# SUMMARY OF SAFETY AND EFFECTIVENESS DATA (SSED)

## I. GENERAL INFORMATION

| | |
|---|---|
| Device Generic Name: | Stent, urethral, prostatic, semi-permanent |
| Device Trade Name: | The Spanner™ Temporary Prostatic Stent |
| Device Procode: | NZC |
| Applicant's Name and Address: | SRS Medical Systems, Inc.<br>76 Treble Cove Road Building 3<br>North Billerica, MA 01862 USA |
| Date(s) of Panel Recommendation: | None |
| Premarket Approval Application (PMA) Number: | P060010/S013 |
| Date of FDA Notice of Approval: | October 7, 2022 |

The original PMA (P060010) was approved on December 14, 2006 and is indicated for temporary use (up to 30 days) to maintain urine flow and allow voluntary urination in patients following minimally invasive treatment for benign prostatic hyperplasia (BPH) and after initial post-treatment catheterization. The SSED to support the indication is available on the CDRH website and is incorporated by reference here. The current supplement was submitted to expand the indication for The Spanner™ Temporary Prostatic Stent. To support the extended duration of use for The Spanner from 30 days to 90 days (i.e., three devices used for 30-days each), biocompatibility testing was performed.

## II. INDICATIONS FOR USE

The Spanner™ Prostatic Stent is intended for temporary use (up to 30 days) to maintain urine flow and allow voluntary urination for patients who are not candidates for pharmacologic, minimally invasive or surgical treatment of the prostate.

## III. CONTRAINDICATIONS

The Spanner is contraindicated for use in patients with:

- Positive urine culture or active urinary tract infection,
- History of symptomatic urinary tract disease such as urethral stricture, bladder stones, or other significant urological conditions (e.g., gross hematuria) that could affect the function of the stent,

- Surgery altering the normal uro-genital anatomy or abnormal urethral anatomy that affects the function of the lower urinary tract, or
- A prostatic urethral length less than 4 cm or greater than 9 cm (combined length from the top (proximal side) of the bladder neck to the bottom (distal side) of external sphincter).

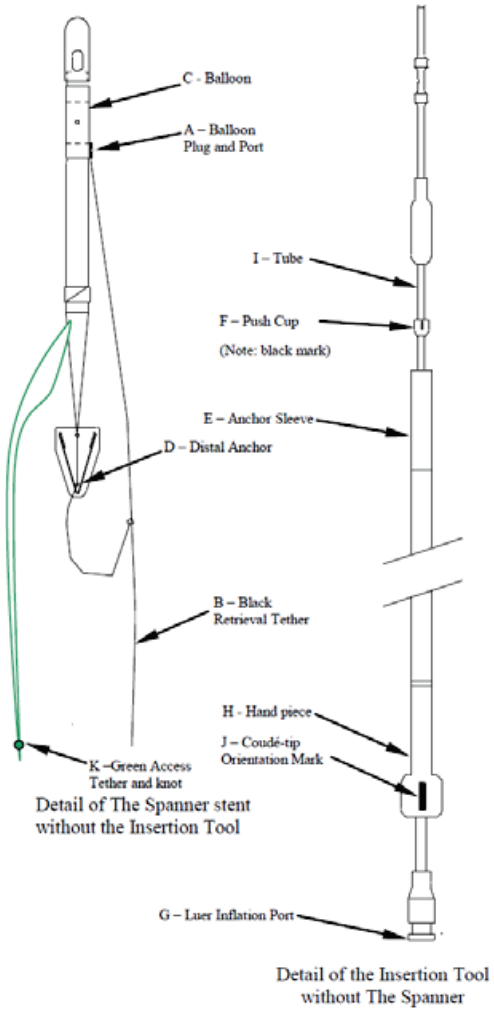
## IV. WARNINGS AND PRECAUTIONS

The warnings and precautions can be found in The Spanner™ Prostatic Stent physician's Instructions for Use.

