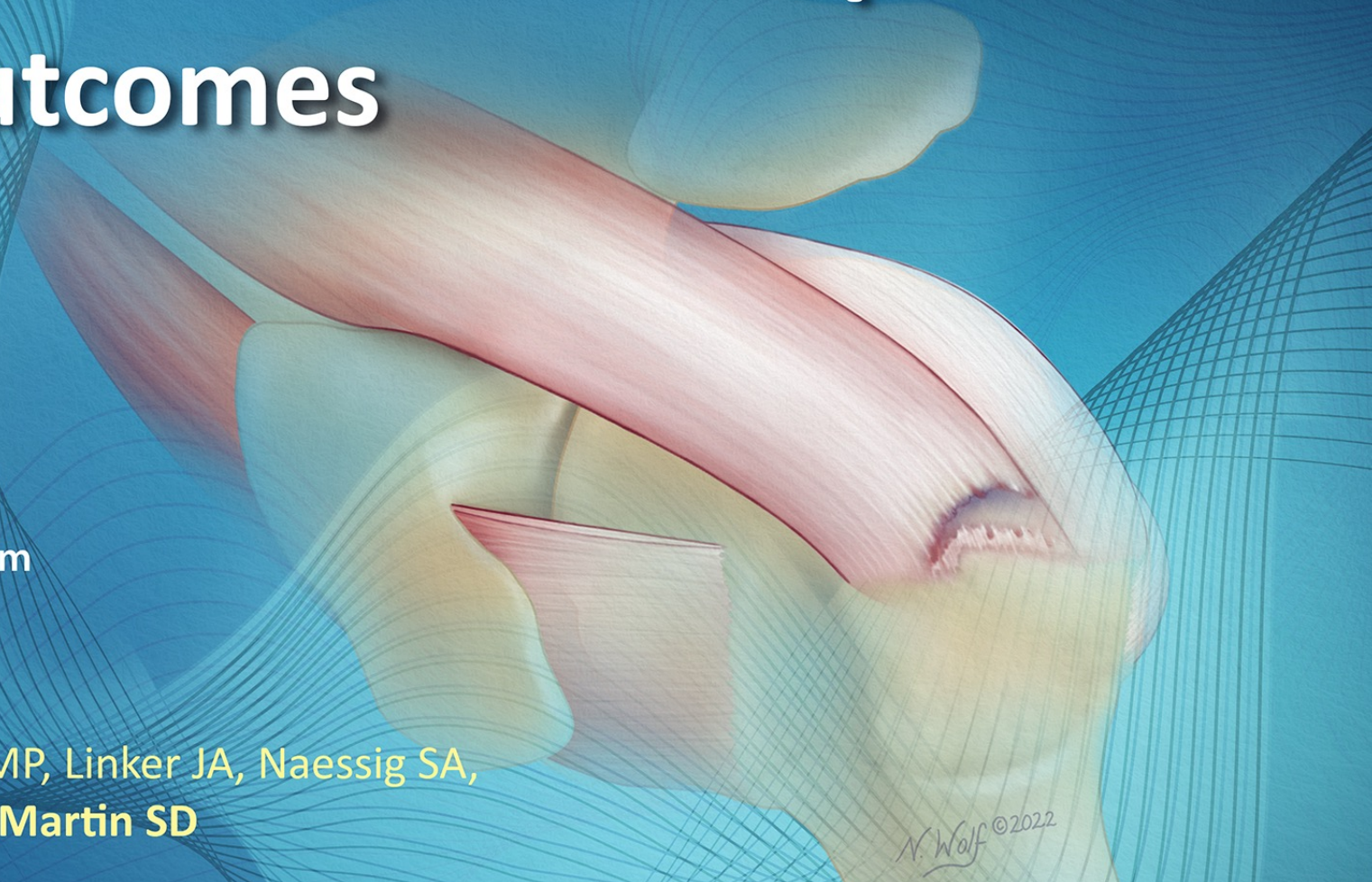
Gender Analysis of Rotator Cuff Repair Utilization and Outcomes



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I (and/or my co-authors) have nothing to disclose directly related to this talk.

