

Evaluation of Antimicrobial Prophylaxis and Infectious Outcomes in Penile Prosthetic Implants at VA Long Beach Healthcare System

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BACKGROUND

Erectile dysfunction affects about 30 million men in the USA. One solution is the penile prosthetic implant (PPI). The rate of infection is estimated at 0.33 to 11.4% in primary surgeries and up to 18% in revision surgery, most commonly involving gram positive bacteria. While some literature suggests Candida as a cause of infection, the American Urological Association (AUA) guidelines do not recommend prophylactic antifungal therapy. The 2019 AUA guidelines recommend antibacterial prophylaxis for the total of ≤ 24 hours duration. In contrast, many urologists prescribe antibiotics for 5 to 14 days after surgery.

Objective: The primary study objective was to identify the rate of infection and describe the use of antimicrobial prophylaxis in patients who received a PPI at Veterans Affairs Long Beach Healthcare System (VALBHS). Our secondary objectives were to identify risk factors associated with infectious outcomes after PPI implantation, to identify organisms associated with PPI infection, and to evaluate complications with antimicrobial use.

METHODS

Study Design: This is a quality improvement retrospective chart review project. 176 male veterans who had a penile prosthetic implanted at VALBHS between October 1999 to July 2021 were identified through Corporate Data Warehouse. Patient medical records were reviewed starting from procedure date to December 2021 or expiration using Computerized Patient Record System (CPRS). T-tests, Fisher's exact and chi square tests were used for data analysis.