## V. DEVICE DESCRIPTION

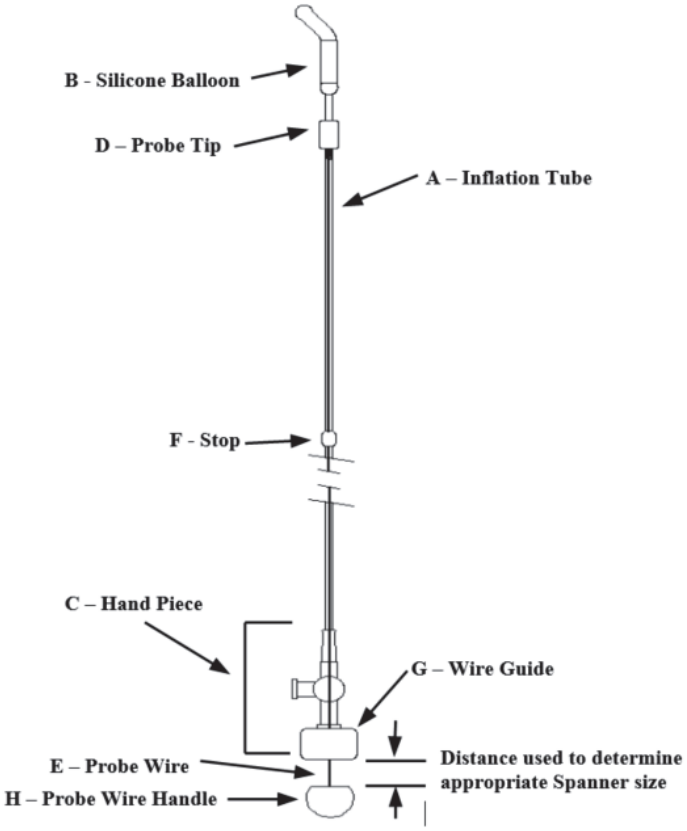
The Spanner™ Temporary Prostatic Stent ("The Spanner™", Figure 1) is a sterile, single use device made from silicone elastomer designed to facilitate volitional voiding urination for patients who are not candidates for pharmacologic, minimally invasive or surgical treatment of the prostate. The stent portion is positioned in the prostatic urethra, extending from the bladder to the apex of the prostate. The interior lumen provides a conduit for urine to flow from the bladder to the external sphincter during urination. The stent is held in the bladder by an inflatable balloon on its proximal end and a soft distal anchor on the distal end. The distal anchor is attached to the stent by the device tethers. The tethers traverse the external sphincter, with the anchor positioned on the distal side of the sphincter to prevent migration toward the bladder, while allowing normal sphincter function to occur. The stent is removed using the retrieval tether, which provides for the deflation of the balloon and withdrawal of the stent. To facilitate device insertion, the stent is mounted on a sterile, single use insertion tool. The stent and insertion tool are provided together in a sterile package. The Spanner™ is available in 20 Fr diameter, six lengths (4, 5, 6, 7, 8, and 9 cm), and straight or coudd-tip versions. While none of the patients in the clinical study to support the expanded indication used size 4 of the device, approval includes size 4 because the study used to support the original PMA approval included this size.

**Figure 1. The Spanner™ and Insertion Tool**




The Surveyor™ (Figure 2) is a sterile, single use device accessory to The Spanner™ used to select the appropriate size The Spanner™. The Surveyor™ is used to assess the distance from the top (proximal side) of the bladder neck to the bottom (distal side) of the external sphincter. This distance corresponds to the distance from The Spanner™ balloon to the distal anchor when The Spanner™ resides *in situ.* The Surveyor™ consists of a polymer inflation tube with a silicone balloon on the proximal end and a polycarbonate hand piece on the distal end. A short Teflon probe encircles the inflation tube and slides freely along its length between the balloon and the handle. The probe slides along the Surveyor™ inflation tube through the length of the pendulous urethra to the level of the bottom (distal side) of the external sphincter. A stainless-steel wire attached to the probe extends the length of the inflation tube through the Surveyor hand piece where it is attached to a small handle. Components of the Surveyor™, external of the patient, replicate the position of the probe relative to the bottom of the external sphincter. The appropriate The Spanner™ size is identified using a selector card used in conjunction with the Surveyor™.

