

# Real-world experience with the SAPIEN 3 Ultra TAVR: A propensity matched analysis from the United States

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# Disclosure Statement

## Tamim Nazif, MD

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

| Affiliation/Financial Relationship      | Company                        |
|-----------------------------------------|--------------------------------|
| ● Consulting Fees/Honoraria:            | Edwards Lifesciences           |
| ● Consulting Fees/Honoraria:            | Medtronic                      |
| ● Consulting Fees/Honoraria:            | Boston Scientific              |
| ● Consulting Fees/Honoraria:            | Baylis Medical                 |
| ● Consulting Fees/Honoraria:            | Biotrace Medical               |
| ● Equity and Consulting Fees/Honoraria: | Keystone Heart / Venus Medtech |

Statistical analyses were performed by Edwards Lifesciences. The views or opinions presented here do not represent those of the American College of Cardiology, The Society of Thoracic Surgeons, or the STS/ACC TVT Registry.

## Background & Objectives

- Paravalvular regurgitation (PVR) ( $\geq$  moderate) after TAVR has been associated with adverse clinical outcomes, including mortality
- The Edwards SAPIEN 3 Ultra is a new generation balloon-expandable transcatheter heart valve with an enhanced outer skirt to reduce PVR
- Limited data are available on clinical and hemodynamic outcomes of TAVR with the SAPIEN 3 Ultra
- We performed a propensity matched analysis of data from the STS/ACC TVT Registry™ to compare outcomes of patients treated with the SAPIEN 3 Ultra and SAPIEN 3 valves

# Edwards SAPIEN 3 Ultra Valve

## SAPIEN 3 stent frame and leaflets

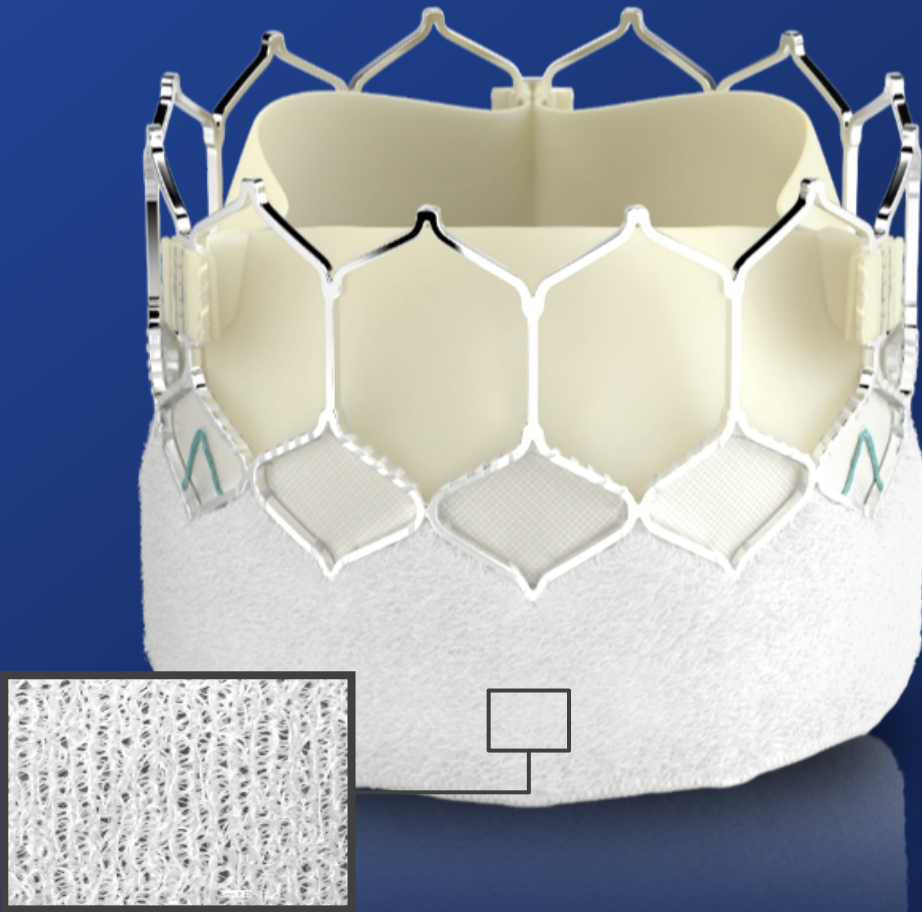
- Balloon-expandable, cobalt-chromium
- Open cell design for coronary access
- Bovine pericardial leaflets

