

Perioperative Prevention of Penile Prosthesis Infection: Practice Patterns among Surgeons of SMSNA and ISSM

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ABSTRACT

Introduction. Anecdotally, there is great variation in the use of strategies to prevent postoperative penile implant infection.

Aim. To evaluate the perioperative practice patterns of surgeons who insert penile prostheses focusing on their respective infection control routines.

Method. An anonymous Web-based survey was sent to members of the Sexual Medicine Society of North America (SMSNA) and the International Society of Sexual Medicine (ISSM).

Main Outcome Measures. Thirty-nine questions were asked pertaining to the strategies used during the pre-, intra-, and postoperative phases of penile implant surgery to prevent infection.

Results. One hundred twenty-nine surgeons responded to the survey (SMSNA 84; ISSM 45). Most surgeons considered themselves sexual medicine specialists. More SMSNA respondents had inserted >100 prosthesis (SMSNA 69%, ISSM 50%). Routine urine culture is not performed by 40% and 50% of SMSNA and ISSM members, respectively. Similar percentages of surgeons from each society request a daily preoperative antimicrobial scrub. About two-thirds of ISSM members use razors for the preoperative shave compared with one-third of SMSNA members. Most ISSM surgeons preferred povidone-iodine for hand and skin preparation while most SMSNA surgeons chose this only for skin preparation. Two-thirds of SMSNA members prepared the skin for at least 10 minutes compared with 34% of ISSM surgeons. There were considerable differences in all aspects of antibiotic usage not only between members of both societies but also among individual members of each society. Most surgeons prefer not to place a drain (SMSNA 70%, ISSM 81%). Discharge timing differs between the two groups.

Conclusions. There is great variation in perioperative strategies utilized to prevent penile implant infections including some key differences between surgeons from SMSNA and ISSM. It is unknown if these variations result in changes in the postoperative infection rate; however, the study data may assist in the formation of practice guidelines and form the basis of future prospective studies. **Katz DJ, Stember DS, Nelson CJ, and Mulhall JP. Perioperative prevention of penile prosthesis infection: Practice patterns among surgeons of SMSNA and ISSM. J Sex Med 2012;9:1705–1714.**

Key Words. Inflatable Penile Prosthesis; Antibiotic Selection; Infection; Erectile Dysfunction; Survey of Urologists; Erectile Dysfunction; Practice Pattern Survey; Three-Piece Penile Implant

Introduction

Penile implants have remained integral in the treatment of erectile dysfunction (ED) refractory to medical treatment since their introduction

in 1973 [1]. They provide a prompt, rigid, and reliable erection with associated high satisfaction rates among patient and their partners [2,3]. Postoperative implant infection remains low at 1–3% [4,5]. Identified risk factors for infection include poorly controlled diabetes, spinal cord injury, immunosuppression, concurrent urinary tract infection, and ileal conduit [5–9]. Some of these

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risk factors are non-modifiable and great variation exists in other strategies to prevent postoperative penile prosthesis infection.

Central to these strategies is the provision of perioperative antibiotics; however, other peripheral approaches have been proposed in an attempt to reduce infections such as preoperative bathing in an antibacterial shower, intraoperative technical modifications and limiting drain placement [10–13]. Robust data on these prevention strategies are absent and thus detailed specific recommendations are lacking. Indeed, official antibiotic guidelines for antimicrobial prophylaxis in prosthetic surgery differ between the American Urological Association and the European Association of Urology [14,15]. We therefore sought to assess in detail the perioperative strategies used by urological penile implant surgeons worldwide to prevent postoperative implant infections.

Aims

We evaluated the perioperative practice patterns of surgeons who insert inflatable penile prostheses focusing on infection control routines. We aimed to assess for trends in practice and to determine if any significant differences existed among surgeons from members of the Sexual Medicine Society of North America (SMSNA; mostly North American urologists) and the International Society of Sexual Medicine (ISSM; mostly non-North American urologists). We also sought to examine for variations in practice among surgeons within a particular society.