**Figure 2. The Surveyor™**




## VI. ALTERNATIVE PRACTICES AND PROCEDURES

There are several other alternatives to manage voiding dysfunction and lower urinary tract symptoms in patients. These include Foley catheterization, clean intermittent self-catheterization, suprapubic catheterization, medication, and no catheterization. Each alternative has its own advantages and disadvantages. A patient should fully discuss these alternatives with his/her physician to select the method that best meets expectations and lifestyle.

## VII. MARKETING HISTORY

The Spanner has a CE-mark and is commercially available in the EU, US, Saudi Arabia, and South Korea for the indication approved under the original PMA.

The Spanner has not been withdrawn from marketing for any reason related to its safety or effectiveness in any country.

## VIII. POTENTIAL ADVERSE EFFECTS OF THE DEVICE ON HEALTH

Below is a list of the potential adverse effects (e.g., complications) associated with the use of the device.

- Micturition Burning
- Bleeding/Hematuria
- Urinary Frequency
- Urinary Urgency
- Bacteriuria
- Pain/Discomfort/Spasm
    - Perineal Pain
    - Trauma Activated Pain
    - Dyspareunia – Painful Sex
    - Penile Pain
    - Testicular Pain
    - Bladder Discomfort
- Symptomatic urinary tract infection (UTI)
- Urinary Retention
- Urinary Incontinence
- Ulceration/Trauma of Urethra/Bladder
- Ejaculation Disorder/Failure
- Elevated post-void residual (PVR)
- Urinary Hesitation
- Difficulty in Micturition
- Post Void Dribble
- Pruritus
- Mucosal Tingling
- Migration
- Spanner Expulsion
- Bladder Calculus
- Hemospermia
- Epididymitis
- Penile Swelling
- Phimosis
- Urethritis

For the specific adverse events that occurred in the clinical study, please see Section X below.

## IX. SUMMARY OF NONCLINICAL STUDIES

The components, materials, manufacturing, processing, and sterilization of the The Spanner Temporary Prostatic Stent are identical to those that are approved under P060010 and its supplementsNo other additional laboratory or bench testing was needed for this PMA supplement.

### A. Biocompatibility

Biocompatibility testing was performed for all patient-contacting components of The Spanner in accordance with ISO 10993-1 *Biological evaluation of medical devices – Part 1: Evaluation and testing within a risk management process*, on the finished sterilized devices. All biocompatibility studies were conducted in compliance with Good Laboratory Practices (GLP), 21 CFR Part 58.

The Spanner device is considered a permanent (> 30 days) surface device contacting mucosal membranes. The following biocompatibility endpoints were assessed for this device component:

- Cytotoxicity, ISO 10993-1:2003
- Sensitization, ISO 10993-1:2003
- Irritation, ISO 10993-1:2003
- Acute Systemic Toxicity, ISO 10993-1:2003
- 2, 4, and 13-week Muscle Implantation Studies, ISO 10993-1:2003
- Chemical Characterization followed by a Toxicological Risk Assessment (10993-17:2012 and 10993-18:2020, respectively) were performed in lieu of the following biological endpoints:
    - Sub Chronic Systemic Toxicity
    - Genotoxicity

All pre-specified test acceptance criteria were met, and all tests passed.

## X. SUMMARY OF PRIMARY CLINICAL STUDY

To support this Panel Track Supplement, the applicant performed a clinical study to establish a reasonable assurance of safety and effectiveness of The Spanner™ for temporary use (up to 30 days) to maintain urine flow and allow voluntary urination for patients who are not candidates for pharmacologic, minimally invasive or surgical treatment of the prostate in the US under IDE # G150243. Data from this clinical study were the basis for the PMA approval decision. A summary of the clinical study is presented below.

### A. Study Design

Patients were treated between August 3, 2016 and January 31, 2019. The database for this Panel Track Supplement reflected data collected through January 31, 2019 and included 107 patients. There were 8 investigational sites.