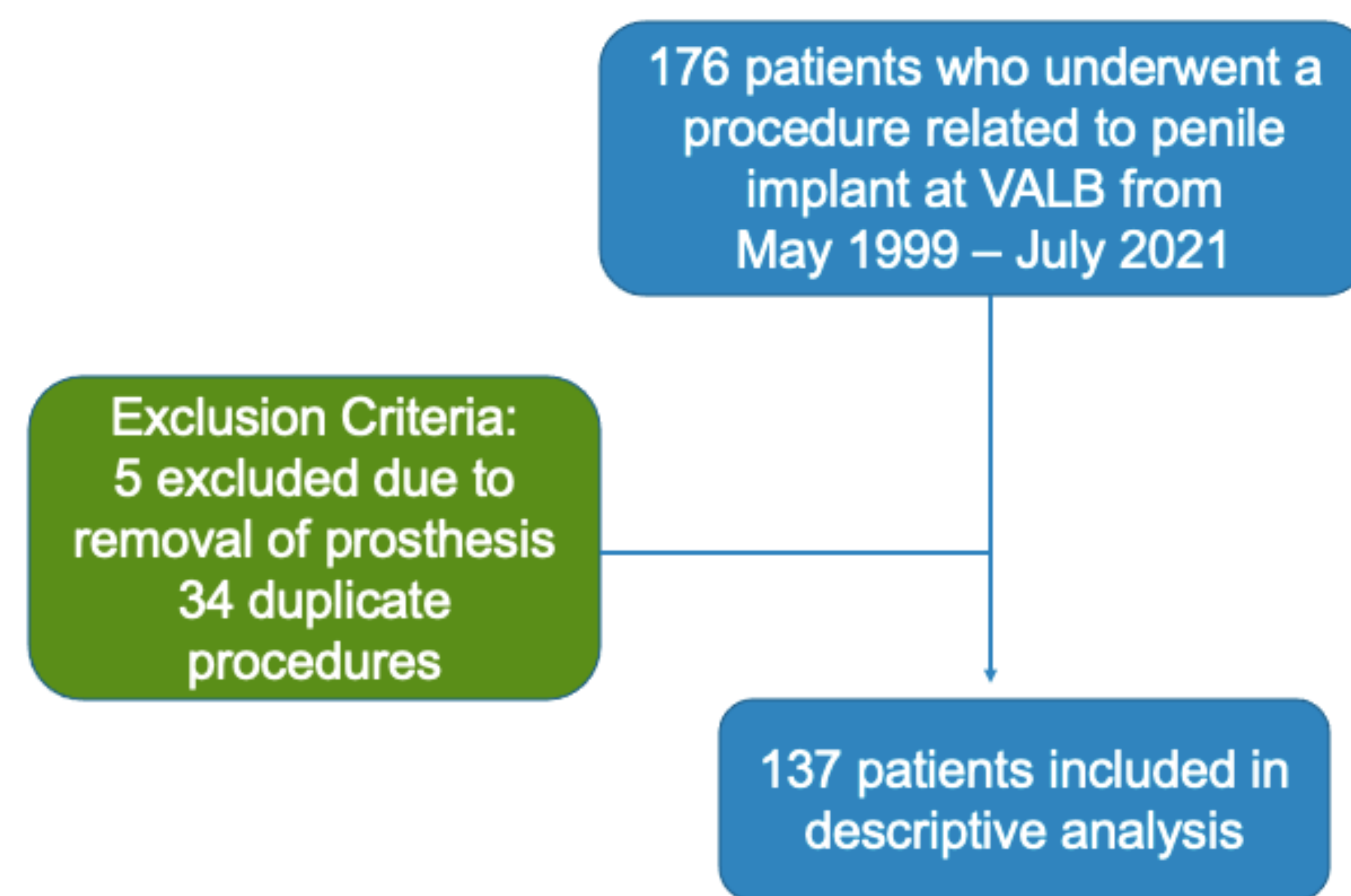


Figure 1. Methodology with inclusion and exclusion criteria

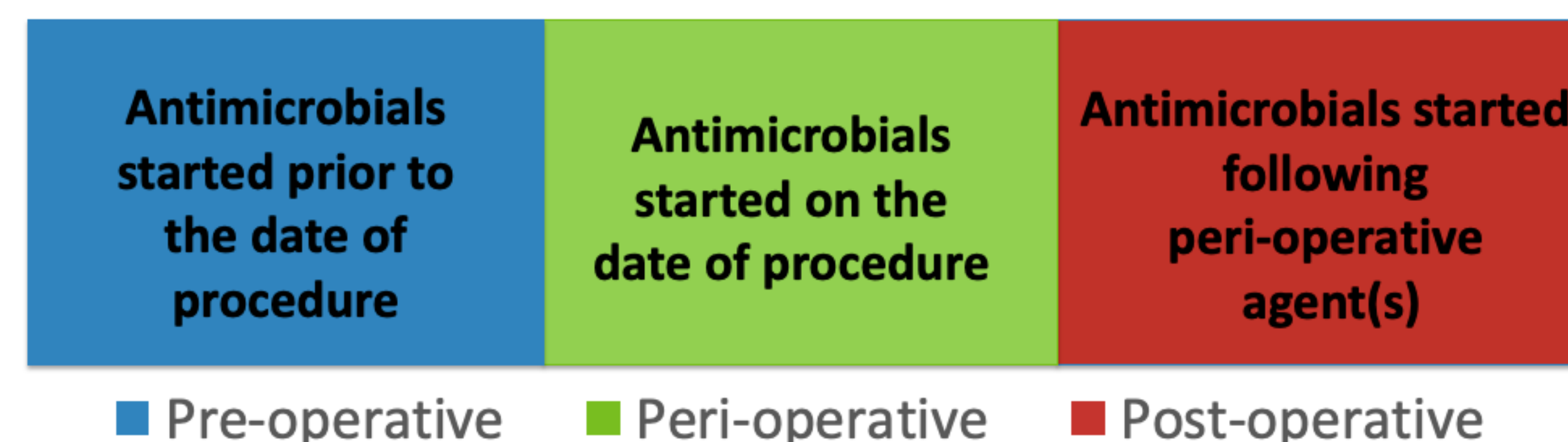


Figure 2. Antimicrobial prophylaxis timeline definitions

RESULTS

Characteristic	Total Patients (N=137)
Age – Years	66.12
Race	No. of patients(%)
White	74 (54.0%)
African American	27 (19.7%)
Asian	1 (0.7%)
American Indian	1 (0.7%)
Unknown	35 (25.5%)
Urine Culture Collected	129 (94.2%)
Positive	16 (12.4%)
MRSA Nares Collected	88 (64.2%)
Positive	6 (6.8%)

Risk Factor	Total Patients (N=137)
Smoker	89 (65.0%)
Prior Implant	56 (40.9%)
Polysubstance Abuse	48 (35.0%)
Diabetes	40 (29.2%)
Peyronie's disease or Priapism	13 (9.5%)
Homelessness	10 (7.3%)
Spinal Cord Injury	6 (4.4%)
Chronic Immunosuppression	6 (4.4%)
Anticoagulation	5 (3.7%)
HIV	1 (0.7%)
No Risk Factors	11 (8.0%)

Primary Objectives:

- Rate of Infection: 14/137 patients (10.2%)
 - Definite infection: 9 patients (6.6%)
 - Possible infection: 5 patients (3.6%)
- Median onset of Infection: 19 days

Antimicrobial Use	No. of Patients (%)	Mean duration (days)
Pre-operative	36 (26%)	4.1
Peri-operative	137 (100%)	2.1
Post-operative	130 (95%)	9.0
Total	137 (100%)	11.8

Antimicrobial Period	Infection (N=14)	No Infection (N=123)	P-value
Pre-operative	4 (28.6%)	32 (26.0%)	0.76
Peri-operative	14 (100%)	127 (100%)	1.00
Post-operative	14 (100%)	116 (94.3%)	1.00
Mean Antimicrobial duration (days)			
Pre-operative	6.5	3.8	0.39
Peri-operative	2.7	2.1	0.07
Post-operative	9.5	8.9	0.44
Total duration	14.2	11.5	0.08