Methods

Instrument

A 39-question survey (Appendix 1) was sent electronically to members of the SMSNA and ISSM using the Web-based tool Survey Monkey (SurveyMonkey.com, LLC, Palo Alto, CA, USA). The survey was completed anonymously and posed questions relating to the pre-, intra-, and postoperative phases of penile implant surgery. Practitioner demographics and experience were also surveyed.

Main Outcome Measures

The survey addressed the perioperative practice patterns of SMSNA and ISSM members. Preoperative questions included the utilization of urine cultures, timing of patient shaving, shaving imple-

ment used, hand-scrubbing ingredient and duration of scrub, and surgical glove preferences. The factors relating to intraoperative practices included skin preparation, operating room characteristics, and types of drapes used. Drain utilization and usual length of patient stay were also queried. Antibiotic preferences were a major focus of the survey. We questioned surgeons on their pre-, intra-, and postoperative antibiotic usage. Questions related to both oral and intravenous antibiotics. The type of intraoperative antibiotic irrigation was also queried.

Details concerning members' background were collected and included the region of practice, experience as a resident, and fellowship training. Information on past and current experience with penile prosthesis procedures was surveyed.

Results

Surgeon Demographics

A total of 129 surgeons responded to the survey. Eighty-four respondents were from SMSNA and 45 were from ISSM. As seen in Figure 1A, B, SMSNA members were overwhelmingly North American (92%) while ISSM members were mainly from Latin America (44%), North America (13%), or Europe (13%). In both societies approximately 55% of physicians described their practices as private with the remainder in academics. A majority of ISSM members (60%) focus their practice on andrology compared with 40% of SMSNA members. This is reflected by 49% of ISSM respondents devoting more than 50% of their practice to male sexual dysfunction compared with 29% of SMSNA respondents. Overwhelmingly, the vast majority of all respondents considered themselves specialists in sexual medicine (SMSNA 90%, ISSM 100%).

Surgeon Experience

During residency training, approximately similar proportion of surgeons between SMS and ISSM "scrubbed in" for penile implant cases. Fifty percent of SMSNA respondents and 42% of ISSM respondents had participated in at least 20 cases. On the other end of the spectrum, 23% of SMSNA members participated in fewer than five cases compared with 41% of ISSM members.

ISSM members were twice as likely to be fellowship-trained in sexual medicine (ISSM 71% vs. SMSNA 35%). ISSM members were in practice for longer with 91% being in practice for at