The study was a prospective, multicenter, single-arm, open-label clinical study to evaluate the use of The Spanner™ in patients dependent on urinary catheters for bladder drainage with comorbid conditions that preclude them from pharmacologic, minimally invasive or surgical treatment of the prostate. The study enrolled male subjects greater than 45 years of age diagnosed with benign prostatic hypertrophy in urinary retention and catheterized for less than 180 days and was evaluated for

success based on the proportion of subjects who achieved adequate bladder drainage over 90 days as defined by a post-void residual (PVR) of ≤ 150 ml.

Subjects were screened and enrolled after signing the informed consent, and inserted with The Spanner™ (Visit 1). Subjects were enrolled in the trial for a period of approximately 105 days. The study consisted of a study endpoint period (with stent replacement every 30 days) and a follow-up phone call visit 15-20 days after final stent removal (Visit 4).

The primary effectiveness endpoint is the proportion of patients who achieve adequate bladder drainage over 90 days, defined as a PVR of ≤150 ml. The pre-specified success criterion for this study is that ≥50 percent of patients will achieve adequate bladder drainage at each of the 4 evaluations over 90 days. The primary objective is met if the one-sided lower bound of the 95% confidence limit for the incidence of patients who achieve adequate bladder drainage at each of the 4 evaluations over 90 days is ≥ 50%. The null and alternative hypotheses were tested at a one-sided $\alpha$=0.025 level of significance:

Ho: $\pi \leq 0.5$
Ha: $\pi > 0.5$

where $\pi$ is the proportion of patients with maintenance of successful voiding during The Spanner™ use period.

To have an 80% chance of demonstrating that the proportion of subjects achieving success with The Spanner is statistically significantly greater than 50%, assuming that the device can achieve a 65% success rate, with $\alpha$=0.05, a sample size of n=85 completers was needed for the study. The sample size calculation was based on an exact binomial one sample test. Assuming a dropout rate of 20%, the total sample size of n=105 subjects was required for the study.

Data management and monitoring activities were conducted by Medelis, an independent Contract Research Organization (CRO), during the clinical study.

1. Clinical Inclusion and Exclusion Criteria

   Enrollment in the study was limited to patients who met the following inclusion criteria:

   - Age > 45 years,
   - In urinary retention and catheterized (indwelling or intermittent) for less than 180 days,
   - Documented diagnostic history (within 180 days of study) of detrusor contractility (> 15 cmH2O) confirmed via pressure-flow test,
   - Negative Urinalysis on Visit 1,
   - Not a candidate for pharmacologic, minimally invasive or surgical treatment of the prostate,

- Charlson Weighted Index of Comorbidity Score > = 1,[1]
- Willing and able to sign the Informed Consent Form,
- Willing and able to complete the follow-up protocol requirements,
- Experiencing catheter-induced discomfort.

Patients were not permitted to enroll in the study if they met any of the following exclusion criteria:

- Current use of a urinary catheter daily for greater than 180 consecutive days immediately preceding entering into the study,
- Positive Urinalysis on Visit 1,
- Current or recent (within the last 6 months) urinary tract disease including urethral stricture, bladder stones, and other significant urological conditions or surgery,
- Surgery altering the normal uro-genital anatomy or abnormal urethral anatomy that affect the function of the lower urinary tract,
- History of conditions associated with neurogenic bladder, including spinal cord injury, multiple sclerosis, or Parkinson's disease,
- Use of anticholinergic medication,
- Gross hematuria when catheter is removed on Visit 1,
- Known or suspected prostate cancer,
- Prior pelvic irradiation therapy,
- Prostatic urethral length < 4 cm or > 9 cm (combined length from the top proximal side of the bladder neck to the bottom distal side of the external sphincter),
- Intravesical enlargement of the median lobe of the prostate,
- Prior penile prosthesis.

2. Follow-up Schedule
   All patients were scheduled to return for follow-up examinations at approximately 30 day intervals postoperatively for a total of 4 visits.

   Preoperatively, the patients were screened, enrolled, and informed consent was obtained. Patients completed a history and physical, cystoscopy, and Surveyor measurement. At each visit, the patients completed urinalysis, urine culture and sensitivity, PVR assessment, uroflowmetry, subject satisfaction questionnaire, and serum creatine. Postoperatively, the objective parameters measured during the study included International Prostate Symptom Score (IPSS). A new Spanner was inserted during Visits 1-3. The final Spanner was removed and cystoscopy was completed during Visit 4. Adverse events and complications were recorded at all visits. A follow-up phone call occurred 15-20 days after final Spanner removal.