## Enhanced outer sealing skirt

- Textured PET Material
- 40% increase height of outer skirt

## Commander delivery system

- 14 Fr eSheath compatible (all valve sizes)



\* Available 20, 23 and 26 mm sizes

# Methods

- Patients in the STS/ACC TVT Registry<sup>TM</sup> who underwent TAVR with SAPIEN 3 or SAPIEN 3 Ultra between January 2019 and February 2020
- Excluded non-elective TAVR, alternative access, valve-in-valve
- Using a logistic regression model, a propensity score matched analysis was performed with 1:1 matching of 27 covariates\*
- Missing baseline values were imputed with the Markov chain Monte Carlo method
- Clinical and echocardiographic outcomes at discharge and 30 days were compared between matched SAPIEN 3 Ultra and SAPIEN 3 patients

\*Covariates: age, gender, NYHA III/IV, BMI, hypertension, diabetes, creatinine, PAD, carotid stenosis, atrial fibrillation, prior stroke, immunocompromised, GFR, chronic lung disease, prior PCI, prior CABG, porcelain aorta, mean gradient, LVEF, mitral regurgitation, tricuspid regurgitation, 5MWT, KCCQ, hemoglobin, STS, valve size, type of anesthesia

# SAPIEN 3 Ultra vs SAPIEN 3 TAVR Study Population

40,740 S3U and S3 Patients in  
TVT Registry  
(Jan 2019 – February 2020)

1164 Non-Native;  
2055 Non-Transfemoral;  
3196 Non-Elective;  
19 < 30 Days from Procedure

**SAPIEN 3 Ultra**

**N = 1324**

**SAPIEN 3**

**N = 32982**

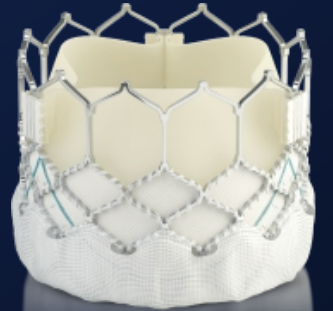
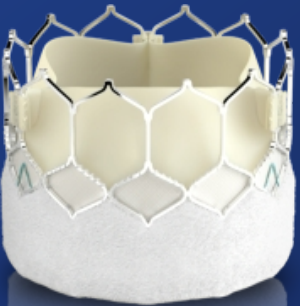
1:1 Propensity Score Matching  
(27 Covariates)

**SAPIEN 3 Ultra**

**N = 1324**

**SAPIEN 3**

**N = 1324**



# Baseline Characteristics

## *Propensity-Matched*

| Characteristic<br>Mean $\pm$ SD or % | SAPIEN 3 Ultra<br>(N = 1324) | SAPIEN 3<br>(N = 1324) | p-value |
|--------------------------------------|------------------------------|------------------------|---------|
| Age (years)                          | 79.5 $\pm$ 8.47              | 79.9 $\pm$ 7.98        | 0.21    |
| Male                                 | 44.2                         | 44.0                   | 0.91    |
| BMI (kg/m <sup>2</sup> )             | 29.1 $\pm$ 6.84              | 28.9 $\pm$ 6.22        | 0.51    |
| STS Risk Score (%)                   | 4.3 $\pm$ 3.12               | 4.4 $\pm$ 3.35         | 0.68    |
| PAD                                  | 21.9                         | 20.6                   | 0.4     |
| Carotid Stenosis                     | 25.3                         | 26.7                   | 0.48    |
| Atrial Fibrillation/Flutter          | 33.7                         | 33.5                   | 0.9     |
| Prior Stroke                         | 9.3                          | 8.8                    | 0.64    |
| Chronic Lung Disease                 | 35.3                         | 35.4                   | 0.95    |
| Prior PCI                            | 31.0                         | 27.6                   | 0.058   |
| Prior CABG                           | 11.0                         | 11.0                   | 1       |
| Porcelain Aorta                      | 2.3                          | 2.1                    | 0.79    |
| GFR (mL/min/1.73 m <sup>2</sup> )    | 61.8 $\pm$ 25.28             | 62.6 $\pm$ 31.29       | 0.45    |
| NYHA III/IV                          | 57.4                         | 57.8                   | 0.83    |
| KCCQ                                 | 48.2 $\pm$ 24.51             | 50.1 $\pm$ 24.30       | 0.05    |