I have no conflicts

Introduction

- Arthroscopic rotator cuff repair procedures have notably increased in popularity
  - 205% increase in frequency
    - 2010–2019
- Health inequities have been identified in various orthopaedic subspecialties
  - Total Joint Arthroplasty
  - Spinal Fusion
  - Humeral Fracture Fixation
  - Carpal Tunnel Syndrome Release
- Identifying demographic differences important
  - May potentially compromise delivery of equitable patient care
    - Eg. Patient Sex
- Purpose of this study
  - Investigate sex-related differences in utilization and perioperative outcomes
    - among patients following arthroscopic rotator cuff repair

Methods

- American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP)
  - Identified patients who underwent arthroscopic rotator cuff repair
    - Based on Current Procedural Terminology
      - CPT code: 29827
- Data Collection
  - Baseline demographics and clinical characteristics
  - Stratified based on gender to compare:
    - Adverse Events
    - Utilization rates
    - Operative time
    - Length of hospital stay
    - Days from operation to discharge
    - Readmission rates

Results

- Baseline Demographics
  - 2010–2019
    - 42,443 patients
      - 57.7% male
      - 42.3% female
  - Compared to males, females were
    - Older (p<0.001)
    - Generally, less healthy (p<0.001 for all) as indicate by:
      - Higher ASA classes
      - Higher rates of Obesity
        - (52.0% vs. 44.8%)
      - Higher rates of COPD
        - (4.0% vs. 2.7%)
      - Increased steroid use
        - (2.7% vs. 1.6%)

Categorical variables reported as n (%), *Statistically significant (p<0.05)
Abbreviations: ASA (American Society of Anesthesiology), BMI (Body Mass Index), COPD (Chronic Obstructive Pulmonary Disease), CHF (Congestive Heart Failure)

Patient Demographics Stratified by Sex

	Female N=17960	Male N=24483	P Value
Age			**<.001***
0-24	60 (0.3)	143 (0.6)	
25-34	203 (1.1)	516 (2.1)	
35-44	1112 (6.2)	2111 (8.6)	
45+	16584 (92.3)	21713 (88.7)	
Race			**<.001***
Black or African American	2280 (12.7)	2073 (8.5)	
White	15680 (87.3)	22410 (91.5)	
BMI			**<.001***
Normal (<24.9 kg/m^2)	3554 (19.9)	3005 (12.4)	
Overweight (25-29.9 kg/m^2)	5018 (28.1)	9688 (39.8)	
Obese (>30 kg/m^2)	9273 (52.0)	11637 (47.8)	
Diabetes Mellitus			0.884
No	15000 (83.5)	20461 (83.6)	
Yes	2960 (16.5)	4022 (16.4)	
ASA Class			**<.001***
1	1049 (5.8)	2220 (9.1)	
2	10271 (57.2)	14039 (57.4)	
3+	6632 (36.9)	8212 (33.6)	
Current smoker within one year			**<.001***
No	15413 (85.8)	20669 (84.4)	
Yes	2547 (14.2)	3814 (15.6)	
History of severe COPD			**<.001***
No	17234 (96.0)	23825 (97.3)	
Yes	726 (4.0)	658 (2.7)	
CHF			0.758
No	17933 (99.8)	24449 (99.9)	
Yes	27 (0.2)	34 (0.1)	
Hypertension requiring medication			0.373
No	9430 (52.5)	12962 (52.9)	
Yes	8530 (47.5)	11521 (47.1)	
Steroid use for chronic condition			**<.001***
No	17470 (97.3)	24097 (98.4)	
Yes	490 (2.7)	386 (1.6)	

Results

- **Unadjusted & adjusted analyses revealed females experience**
  - **Shorter operative times**
    - **(mean difference [MD] 11.5 minutes, P < .001)**
  - **Longer hospital stays**
    - **(MD 0.03 days, P < .001)**
  - **Longer times from operation to discharge**
    - **(MD 0.03 days, P < .001)**