Table 1 below summarizes the study activities.

**Table 1: Study Activities for Each Visit**

| Activity | Visit 1<br>Screening<br>End of Catheter Use<br>Device #1 Placement | Visit 2<br>1 Month<br>Device #1 Removal<br>Device #2 Placement | Visit 3<br>2 Month<br>Device #2 Removal<br>Device #3 Placement | Visit 4<br>3 Month<br>Device #3 Removal | Follow-up Phone Call |
|---|---|---|---|---|---|
| **Visit Windows** | **Not Applicable** | **30 ± 5 days** | **30 ± 5 days** | **30 ± 5 days** | **15-20 days Post Final Device Removal** |
| Informed Consent | ● | | | | |
| History and Physical with DRE | ● | | | | |
| Urinalysis with Micro | ● | ● | ● | ● | |
| Urine Culture & Sensitivity[1] | ● | ● | ● | ● | |
| Uroflow | ● | ● | ● | ● | |
| PVR | ● | ● | ● | ● | |
| Subject Satisfaction Questionnaire | ● | ● | ● | ● | |
| IPSS | | ● | ● | ● | |
| Cystoscopy | ● | | | ● | |
| Patient is Enrolled | ● | | | | |
| Surveyor Measurement | ● | | | | |
| Stent Placement | ● | ● | ● | | |
| Serum Creatinine | ● | ● | ● | ● | |
| Adverse Events | ● | ● | ● | ● | ● |
| Discharge | | | | | ● |

1 If Indicated

3. Clinical Endpoints

**Primary Safety**: Complete characterization of all recorded adverse events and serious adverse events including frequency, severity and relatedness reported throughout the study.

**Primary Effectiveness:** The proportion of subjects who achieved adequate bladder drainage over 90 days as defined by a PVR of ≤150 ml. The pre-specified success criterion for this study was that ≥50% of subjects will achieve adequate bladder drainage over 90 days of use of The Spanner.

Secondary Effectiveness Endpoints included:

- The proportion of subjects over 30 days (Visits 1 and 2) with PVR ≤150 ml.
- The proportion of subjects over 30 days (Visits 1 and 2) with PVR ≤250 ml.
- The proportion of subjects over 90 days (Visits 1-4 with PVR ≤250 ml.

Exploratory Endpoints included:

- To measure the effects of The Spanner over time on maximum flow rate (Qmax in ml/sec) as assessed by uroflowmetry.
- To measure the effects of The Spanner over time on the International Prostate Symptom Score (IPSS).

## B. Accountability of PMA Cohort

At the time of database lock, of 107 patients enrolled in the clinical study. 107 patients are available for analysis at the completion of the study. 1 patient withdrew consent during the implantation procedure during Visit 1, and is included in the ITT analysis group. Of the 107 patients in the ITT analysis group, eighty-two men completed the study (82/107; 76.6%) and 25/107 (23.4%) discontinued. Of those who discontinued, it was primarily due to patient unwillingness to compete study requirements (9/107; 8.4%), physician-mediated withdrawal based on the belief that the subject was unable to complete study requirements (8/107; 7.5%), and lack of effectiveness (4/107; 3.7%).

**Intent-to-Treat (ITT) (n=107)**: All enrolled subjects who underwent an attempted Spanner device implant procedure. There is no imputation for missing data in this analysis group, including no imputation for missing data for early termination subjects. This is the primary analysis population.

**Per Protocol (PP) (n=79):** All subjects who were enrolled in the study, were implanted with The Spanner device, and completed all study visits with no protocol deviations that affected the primary endpoint while enrolled in the study.

**Safety Population (n=107):** The safety population consists of all subjects who were enrolled in the study.

## C. Study Population Demographics and Baseline Parameters

The demographics of the study population are provided in Table 2 below.