# Baseline ECHO

*Propensity-Matched*

| Characteristic<br>Mean ± SD or %  | SAPIEN 3 Ultra<br>(N = 1324) | SAPIEN 3<br>(N = 1324) | p-value |
|-----------------------------------|------------------------------|------------------------|---------|
| LVEF                              | 59.4 ± 11.69                 | 59.8 ± 10.07           | 0.34    |
| Mean Gradient (mmHg)              | 42.5 ± 14.07                 | 43.1 ± 13.26           | 0.22    |
| AV Area (cm <sup>2</sup> )        | 0.73 ± 0.21                  | 0.74 ± 0.23            | 0.65    |
| Aortic Regurgitation              |                              |                        |         |
| None/Trace                        | 48.7                         | 48.8                   | 0.95    |
| Mild                              | 40.8                         | 39.6                   | 0.55    |
| Moderate/Severe                   | 10.6                         | 11.6                   | 0.40    |
| Mitral Regurgitation (mod/sev)    | 12.6                         | 12.7                   | 0.95    |
| Tricuspid Regurgitation (mod/sev) | 11.7                         | 12.4                   | 0.57    |

# Procedural Outcomes

## *Propensity-Matched*

| Outcome<br>Mean $\pm$ SD or %    | SAPIEN 3 Ultra<br>(N = 1324) | SAPIEN 3<br>(N = 1324) | p-value |
|----------------------------------|------------------------------|------------------------|---------|
| Conscious Sedation               | 73.5                         | 75.6                   | 0.22    |
| Valve Size                       |                              |                        |         |
| 20 mm                            | 1.5                          | 1.7                    | 0.64    |
| 23 mm                            | 45.5                         | 46.1                   | 0.73    |
| 26 mm                            | 53.0                         | 52.1                   | 0.64    |
| Procedure Time (min)             | 75.3 $\pm$ 36.63             | 81.7 $\pm$ 40.57       | <0.01   |
| Fluoroscopy Time (min)           | 13.2 $\pm$ 10.32             | 14.7 $\pm$ 8.48        | <0.01   |
| Device Success                   | 97.1                         | 98.0                   | 0.11    |
| Conversion to Open Heart Surgery | 0.2                          | 0.1                    | 1.00    |
| Coronary Compression/Obstruction | 0.1                          | 0.0                    | 1.00    |
| Annulus Rupture                  | 0.0                          | 0.0                    | N/A     |

# Index Hospitalization

*Propensity-Matched*

| Outcome<br>Median [IQR] or % | SAPIEN 3 Ultra<br>(N = 1324) | SAPIEN 3<br>(N = 1324) | p-value |
|------------------------------|------------------------------|------------------------|---------|
| ICU LOS (hours)              | 2.4 [0.0, 26.0]              | 7.0 [0.0, 26.0]        | 0.41    |
| % with No ICU Stay           | 40.6                         | 39.7                   | 0.63    |
| Hospital LOS (days)          | 2.0 [1.0, 2.0]               | 1.0 [1.0, 2.0]         | 0.02    |
| ≤ 1 day                      | 48.4                         | 52.2                   | 0.05    |
| 2 days                       | 29.6                         | 29.7                   | 0.97    |
| ≥ 3 days                     | 22.0                         | 18.1                   | 0.01    |
| Discharge Location           |                              |                        |         |
| Home                         | 94.0                         | 92.6                   | 0.16    |
| Extended Care/TCU/Rehab      | 3.4                          | 4.3                    | 0.23    |
| Other                        | 2.6                          | 3.1                    | 0.48    |