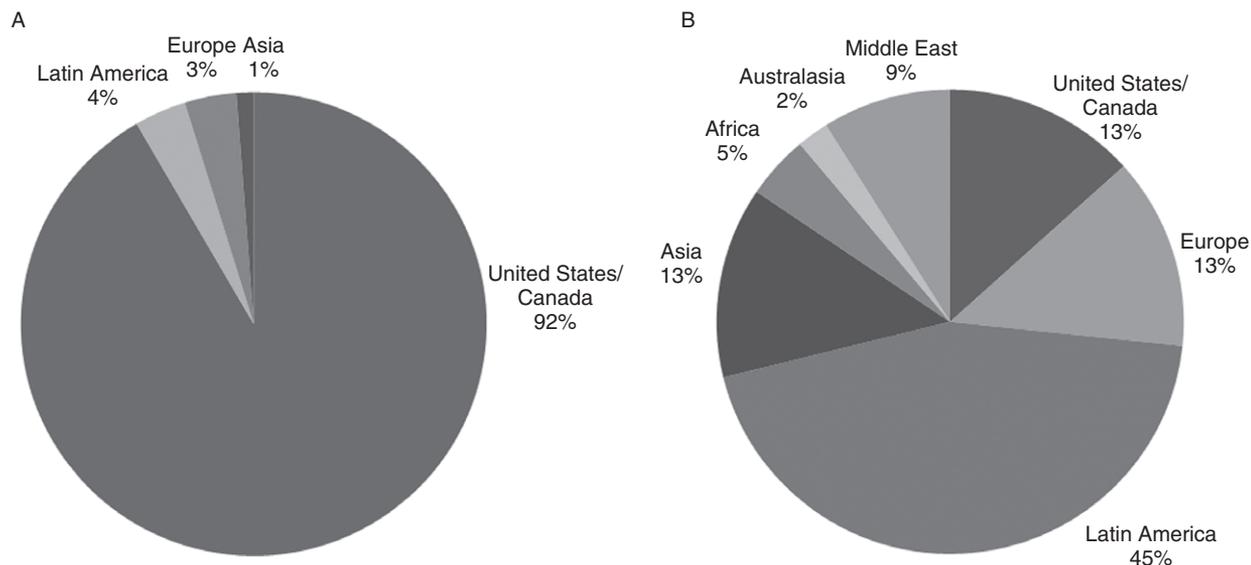


Figure 1 (A) Sexual Medicine Society of North America surgeon demographics. (B) International Society of Sexual Medicine surgeon demographics.

least 10 years, compared with SMSNA members of whom only 67% had experience of 10 or more years. In practice since residency, 69% of SMSNA members had inserted more than 100 prostheses and 76% had been inserting prostheses for more than 6 years. In contrast, only 50% of ISSM members had inserted 100 or more prostheses despite the fact that 93% had been inserting prostheses for more than 6 years, representative of implant utilization outside of the United States. Half of SMSNA respondents insert more than 20 prostheses a year while only 18% of ISSM members do so.

Preoperative Factors

Forty percent of SMSNA members and 50% of ISSM members do not routinely culture urine pre-

operatively. Figure 2 highlights practitioner habits in this regard. Of respondents who do routinely culture urine, 61% of SMSNA members and 45% of ISSM members do so 1–2 weeks prior to surgery. There were similar numbers of surgeons requesting patients to perform a daily preoperative topical antimicrobial scrub (SMSNA 59% vs. ISSM 64%). Of the SMSNA members who did, 9% asked patients to perform the scrub from at least 5 days preoperatively and 4% asked them to perform the scrub only on the day of surgery. Among ISSM members who ask their patients to perform a daily scrub, 11% ask them to do so for at least 5 days and 21% have them do so only on the day of surgery.

The preoperative shave was usually performed in the operating room by 97% of SMSNA and

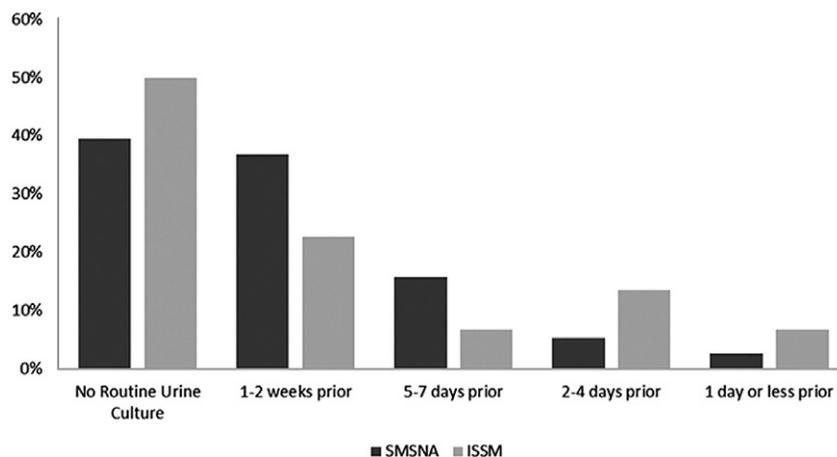


Figure 2 Comparison of urine culture timing. SMSNA = Sexual Medicine Society of North America; ISSM = International Society of Sexual Medicine.