**Table 2: Demographics and Baseline Characteristics**

| Demographics[1, 4] | Mean±SD | Median | Min-Max | n |
|---|---|---|---|---|
| Age[2] (years) | 77.12±10.62 | 78 | 50-97 | 107 |
| Height[3] (inches) | 68.74±3.55 | 69 | 57-75 | 102 |
| Weight (pounds) | 185.66±38.13 | 176 | 117-332 | 102 |
| BMI | 27.63±5.51 | 27 | 19-50 | 102 |
| **Ethnicity** | **n/N(%)** | | | |
| Hispanic or Latino | 0/107(0.00%) | | | |
| Not Hispanic or Latino | 104/107(97.20%) | | | |
| Missing | 3/107(2.80%) | | | |

| Race | n/N(%) |
|---|---|
| American Indian or Alaska Native | 0/107(0.00%) |
| Asian | 0/107(0.00%) |
| Black or African American | 3/107(2.80%) |
| White | 103/107(96.26%) |
| Other | 0/107(0.00%) |
| Missing | 1/107(0.93%) |

1 Three subjects choose not to provide a response to their ethnicity and one subject choose not to provide a response to his race.
2 Patient 007-030 age (80) derived from birth date
3 Patient 010-007 showed height as 175 which was presumed to be in cm and was converted to inches
4 Height and weight are missing for 5 subjects

## D. Safety and Effectiveness Results

### 1. Safety Results

The analysis of safety was based on the ITT population, which included 107 patients for which Spanner insertion was attempted with follow-up through 105 days. The primary safety endpoint was complete characterization of all recorded adverse events and serious adverse events including frequency, severity and relatedness reported throughout the study.The key safety outcomes for this study are presented below in Table 3. Adverse effects are reported in Table 4.

Adverse effects that occurred in the PMA clinical study:

Table 3 provides a summary of all adverse events reported by all subjects. There were 173 adverse events (AEs) reported by 81/107 (75.7%) subjects. Out of the total number of reported AEs, 101/173 (58.38%) were deemed related or possibly related to the device or procedure by the investigator. Most AEs were mild (151/173; 87.28%) to moderate (20/173; 11.56%) in severity. Fifteen of the 107 subjects (14.02%) reported 16 serious adverse events (SAEs), of which 13 were moderate and 3 were mild. All SAEs required subject hospitalization and all were resolved prior to study completion. None of the SAEs were related to the procedure or the device, and 9 of 16 (56.3%) were associated with pre-existing conditions. There were no subject deaths reported during this study.

**Table 3: Summary of Adverse Events**

| All Adverse Events | | | |
|---|---|---|---|
| | n/N(%) | Events | 95% CI |
| AE | 81/107(75.70%) | 173 | [0.665,0.835] |
| AE related to device or procedure | 47/107(43.93%) | 101 | [0.386,0.594] |
| **Severity** | | | |
| Severe | 2/107(1.87%) | 2 | [0.003,0.086] |
| Moderate | 11/107(10.28%) | 20 | [0.070,0.230] |
| Mild | 77/107(71.96%) | 151 | [0.878,0.986] |
| **Relationship to device or procedure** | | | |
| Definite | 8/107(7.48%) | 11 | [0.044,0.185] |

| | | | |
|---|---|---|---|
| Probable | 25/107(23.36%) | 40 | [0.211,0.421] |
| Possible | 24/107(22.43%) | 50 | [0.200,0.408] |
| Unlikely | 35/107(32.71%) | 44 | [0.322,0.547] |
| Not related | 22/107(20.56%) | 28 | [0.179,0.382] |
| **All Serious Adverse Events** | | | |
| | **n/N(%)** | **Events** | **95% CI** |
| Serious AE | 15/107(14.02%) | 16 | [0.782,1.000] |
| Serious AE related to device or procedure | 0/107(0.00%) | 0 | [0.000,0.218] |
| **Severity** | | | |
| Severe | 0/107(0.00%) | 0 | [0.000,0.218] |
| Moderate | 12/107(11.21%) | 13 | [0.519,0.957] |
| Mild | 3/107(2.80%) | 3 | [0.043,0.481] |
| **Relationship to device or procedure** | | | |
| Definite | 0/107(0.00%) | 0 | [0.000,0.218] |
| Probable | 0/107(0.00%) | 0 | [0.000,0.218] |
| Possible | 0/107(0.00%) | 0 | [0.000,0.218] |
| Unlikely | 2/107(1.87%) | 2 | [0.017,0.405] |
| Not related | 14/107(13.08%) | 14 | [0.681,0.998] |

Table 4 lists the number and percentage of all procedure and/or device related adverse events that occured in at least 2% of subjects. The most common AEs reported were bacteriuria (asymptomatic) (25/107; 23.36%) followed by pain (10/107; 9.35%) and urinary urgency (8/107; 7.48%).