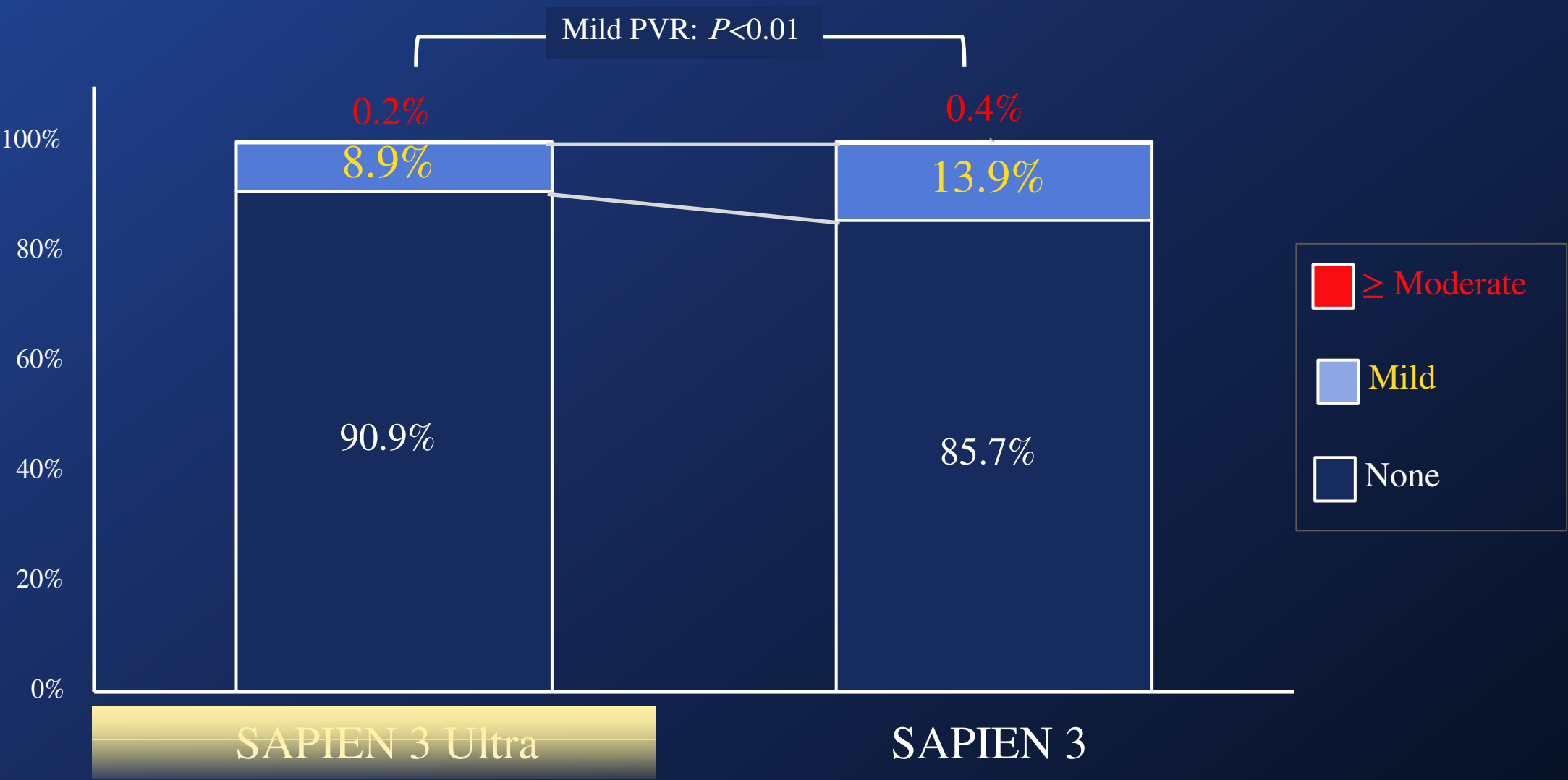
# Discharge ECHO Outcomes

*Propensity-Matched*

| Outcome<br>Mean ± SD or %           | SAPIEN 3 Ultra<br>(N = 1324) | SAPIEN 3<br>(N = 1324) | p-value |
|-------------------------------------|------------------------------|------------------------|---------|
| Mean Gradient (mmHg)                | 11.9 ± 5.03                  | 11.9 ± 5.07            | 0.77    |
| AV Area (cm <sup>2</sup> )          | 1.90 ± 0.67                  | 1.79 ± 0.53            | <0.01   |
| Paravalvular Regurgitation (N=1115) |                              |                        |         |
| None                                | 90.9                         | 85.7                   | <0.01   |
| Mild                                | 8.9                          | 13.9                   | <0.01   |
| Moderate/Severe                     | 0.2                          | 0.4                    | 0.45    |

# Discharge Paravalvular Regurgitation

*Propensity-Matched*



# 30-Day Clinical Outcomes

*Propensity-Matched*

| Outcome<br>Mean ± SD or %          | SAPIEN 3 Ultra<br>(N = 1324) | SAPIEN 3<br>(N = 1324) | p-value |
|------------------------------------|------------------------------|------------------------|---------|
| All-cause Mortality                | 0.9                          | 1.3                    | 0.34    |
| Cardiac Death                      | 0.5                          | 0.3                    | 0.63    |
| Stroke                             | 1.2                          | 1.7                    | 0.38    |
| All-cause Mortality or Stroke      | 1.9                          | 2.9                    | 0.11    |
| Aortic Valve Re-intervention       | 0.0                          | 0.0                    | N/A     |
| Life-threatening Bleeding          | 0.0                          | 0.3                    | 0.10    |
| Major Vascular Complication        | 1.1                          | 0.9                    | 0.66    |