Perioperative Outcomes Following Arthroscopic Rotator Cuff Repair Stratified by Sex (Unadjusted)

	Female N=17960	Male N=24483	P Value
Total Operation Time			**<.001***
Mean ± SD (mins)	83.1 ± 43.4	94.1 ± 47.1	
Length of Total Hospital Stay			**<.001***
Mean ± SD (days)	0.20 ± 3.1	0.14 ± 1.7	
Days from Operation to Discharge			**<.001***
Mean ± SD (days)	0.16 ± 1.3	0.12 ± 1.5	

Logistic Regression Model for Binary Outcomes by Sex (Adjusted)

Outcomes	Rate Ratio**	95% CI		P Value	Estimated Mean Difference
Total Operation Time	0.884	0.876	0.892	**<.0001***	-11.50
Length of Total Hospital Stay	1.24	1.13	1.36	**<.0001***	0.03
Days from Operation to Discharge	1.26	1.16	1.38	**<.0001***	0.03

**Female vs male (adjusted for age, race, BMI, ASA class, smoking, COPD, and steroid use)

*Statistically significant (p<0.05)

Results

- Conversely, females were found to have
  - Lower Rates of:
    - Serious adverse events [SAE]
      - (OR, 0.69; 95% CI, 0.55-0.86)
    - Readmissions
      - (OR, 0.88; 95% CI, 0.66-0.97)
  - Higher Rates of:
    - Minor adverse events
      - (odds ratio [OR], 1.75; 95% confidence interval [CI], 1.24-2.47)

Perioperative Outcomes Following Arthroscopic Rotator Cuff Repair Stratified by Sex (Unadjusted)

	Female N=17960	Male N=24483	P Value
Readmission			0.166
No	17181 (99.01)	23322 (98.87)	
Yes	171 (0.99)	266 (1.13)	
Serious Adverse Event			**0.002***
No	17839 (99.33)	24251 (99.05)	
Yes	121 (0.67)	232 (0.95)	
Minor Adverse Event			**<.001***
No	17883 (99.57)	24426 (99.77)	
Yes	77 (0.43)	57 (0.23)	

Logistic Regression Model for Binary Outcomes by Sex (Adjusted)

Outcomes	Odds Ratio**	95% CI		P Value
Readmission	0.80	0.66	0.97	**0.0248***
SAE	0.69	0.55	0.86	**0.0011***
MAE	1.75	1.24	2.47	**0.0014***

**Female vs male (adjusted for age, race, BMI, ASA class, smoking, COPD, and steroid use)

*Statistically significant ($p<0.05$)