**Table 4: Adverse Events Related to Procedure of Device**

| Adverse Events[1] | n/N (%) | Events |
|---|---|---|
| Bacteriuria | 25/107(23.36%) | 29/173 |
| Pain | 10/107(9.35%) | 10/173 |
| Urinary urgency | 8/107(7.48%) | 8/173 |
| Urinary frequency | 6/107(5.61%) | 6/173 |
| Dysuria | 6/107(5.61%) | 6/173 |
| Voiding difficulty | 6/107(5.61%) | 6/173 |
| Hematuria | 5/107(4.67%) | 5/173 |
| Urinary incontinence | 4/107(3.74%) | 5/173 |
| Urinary retention | 4/107(3.74%) | 5/173 |
| Urinary tract infection | 4/107(3.74%) | 5/173 |
| Penile pain | 3/107(2.80%) | 3/173 |
| Residual urine | 3/107(2.80%) | 3/173 |
| 1 Reporting AEs of 2% or greater only | | |

AEs experienced by less than 2% of the subjects during the study endpoint period included: abnormal urinalysis (2/107; 1.87%), bladder discomfort (1/107; 0.93%), calculus urinary bladder (1/107; 0.93%), cloudy urine (1/107; 0.93%), nocturia (1/107; 0.93%), painful erection (1/107; 0.93%), post void dribbling (1/107; 0.93%), pus cells in urine (1/107; 0.93%).

Urethral and bladder cystoscopy was conducted prior to Spanner insertion and after the final Spanner removal to assess the impact of The Spanner on the urinary tract. There were no significant differences in findings between baseline bladder and urethral cystoscopy and bladder and urethral cystoscopy following extended use of The Spanner.

2. Effectiveness Results

The primary objective of the study was to determine the proportion of subjects who achieved adequate bladder drainage over 90 days as defined by a post-void residual (PVR) of ≤150 ml. The pre-specified success criterion for this study was that ≥50% of subjects will achieve adequate bladder drainage over 90 days of use of The Spanner.

The primary effectiveness endpoint is the success/failure of the subject to have a successful urinary void at all four study visits: (a) upon initial placement of the first stent (Visit 1), and (b) at all three visits in which the subject has a stent placed for 30 days (Visits 2, 3 and 4). The primary endpoint was met using the ITT analysis group. Table 5 shows the proportion of subjects who achieved adequate bladder drainage for the ITT analysis group.

At all combined visits, 79/107 (73.83%) of subjects had a PVR volume of ≤150ml and therefore achieved adequate bladder drainage using the ITT analysis group. The ITT population imputed all missing values as failures. The p-value for all combined visits is < 0.0001 and CI is [0.644, 0.819].

**Table 5: Primary Effectiveness Endpoint Analysis for All Visits - ITT**

| Analysis Group | n/N(%) | [CI]** | p-value* |
|---|---|---|---|
| ITT | 79/107(73.83%) | [0.644,0.819] | < 0.0001 |
| * Proportion Test<br>** CI = 95% Confidence Interval | | | |

At each visit, subjects had two attempts within a few hours to conduct a uroflow and demonstrate a PVR of ≤150ml by abdominal ultrasound. Subjects with a minimum PVR >250ml (and <350ml) were scheduled for a follow-up visit within one week to monitor their PVR. Subjects with a minimum PVR > 350ml were removed from the study per protocol.

Tables 6 and 7 show the PVR summary at various PVR intervals at each study visit for the ITT analysis population, which is the most conservative analysis population. For the ITT population, at each study visit, the vast majority of subjects had PVR ≤ 100 ml.