| New Requirement for Dialysis       | 0.4                          | 0.2                    | 0.35    |
| New Pacemaker (including baseline) | 6.0                          | 5.7                    | 0.66    |
| Any Readmission                    | 4.4                          | 6.8                    | 0.02    |
| NYHA III/IV                        | 4.6                          | 5.5                    | 0.42    |
| KCCQ                               | 79.2 ± 20.83                 | 77.6 ± 21.02           | 0.12    |

# Clinical Outcomes Are Comparable to S3 Ultra Prospective, Multicenter Study

| <div> <div>2019 PCR<br/>london valves</div> <div>Secondary Endpoints to 30 Days</div> </div> |           |
|----------------------------------------------------------------------------------------------|-----------|
| Outcome                                                                                      | N = 83    |
| Mortality                                                                                    | 1 (1.2)*  |
| Stroke                                                                                       | 2 (2.4)   |
| Disabling Stroke                                                                             | 2 (2.4)   |
| AKI – Stage 2 or 3                                                                           | 1 (1.2)   |
| New PPMI (incl baseline)                                                                     | 8 (9.6)   |
| New LBBB (incl baseline)                                                                     | 10 (12.0) |
| Coronary Obstruction                                                                         | 1 (1.2)   |
| AV Re-intervention                                                                           | 0         |
| Endocarditis                                                                                 | 0         |
| Valve Thrombosis                                                                             | 0         |