Antimicrobials	Patients (N=36)
Fluoroquinolones	15 (41.7%)
TMP/SMX	9 (25.0%)
Vanco/gentamicin	6 (16.7%)
Piperacillin-tazobactam/amikacin	1 (2.8%)
Cephalexin	1 (2.8%)
Clindamycin	1 (2.8%)
Amoxicillin/clavulanate	1 (2.8%)
Nitrofurantoin	1 (2.8%)
TMP/SMX/ciprofloxacin	1 (2.8%)

Antimicrobials	Patients (N=137)
Vanco/gentamicin	83 (60.6%)
Vanco/gentamicin/rifampin	15 (11.0%)
Vanco/gentamicin/fluconazole	11 (8.0%)
Vanco/pip-tazo/fluconazole	3 (2.2%)
Vanco/pip-tazo	3 (2.2%)
Vanco/gentamicin/TMP/SMX	2 (1.5%)
Vanco/gentamicin/ciprofloxacin	2 (1.5%)
Vanco/gentamicin/cefazolin	2 (1.5%)
Vanco/gentamicin/levofloxacin	2 (1.5%)
Vanco/ciprofloxacin	2 (1.5%)
Vanco/cefazolin	2 (1.5%)
Gentamicin/cefazolin	2 (1.5%)
Others	8 (5.9%)

Antimicrobials	Patients (N=130)
Fluoroquinolones	59 (45.4%)
Cephalexin	33 (25.4%)
TMP/SMX	22 (16.9%)
Ciprofloxacin/fluconazole	5 (3.9%)
TMP/SMX/fluconazole	3 (2.3%)
Clindamycin	2 (1.5%)
Cephalexin/levofloxacin	2 (1.5%)
Cephalexin/fluconazole	1 (0.8%)
Cephalexin/ciprofloxacin	1 (0.8%)
TMP/SMX/clindamycin	1 (0.8%)
Gatifloxacin	1 (0.8%)

RESULTS (continued)

Secondary Objectives:

	Culture (N)	Culture (%)
Total cultures sent	8/14	57%
Positive culture	5/8	62.5%
Gram Positive ¹	3/5	60%
Gram Negative ²	2/5	40%
Polymicrobial ³	1/5	20%
Negative culture	3/8	30%
Fungal culture	0/8	0%

1. Staphylococcus
2. Pseudomonas, ESBL E.coli
3. Polymicrobial = Enterococcus, Staphylococcus, and Pseudomonas

Risk Factor	Infection (N=14)	No Infection (N=123)	P-value
Smoker	10 (71.4%)	79 (64.2%)	0.77
Prior Implant	9 (64.3%)	47 (38.2%)	0.08
Polysubstance Abuse	8 (57.1%)	40 (32.5%)	0.06
Diabetes	2 (14.3%)	38 (30.9%)	0.35
Peyronie's disease or Priapism	2 (14.3%)	11 (8.9%)	0.62
Homelessness	0	10 (8.1%)	0.59
Spinal Cord Injury	2 (14.3%)	4 (3.3%)	0.11
Chronic Immunosuppression	1 (7.1%)	5 (4.1%)	0.48
Anticoagulation	0	5 (4.1%)	1
HIV	0	1 (0.8%)	1
No Risk Factors	0	11 (8.9%)	0.60

DISCUSSION AND CONCLUSION

Antimicrobial prophylaxis duration at VALBHS exceeded the AUA recommendation. The average total duration of antimicrobial prophylaxis was 11.8 days and almost all patients had antimicrobial prophylaxis extended beyond 24 hours post surgery. The rate of infection of 10.2% is within the reported range of 0.33-11.4%. Gram positive species were the most common organisms found in infection cases, similar to previous studies, however no fungal infections were found in this patient population. There were no differences in prophylaxis antimicrobial usage between the infection and no infection groups. There were no statistically significant differences in patient risk factors between the infection and no infection groups but the most common risk factors were smoking, prior implant, polysubstance abuse and diabetes. There were limited complications with antimicrobial uses: 2.2% AKI, 1.5% antimicrobial resistance.

FUTURE DIRECTION

- Further studies should be conducted to determine the optimal duration of antimicrobial prophylaxis
- There were no fungal infections in our study group – if antifungal prophylaxis is done, it should be dependent on individualized patient risk factors
- Since the AUA recommends prophylactic antibiotics covering MRSA and gram negative bacteria, obtaining pre-operative MRSA nares and urine culture screening may not be necessary

LIMITATIONS

- Retrospective chart review was conducted
- Historical bias: amount of detail in notes varied given the study period was 20 years
- Limited generalizability: VA patient population and small population size
- Measurement bias: low incidence of antimicrobial-related complications may have been due to the lack of labs collected after the procedure was completed

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