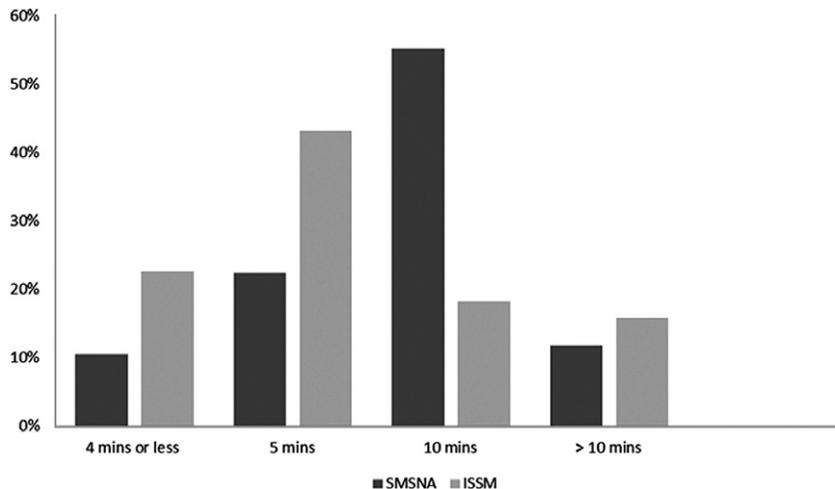


Figure 3 Comparison of skin preparation duration. SMSNA = Sexual Medicine Society of North America; ISSM = International Society of Sexual Medicine.

80% of ISSM members. The remaining 3% of SMSNA members, along with 18% of ISSM members, had patients shaved on the day of surgery but before the operating room by the patient or hospital staff. A single respondent from the ISSM had the shave performed by the patient before the day of surgery. Although only a third of SMSNA members used razors for the preoperative shave (the remainder used clippers), a majority indicated that they would choose razors if allowed to choose the shaving implement. More than two-thirds of ISSM members indicated a preference for razors over clippers but, in contrast to the SMSNA members, a nearly identical number actually used razors in practice.

While SMSNA members were nearly evenly divided in the use of chlorhexidine vs. povidone-iodine as the active ingredient used in hand scrubbing (38% and 39%, respectively), ISSM members overwhelmingly (73%) used povidone-iodine. Fifty-seven percent of SMSNA members strictly timed their hand scrub compared with 80% of ISSM members. The duration of the hand scrub was similar in the two groups. More SMSNA respondents double-gloved (58%) compared with ISSM respondents (20%).

Intraoperative Factors

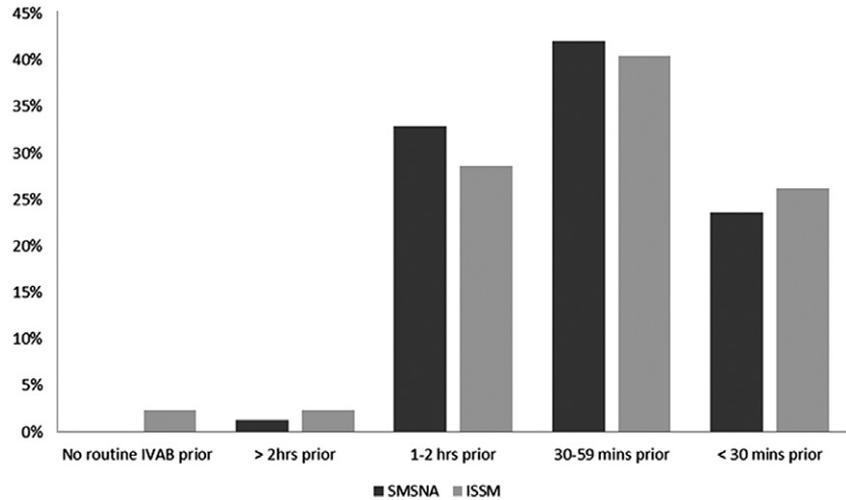
Almost twice as many SMSNA members (27% vs. 14%) routinely operated in a room with either laminar flow or positive pressure ventilation, although 15% of SMSNA members and 9% of ISSM members did not know if their operating rooms had this capability. The active ingredient used by SMSNA members for skin preparation was povidone-iodine (58%), chlorhexidine (10%),

alcohol (3%), or a combination of these (29%). ISSM members also principally used povidone-iodine (71%), while 14% used chlorhexidine and 16% used a combination of these ingredients. None of the ISSM members used alcohol as a component of their skin preparation. Eighty-one percent of SMSNA members and 72% of ISSM members strictly timed their skin preparation. Two-thirds of SMSNA members prepared skin for at least 10 minutes compared with just 34% of ISSM members (Figure 3). Almost all SMSNA members used disposable drapes (95%) while 75% of ISSM surgeons did.

