Failure (%)	8.6	8.8	0.64
Prior MI (%)	42.5	43.3	0.35
Prior PCI (%)	31.9	30.4	<0.05
Prior CABG (%)	13.1	13.5	0.47
Prior Stroke or PVD (%)	17.3	18.4	0.09
Creatinine (mg/dl)	1.15+/-0.88	1.15+/-0.87	0.63
GFR ml/min/1.73 m^2	76.5+/-34.1	76.3+/-27.1	0.63
BMI kg/m^2	32.7+/-21.9	33.2+/-24.5	0.22

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Presentation

Clinical Characteristics

	No-SOS (%)	SOS (%)
STEMI	2.8	3.0
NSTEMI	25	26
Unstable Angina	37	35
Stable Angina	14	14
Atypical Chest Pain	5	5
Other	17	17

Procedure Status

	No-SOS (%)	SOS (%)
Elective	75.9	76.2
Urgent	22.7	19.4*
Emergency	0.36	0.57*

* $P < 0.05$

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Baseline Diagnostic Catheterization

	No-SOS (%)	SOS (%)	p-value
One vessel CAD	36.0	34.9	0.22
Two vessel CAD	36.0	36.9	
Three vessel CAD	28.0	28.1	
Left main disease	3.3	3.8	0.13
Graft disease	9.4	9.7	0.44
LV function (EF)	54.2 +/- 10.6	54.3 +/- 10.7	0.72

Totals add up to >100% because Left Main and Graft disease are in addition to disease in the three major circulations

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Procedure Characteristics

	No-SOS (%)	SOS (%)	P-Value
Staged	26.1	68.0	<0.0001
Lab Visits /Index PCI	1.28	1.73	<0.0001
Single Vessel PCI	80.0	81.9	
Multi-Vessel PCI	21.0	22.1	
Stent Use			=0.03
DES only	71.9	73.7	
BMS only	19.9	19.3	
Mixed DES and BMS	4.3	3.4	
Balloon only	3.9	3.6	

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PCI Success

	No-SOS (%)	SOS (%)
Complete Success	90.7	91.4
Partial Success	5.8	5.6
Failure	3.4	2.5*

Patient Success
P=0.007

	No-SOS (%)	SOS (%)
Success	93.4	94.1
Failure	6.6	5.9

Lesion Success
P=0.04

PCI Success: ≤20% residual stenosis and TIMI 3 flow

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Mortality - *6 Weeks*

	Hospitals without SOS n (%)	Hospitals with SOS n (%)	*Difference in rate (%)*	*Asymptotic one-side 95%CI (%)*	*P Value for Noninferiority*
N	**14,149**	**4718**			
Death	132 (0.9)	46 (1.0)	-0.04	-0.31- 0.23	0.004

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Major Adverse Cardiac Events – 9 months

	Hospitals without SOS	Hospitals with SOS	*Δ rate (%)*	*Asymptotic one-side 95%CI (%)*	*P Value for Noninferiority*	*P Value for Superiority*
N	**14,149**	**4718**				
Death	3.2 %	3.2 %				
TVR	6.5 %	5.4 %				0.0098
Q wave MI	3.1 %	3.1 %				
MACE	12.1 %	11.2 %	0.92	0.04- 1.80	0.05	

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Other Adverse Events - 9 Months

	Hospitals without SOS N=14,149 (%)	Hospitals with SOS N=4718 (%)	P
All CABG	1.5	2.3	<0.001
Emergency CABG	0.1	0.2	
Bleeding	5.3	5.2	
Vascular repair	1.1	1.2	
Stroke	0.6	0.5	
Renal insufficiency	0.9	0.8	
Unplanned Catheterization	14.9	12.0	<0.0001
Any Revascularization	8.5	7.0	<0.01

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Exploratory Analyses
- Include LTF and WD in MACE

	Hospitals without SOS	Hospitals with SOS	*Δ rate (%)*	*Asymptotic one-side 95%CI (%)*	*P Value for Noninferiority*
N	**14,149**	**4718**			
Intention to Treat					
MACE	12.1 %	11.2 %	0.92	0.04- 1.80	0.05
ITT including LTF and WD in Mace					
MACE	14.3 %	13.8 %	0.48	-0.48- 1.44	0.012

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Exploratory Analyses

- *CABG as initial procedure excluded from TVR*

	Hospitals without SOS	Hospitals with SOS	*Δ in rate (%)*	*Asymptotic one-side 95%CI (%)*	*P Value for Noninferiority*	*P Value*
CABG as initial procedure included in TVR definition						
TVR	6.5 %	5.4 %				0.0098
MACE	12.1 %	11.2 %	0.92	0.04- 1.80	0.05	
CABG as initial procedure not included in TVR definition						
TVR	6.2 %	4.6 %				<0.0001
MACE	11.9 %	10.5 %	1.37	0.51- 2.23	0.21	

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Exploratory Analyses
- Per Protocol Analysis

	Hospitals without SOS	Hospitals with SOS	*Δ rate (%)*	*Asymptotic one-side 95%CI (%)*	*P Value for Noninferiority*	*P Value*
N	**13,967**	**4508**				
Death -6 weeks	0.9 %	0.8 %	0.08 %	-0.18- 0.34	0.025	
TVR	6.2 %	4.5 %				<0.0001
MACE-9 months	12.0 %	10.4 %	1.64 %	0.77- 2.51	0.42	

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Target Vessel Revascularization

- TVR may be higher in patients having PCI at hospitals without on-site cardiac surgery
  - higher rate of bare metal stents
  - more conservative approach to PCI
  - lack of a full complement of interventional devices
  - ? Other reasons

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What is a clinically significant difference in MACE ?

	Predicted MACE (%)	Non-inferiority Margin (%)
CPORT	12.0	1.8
SORT OUT IV	8	3.5
ISAR-TEST 5	10	3.0
LEADERS	8	4.0
SPIRIT IV	8.1	3.1

Per Protocol Analysis upper limit of 95% CI = 2.51 %

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Summary

- Compared with patients randomized to hospitals with on-site cardiac surgery, in patients allocated to hospitals without on-site cardiac surgery
  - Index PCI failure is higher *(3.4% vs 2.5% per patient; 6.6% vs 5.9% per lesion)*
  - Use of BMS is higher *(24.2% vs 22.9%)*
  - Staged procedures are less frequent *(26% vs 68%)*
  - fewer catheterization laboratory visits required to complete PCI *(1.3 vs 1.7)*
  - cardiac surgery is used less frequently *(1.5% vs 2.3%)*
- Six weeks and 9 months after PCI, the incidence of death, myocardial infarction, bleeding, stroke, renal failure and vascular repair is similar at hospitals with and without on-site cardiac surgery.
- Incidence of target vessel revascularization is higher at hospitals without on-site cardiac surgery
- Compared with patients randomized to hospitals with on-site cardiac surgery
  - Six week mortality and
  - Nine month MACE

  are non-inferior at hospitals without on-site cardiac surgery
- .

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Conclusions

- In hospitals without on-site cardiac surgery that complete a formal PCI development program, adhere to C-PORT participation requirements, and whose outcomes are monitored the outcomes of non-primary PCI are non-inferior to outcomes at hospitals with surgery on-site.

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