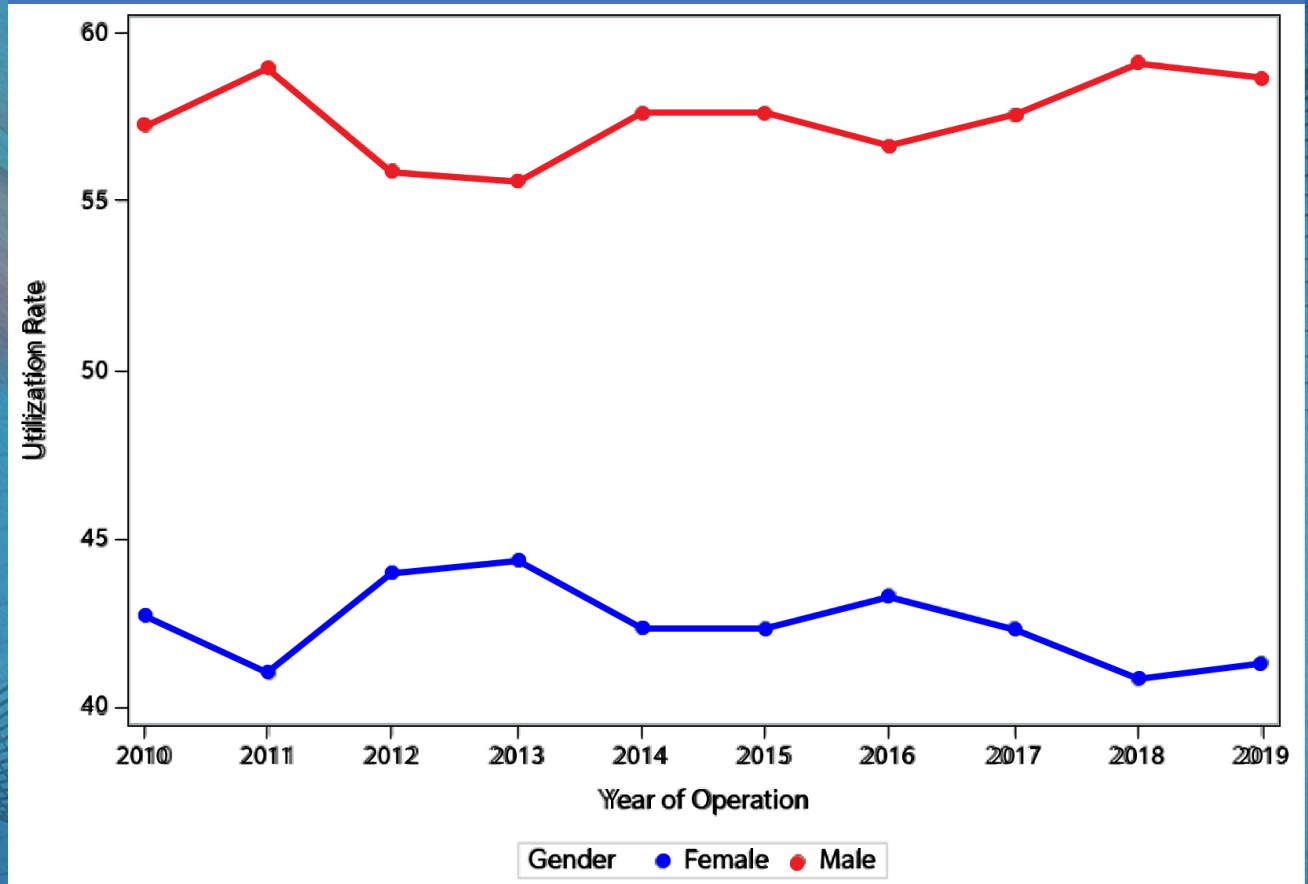
Abbreviations SAE (Serious Adverse Event), MAE (Minor Adverse Event)

Results

- **Disparities in utilization**
  - Increased over the study period
    - (P = .008)