Antibiotic Utilization

Two-thirds of SMSNA and three-quarters of ISSM respondents do not prescribe oral antibiotics preoperatively. However, postoperatively, approximately 90% of surgeons from both member groups gave oral antibiotics with almost all surgeons administering 4 or more days of antibiotics. Of those prescribing postoperative antibiotics, two-thirds of SMSNA surgeons preferred a fluoroquinolone with 29% preferring a cephalosporin. ISSM surgeons were split in their preferences of postoperative antibiotics (fluoroquinolones 46%, cephalosporins 49%). Intravenous antibiotics were given most commonly at least 30 minutes prior to the incision with 75% of SMSNA surgeons and 69% of ISSM surgeons doing so (Figure 4). The choice of IV antibiotic prophylaxis varied considerably among respondents not only between the two membership societies but also among surgeons within each society (Figure 5). SMSNA members used a combination of an aminoglycoside with vancomycin as the most common combination (47%)

Figure 4 Comparison of preoperative intravenous antibiotics timing. SMSNA = Sexual Medicine Society of North America; ISSM = International Society of Sexual Medicine; IVAB = intravenous antibiotics.



whereas ISSM members used an aminoglycoside with a cephalosporin most commonly (33%). Most members of both groups continue the IV antibiotic as long as the patient is in the hospital (SMSNA 61%, ISSM 69%). Antibiotic irrigation had widespread usage with only 8% of SMSNA and 5% of ISSM surgeons electing not to use it. Half of ISSM respondents used an aminoglycoside irrigation compared with 51% of SMSNA members using a combination agent antibiotic irrigation.

Postoperative Factors

Most respondents do not place a drain at the end of the operation (SMSNA 70%, ISSM 81%). If a drain is placed almost all surgeons remove it within 1 day. Seventy-one percent of SMSNA surgeons keep their patients in hospital overnight while 29% prefer same-day discharge. The same percentage of ISSM surgeons chose same-day dis-

charge for their patients but only 52% preferred overnight stay while the rest (19%) stayed for 2 days or more. No SMSNA surgeons routinely kept their patients in hospital for 2 nights or more.

Discussion

One of the most dreaded complications of penile implant surgery is infection. Although the risk in de novo penile prosthetic surgery is very low (1–3%), infections are associated with significant morbidity for the patient and increased healthcare costs [4,5,16–18]. Should an infection occur, salvage surgery has been proposed as a solution, but the failure rate is approximately 20% [16,19]. Therefore, prevention of infection is fundamental in implant surgery and many prevention strategies have been proposed. Most of these strategies focus on negating the pathogenesis of the infection,

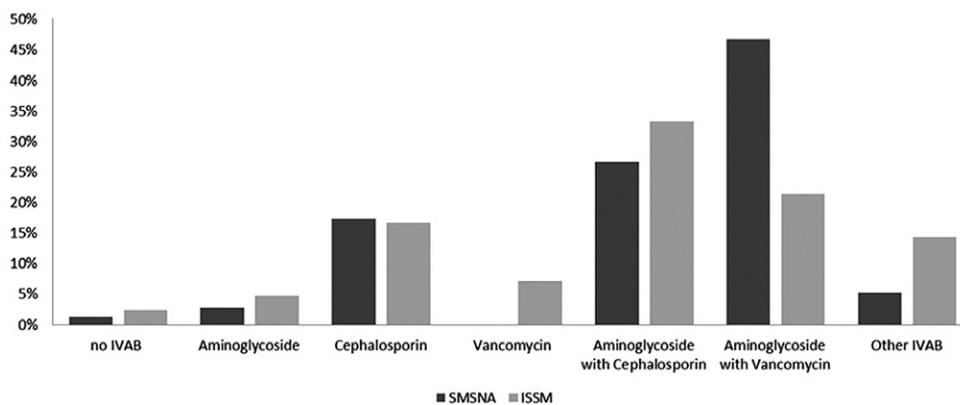


Figure 5 Comparison of preoperative intravenous antibiotics preference. SMSNA = Sexual Medicine Society of North America; ISSM = International Society of Sexual Medicine; IVAB = intravenous antibiotics.

which is thought to arise from contamination from the skin in the peri-surgical area at the time of surgery [20]. Therefore, most implant infections occur with commensal skin organisms and usually appear within the first 3 months [18,21].