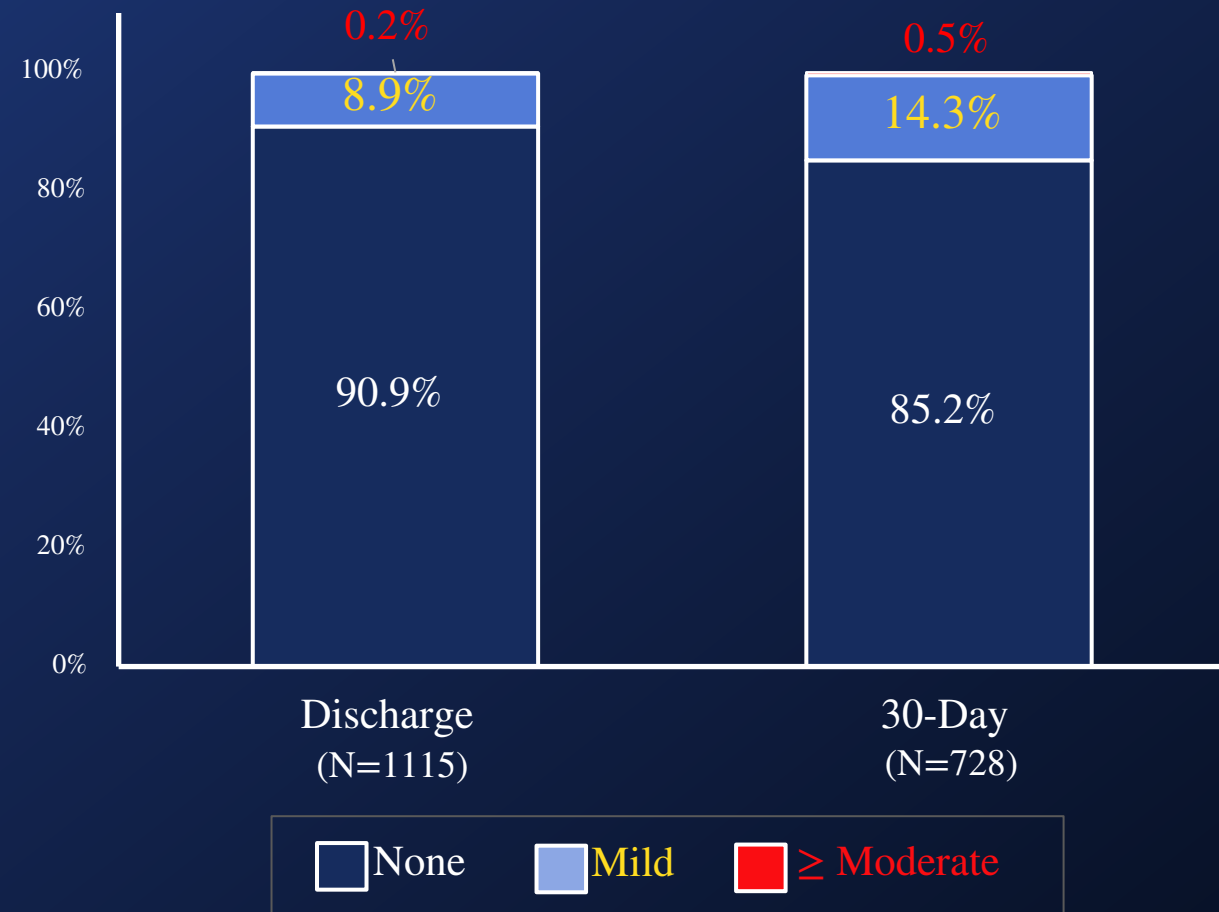