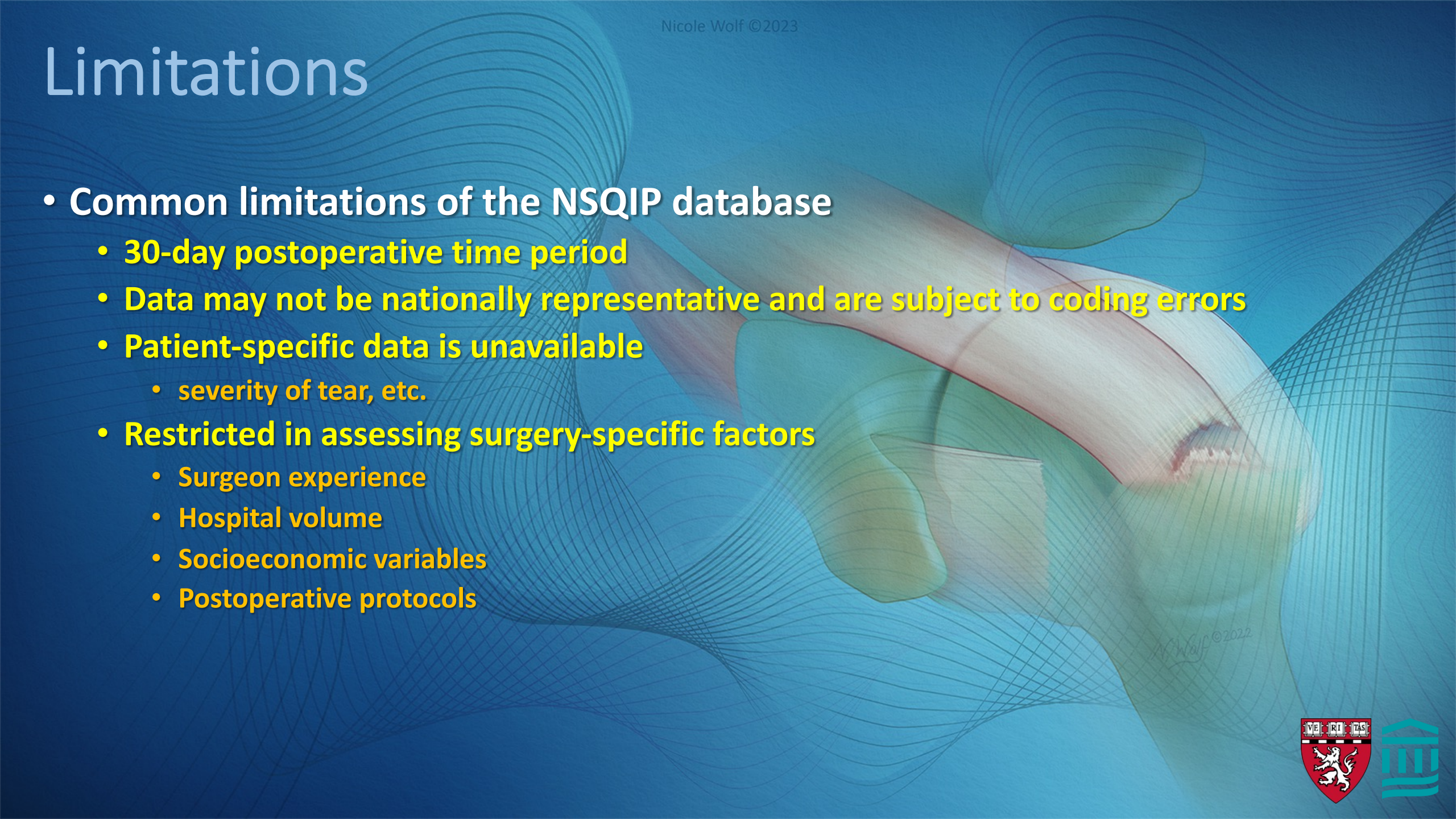
- **Relative proportion of female patients undergoing arthroscopic rotator cuff repair procedures has**
  - Slightly decreased since 2010
    - (slope = -0.017, p_{trend} = 0.0077)

Relative Utilization Rates of Arthroscopic Rotator Cuff Repair Stratified by Sex from 2010 - 2019



Limitations

- Common limitations of the NSQIP database
  - 30-day postoperative time period
  - Data may not be nationally representative and are subject to coding errors
  - Patient-specific data is unavailable
    - severity of tear, etc.
  - Restricted in assessing surgery-specific factors
    - Surgeon experience
    - Hospital volume
    - Socioeconomic variables
    - Postoperative protocols



Discussion & Conclusion

- As use of arthroscopic techniques for rotator cuff repair continues to rise
  - Imperative to recognize and characterize differences in
    - Procedure utilization
    - Perioperative outcomes
- Present study focuses specifically on sex differences and demonstrates
  - Women
    - Relatively smaller proportion of arthroscopic rotator cuff repair procedures
    - Shorter operative time and longer hospital stay
    - Greater risk of early postoperative minor adverse events
  - Males
    - Greater risk for severe adverse events and readmission following surgery
- By highlighting sex-related disparities in rotator cuff repair
  - This study indicates the need for further research to understand and address the root causes of inequality
    - optimize orthopedic care for all

Thank You

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