Despite approximately 15,000 implants inserted each year in the United States, there still remains no consensus or official guideline on the optimal approach to the perioperative prevention of penile implant infections. The reasons for this are multifactorial but stem from the paucity of quality data investigating this issue, which is compounded by the difficulty in conducting a robust clinical trial. It has been estimated that to demonstrate a strategy that reduces implant infection rates from 3% to 1.5% in a prospective randomized trial would require over 3,300 patients [22]. Therefore, much of our practice relies on lower levels of evidence and anecdotally there is a considerable variation in prevention strategies. This study assessed the practice patterns of high volume and experienced implant surgeons and considers many of the key perioperative steps in implant infection prevention.

Our survey aimed to evaluate an international cohort of surgeons so we targeted members of the two largest sexual medicine societies in the world. As expected, SMSNA respondents were mostly from North America. ISSM respondents included members from every continent but Latin American surgeons predominated (Figure 1A, B). Almost every respondent from both associations considered themselves specialists in sexual medicine. Both cohorts were mostly high volume and experienced surgeons. SMSNA surgeons insert more prostheses per year with almost 50% inserting more than 20 per year compared with 18% from ISSM. The cause of this discrepancy in the rate of insertion is unclear. It does not seem to be related to the throughput of patients as approximately equal numbers of patients are seen in an average week in both groups. Neither does it seem to correlate with the type of patients who are managed at the respective practices. In fact, our data reveals that more ISSM surgeons devote more of their practice to andrology and managing male sexual dysfunction compared with SMSNA members. Perhaps this rate of insertion discrepancy reflects the socioeconomic differences of patients or insurance coverage in the respective locales.

For most surgeons, strategies to prevent postoperative infection often begin well before the day of surgery. Just over half of all surgeons routinely

culture the urine, most commonly 1–2 weeks preoperatively. A similar percentage of surgeons also routinely request their patients to perform a preoperative topical antimicrobial scrub usually 1 day prior to surgery. The impact of ensuring sterile urine preoperatively has not been previously analyzed in terms of prevention of implant infection, but there is some data to support the use of topical antimicrobial scrubs reducing the preoperative surgical-site culture colonization rate in the general surgical population and in the artificial urinary sphincter cohorts [12,23]. However, these colonization rates have not correlated with postoperative infections rates and a recent Cochrane review did not demonstrate that preoperative antimicrobial washing prevented surgical site infections [24].

A separate Cochrane review evaluating the method of hair removal preoperatively did conclude that there were statistically significantly more surgical site infections when people were shaved with a razor rather than with clippers (RR 2.02, 95% CI 1.21 to 3.36) [25]. However, this review did not include studies with penile prostheses or scrotal surgery. SMSNA supports surgeons using razors because there is less skin trauma and no apparent increased infection risk [26]. In our survey, two-thirds of SMSNA surgeons use clippers for the preoperative shave compared with one-third of ISSM surgeons, but interestingly, a majority of surgeons from both societies would still prefer to use a razor if given a choice. In the United States, hospital patient care quality improvement initiatives often mandate the use of surgical clippers over razors.

In terms of hand preparation, the major difference between the two groups was the preference of the majority ISSM surgeons toward using povidone-iodine whereas SMSNA urologists were more evenly spread between the povidone-iodine and chlorhexidine for hand antisepsis. ISSM surgeons also more commonly strictly timed the hand scrub but tended to double-glove much less. These differences are probably inconsequential as no level 1 evidence exists that any type of hand antisepsis affects surgical site infections. This is in contrast to skin antisepsis where recent level 1 evidence has emerged indicating that chlorhexidine is significantly better at preventing surgical site infections compared with povidone-iodine [27,28]. Notably, however, these studies took into account multiple types of operations, with very few urological procedures and an unknown (if any) number of penile implant insertions. This current

survey was conducted before the results of such trials were published and therefore may reflect the reason why chlorhexidine was used by the minority of surgeons from both societies. Whether the duration of the skin preparation is also important is unknown but more SMSNA urologists prepped the skin for a longer time and also a greater percentage also strictly timed their skin preparation compared with their ISSM colleagues.