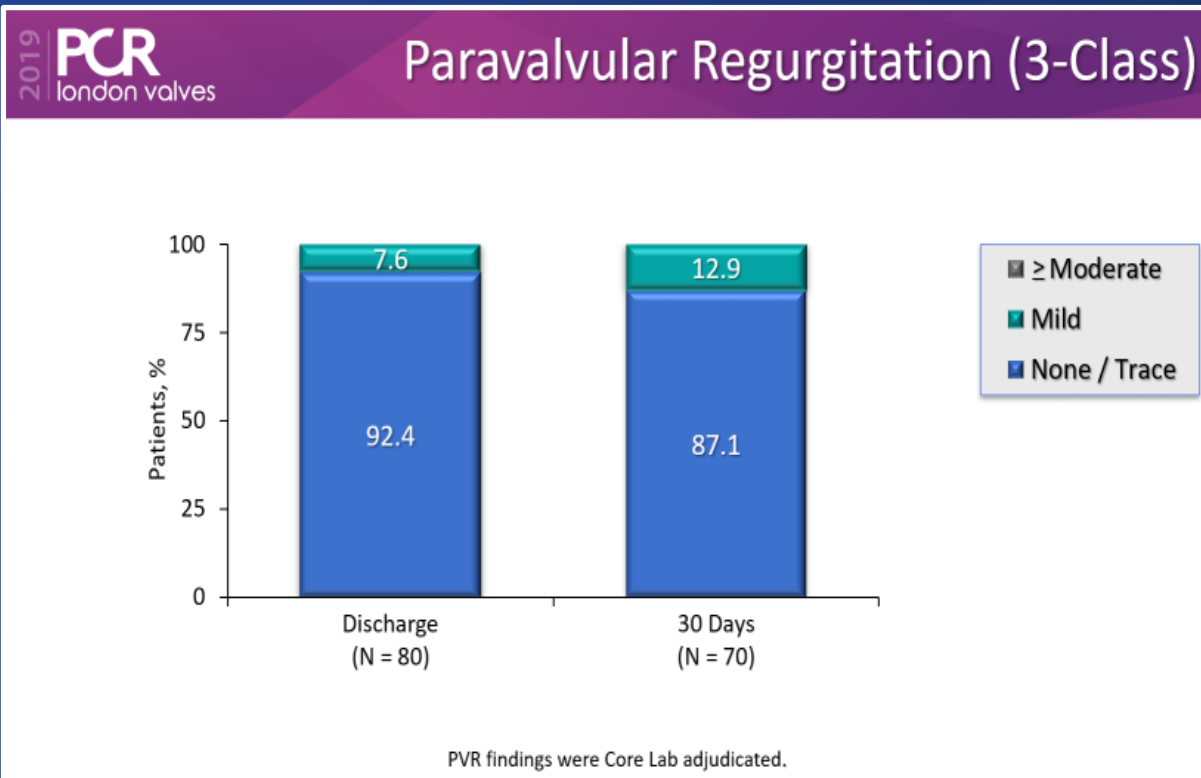
n (%)

\*Cause of death was terminal renal failure

| Outcome<br>%                 | SAPIEN 3<br>Ultra<br>(N = 1324) |
|------------------------------|---------------------------------|
| All-cause Mortality          | 0.9                             |
| Stroke                       | 1.2                             |
| New Pacemaker (inc baseline) | 6.0                             |
| Coronary Obstruction         | 0.1                             |
| Aortic Valve Re-intervention | 0.0                             |
| Endocarditis                 | 0.0                             |
| Valve Thrombosis             | 0.1                             |

# Paravalvular Regurgitation Rates Are Comparable to SAPIEN 3

## Ultra Prospective, Core Lab Adjudicated, Multicenter Study



Webb J. PCR London Valves; November 18, 2019; London, England.

# Limitations

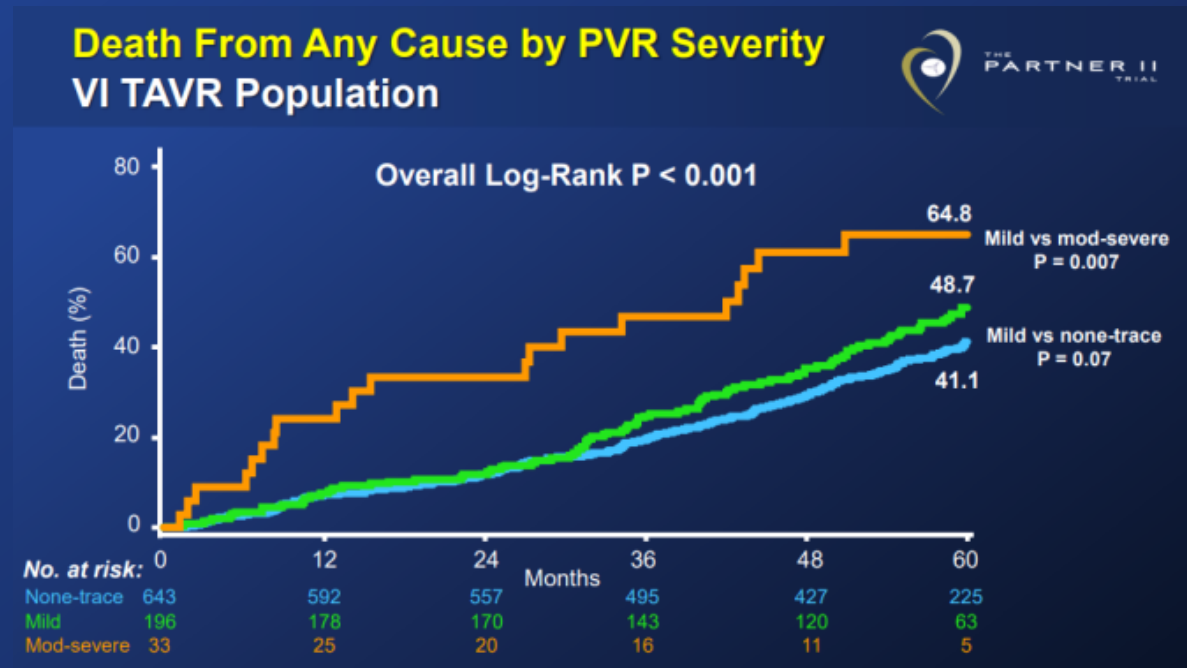
- Retrospective analysis of non-randomized data. Despite propensity score matching, unidentified confounders may have impacted results
- SAPIEN 3 Ultra and SAPIEN 3 patients may not have been treated at the same sites
- STS/ACC TVT Registry <sup>TM</sup> relies on site-reported data, including echocardiography and independent adjudication of PVR not possible
- Pre-operative Computed Tomography imaging not available
- Follow-up was limited to 30 days

## Conclusion

- The current study is the largest available analysis of TAVR outcomes with the balloon-expandable SAPIEN 3 Ultra valve and demonstrated excellent clinical outcomes at 30 days
- In a propensity matched analysis, the use of the SAPIEN 3 Ultra as compared to the SAPIEN 3 was associated with similar aortic valve mean gradients and decreased paravalvular regurgitation

## Extra Slides

# Impact of Moderate / Severe PVL



SAPIEN XT

## PARTNER 2A SAPIEN XT 5 Year Outcomes:

*“In TAVR patients, moderate-severe PVR, but not mild PVR, was associated with increased late mortality”*

# Baseline Characteristics

*Unmatched populations*

| Characteristic<br>Mean ± SD or %  | SAPIEN 3 Ultra<br>(N = 1324) | SAPIEN 3<br>(N = 32982) | p-value |
|-----------------------------------|------------------------------|-------------------------|---------|
| Age (years)                       | 79.5 ± 8.47                  | 79.2 ± 8.45             | 0.26    |
| Male                              | 44.2                         | 58.1                    | <0.01   |
| BMI (kg/m <sup>2</sup> )          | 29.1 ± 6.84                  | 29.7 ± 7.20             | <0.01   |
| STS Risk Score (%)                | 4.3 ± 3.12                   | 4.6 ± 3.45              | <0.01   |
| PAD                               | 21.9                         | 22.3                    | 0.72    |
| Carotid Stenosis                  | 25.3                         | 22.7                    | 0.08    |
| Atrial Fibrillation/Flutter       | 33.7                         | 34.9                    | 0.39    |
| Prior Stroke                      | 9.3                          | 10.2                    | 0.26    |
| Chronic Lung Disease              | 35.3                         | 34.2                    | 0.43    |
| Prior PCI                         | 31.0                         | 32.4                    | 0.28    |
| Prior CABG                        | 11.0                         | 16.0                    | <0.01   |
| Porcelain Aorta                   | 2.3                          | 1.8                     | 0.2     |
| GFR (mL/min/1.73 m <sup>2</sup> ) | 61.8 ± 25.28                 | 62.0 ± 24.77            | 0.78    |
| NYHA III/IV                       | 57.4                         | 65.0                    | <0.01   |
| KCCQ                              | 48.2 ± 24.51                 | 49.0 ± 24.79            | 0.25    |

# Aortic Regurgitation Rates Are Comparable to SAPIEN 3 Ultra

## Prospective, Core Lab Adjudicated, Multicenter Study