A recent study focused on the antibiotic practice patterns of surgeons who insert penile implants as assessed by a 10-question mailed survey demonstrated a marked variation among urologists [29]. Our results are concordant with this lack of uniformity in antibiotic practice patterns of implant surgeons. While antibiotic usage was widespread, the choice of antibiotics differed considerably not only between members of both societies but also among individual members of each society. Consistency was apparent among the majority of surgeons in the usage, timing, and duration of oral and intravenous antibiotics as well as the utilization of intraoperative antibiotic irrigation. However, there was no preferred antibiotic whether administered orally, intravenously, or topically. Even guidelines published by the world's two largest urological societies differ in their recommendations of antibiotic prophylaxis [14,15]. The American Urological Association (AUA) suggest an aminoglycoside with either a 1st/2nd generation cephalosporin or vancomycin for ≤ 24 hours while the European Association of Urology (EUA) guidelines recommend a 2nd/3rd generation cephalosporin with a penicillin. No duration is specified in the EUA guidelines. These conflicting guidelines are representative of the conflicting practice patterns seen in this study and highlight the need for better studies in this area.

The major strengths of this study were that our cohort included mainly high volume and experienced implant surgeons. Our study group also included urologists from every inhabited continent around the world. This is also the first study to comprehensively assess many of the key perioperative steps taken by surgeons to prevent postoperative penile implant infection. This study does not, however, relate the observed practice patterns to infection rates. Outcome parameters were not enquired about and were not an aim of this study. Our two cohorts were also non-randomized and this study suffers from self-selection bias. We also made the assumption that all surgeons answered each question based on a de novo patient and not based on any revision or salvage procedures.

Conclusions

Even among experienced and high-volume penile prostheses surgeons, there is great variation in perioperative strategies utilized to prevent postoperative penile implant infection. In addition, there appears to be some key differences between surgeons from SMSNA and ISSM, most likely reflective of geographic variations in training. Whether these variations alter postoperative infection rates is unknown; however, we suspect that these differences in practice reflect the lack of robust clinical evidence and the absence of available comprehensive guidelines. The results from this study may assist in the formation of prospective studies which can then lead to the development of uniform evidence-based practice guidelines.

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Appendix 1: 39-Question Survey

Please answer each question with the single best answer

Demographics

1. In what region of the world do you practice?
 - United States/Canada
 - Europe
 - Latin America
 - Asia
 - Africa
 - Australasia
 - Middle East
 - Other
2. How would you describe your practice?
 - Private practice urology
 - Academic practice
3. Describe your urology practice:
 - General urology
 - Urologic oncology
 - Andrology
 - Other
4. Do you consider yourself a specialist in sexual medicine?
 - Yes
 - No
5. Are you fellowship-trained in sexual medicine?
 - Yes
 - No
6. How long have you been in practice?
 - less than 5 years
 - 5–10 years
 - 10–20 years
 - more than 20 years

7. How many patients do you see in an average week?

- less than 25
- 25–50
- 51–75
- 76–99
- 100 or more

8. What percentage of your practice relates to managing male sexual dysfunction?

- less than 10%
- 11–30%
- 31–50%
- 51–75%
- more than 75%

Past Experience

9. During your residency, how many times did you “scrub in” to a penile prosthesis insertion?

- never
- 5 or less
- 6–20
- 21–49
- 50 or more

10. For how many years have you been inserting penile prostheses?

- 1
- 2–3
- 4–5
- 6 or more

11. Approximately how many penile prostheses have you inserted?

- 10 or less
- 11 to 25
- 26 to 50
- 51 to 99
- 100 or more

12. Per year, approximately how many penile prostheses do you insert?

- 0
- 1–5
- 6–10
- 11–20
- 21 or more

Perioperative Practice

13. Do you routinely culture the urine preoperatively? If yes, when?

- I do not routinely culture urine.
- 1–2 weeks prior
- 5–7 days prior
- 2–4 days prior
- 1 day or less prior

14. Do you request that your patients perform a daily preoperative topical antimicrobial scrub? If yes, when?

- I do not routinely request my patients to perform a preoperative topical antimicrobial scrub.
- 5–7 days prior
- 2–4 days prior
- 1 day prior
- day of surgery

15. When is the preoperative shave usually performed?

- immediately preoperatively in the operating room
- day of surgery but before the operating room by patient or hospital staff

- before day of surgery by patient
- combination of above
- other

16. If the preoperative shave is performed on the day of surgery or immediately preoperatively, what implement is used?

- razor
- clippers

17. If you were allowed to use any shaving implement, what would you use?

- razor
- clippers

18. What is the active ingredient in the agent you usually use for hand scrubbing?

- chlorhexidine
- povidone-iodine
- alcohol
- combination of above
- other

19. Do you strictly time your hand scrub?

- yes
- no

20. For approximately how long do you hand scrub for?

- 4 minutes or less
- 5 minutes
- 10 minutes
- more than 10 minutes

21. How many layers of gloves do you use for penile prosthesis implantation?

- 1
- 2

22. During surgery, do you routinely change gloves (either 1 or 2 layers) at least once?

- yes
- no

23. Do you routinely operate in a room with laminar flow or positive pressure ventilation?

- yes
- no
- I do not know

24. What is the active ingredient in the agent you usually use for skin preparation?

- chlorhexidine
- povidone-iodine
- alcohol
- combination of above
- other

25. How many times do you apply the skin preparation?

- once
- twice

26. Do you strictly time your skin preparation?

- yes
- no

27. What is the approximate duration of your skin preparation?

- 4 minutes or less
- 5 minutes
- 10 minutes
- more than 10 minutes

28. Do you routinely ensure that the skin prep solution is dry before the incision is made?
- yes
 - no
29. What type of drapes do you use?
- disposable
 - non-disposable

Antibiotics

30. Do you routinely give oral antibiotics prior to primary implant surgery? If yes, when?
- I do not give routine oral antibiotics preoperatively.
 - 3 or more days prior
 - 1–2 days prior
 - on day of surgery
31. Which oral antibiotics do you routinely administer prior to primary implant surgery?
- I do not give routine oral antibiotics preoperatively.
 - Fluoroquinolone
 - Cephalosporin
 - Penicillin based
 - other
32. Do you routinely give oral antibiotics after primary implant surgery? If yes, for how long?
- I do not give routine oral antibiotics preoperatively.
 - for more than 7 days
 - for 4–7 days
 - for 2–3 days
 - for 1 day
33. Which oral antibiotics do you routinely administer after primary implant surgery?
- I do not give routine oral antibiotics preoperatively.
 - Fluoroquinolone
 - Cephalosporin
 - Penicillin based
 - other
34. In relation to the day of surgery, when do you administer IV antibiotics?
- I do not routinely administer IV antibiotics prior to surgery.
 - more than 2 hours prior to incision
 - 1–2 hours prior to incision
 - 30–59 minutes prior to incision
 - less than 30 minutes prior to incision
35. Which IV antibiotics do you routinely administer before primary implant surgery?
- I do not use routine IV antibiotics before surgery.
 - Aminoglycoside only
 - 1st or 2nd generation cephalosporin only
 - Vancomycin only
 - I use a combination of aminoglycoside with a cephalosporin.
 - I use a combination of aminoglycoside with vancomycin.
 - I use a different antibiotic(s).
36. Do you continue to use IV antibiotics after primary implant surgery?
- I do not routinely administer IV antibiotics after surgery.
 - I continue the IV antibiotics as long as the patient is in the hospital.
 - I continue the IV antibiotics after the patient has left the hospital.
37. During surgery, do you utilize antibiotic irrigation? If so, which one?
- I do not utilize antibiotic irrigation.
 - Aminoglycoside
 - Cephalosporin
 - Vancomycin
 - Other
38. Do you routinely use a drain? If yes, for how long?
- I do not use a drain routinely.
 - 1 day
 - 2 days
 - 3 or more days
39. How long do your primary implant patients usually stay in hospital?
- same-day discharge
 - overnight stay
 - 2 nights or more