**Table 6: PVR Summary Statistics – ITT**

| Characteristics | Visit 1 | Visit 2 | Visit 3 | Visit 4 |
|---|---|---|---|---|
| | n/N(%) | | | |
| PVR ≤ 100 ml | 81/107(75.70%) | 80/107(74.77%) | 78/107(72.90%) | 71/107(66.36%) |
| PVR 101-150 ml | 15/107(14.02) | 7/107(6.54%) | 3/107(2.80%) | 10/107(9.35%) |

| | | | | |
|---|---|---|---|---|
| PVR 151-250 ml | 1/107(0.93%) | 1/107(0.93%) | 0/107(0.00%) | 0/107(0.00%) |
| PVR 251-350 ml | 2/107(1.87% | 0/107(0.00%) | 1/107(0.93%) | 0/107(0.00%) |
| PVR > 350ml | 2/107(1.87%) | 0/107(0.00%) | 2/107(1.87%) | 1/107(0.93%) |

**Table 7: PVR Values by Visit – ITT**

| Visits | Mean±SD | Median | Min-Max | n |
|---|---|---|---|---|
| Visit 1 | 65.63±107.11 | 35 | 0-857 | 101 |
| Visit 2 | 45.38±43.39 | 30 | 0-176 | 88 |
| Visit 3 | 46.71±78.90 | 27 | 0-547 | 84 |
| Visit 4 | 53.49±66.37 | 36 | 0-537 | 82 |

Secondary and Exploratory Endpoints

The secondary effectiveness endpoints were measured by the proportion of the subjects who achieved bladder drainage of:

- PVR ≤150 ml over 30 days (as measured at Visits 1 and 2)
- PVR ≤250 ml over 30 days (as measured at Visits 1 and 2)
- PVR ≤250 ml over 90 days (as measured at Visits 1, 2, 3 and 4)

Table 8 shows the number of subjects meeting the secondary endpoints. A total of 86/107 (80.37%) subjects met the first secondary endpoint with a PVR volume ≤150 ml over 30 days (as measured at Visits 1 and 2). For the second secondary endpoint, 87/107 (8131%) subjects successfully measured a PVR volume ≤250 ml over 30 days (as measured at Visits 1 and 2). 79/107 (73.83%) subjects successfully completed the third secondary endpoint by measuring a PVR volume ≤250 ml over 90 days (as measured at Visits 1, 2, 3 and 4).

**Table 8: Descriptive Statistics and Number of Subjects Meeting Secondary Endpoints – ITT**

| | 30 days of Spanner Use | | 90 cumulative days of Spanner Use |
|---|---|---|---|
| | PVR ≤ 150 ml | PVR ≤ 250 ml | PVR ≤ 250 ml |
| Met Endpoint n/N (%) | 86/107 (80.37%) | 87/107 (81.31%) | 79/107 (73.83%) |
| Mean±SD | 45.77±43.30 | 47.13±45.00 | 44.03±41.28 |
| Median | 31 | 31 | 30 |
| Min-Max | 0-150 | 0-176 | 0-176 |

The Exploratory Endpoints included:

- To measure the effects of The Spanner over time on maximum flow rate (Qmax in ml/sec) as assessed by uroflowmetry.

- To measure the effects of The Spanner over time on the International Prostate Symptom Score (IPSS).

Uroflow measurements were obtained at each visit to measure the voided urine output per unit of time. The results of this test include voided volume (VV), maximum flow rate (Qmax), average flow rate (Qavg), total void time and time to peak flow. One of the exploratory endpoints for this study was to measure the effects of The Spanner stent over time on maximum flow rate (Qmax in ml/sec) as assessed by uroflowmetry. Higher Qmax values are desirable over lower values. As uroflowmetry tests are prone to artifacts that artificially elevate the Qmax measurements beyond physiologic levels, all Qmax results that were above 40ml/sec were excluded from all Qmax analyses as shown in Table 9.

**Table 9: Exploratory Effectiveness Results Qmax by Visit – ITT**

| Visit | Qmax (ml/sec)[1] | | | |
|---|---|---|---|---|
| | Mean±SD | Median | Min-Max | n |
| **Visit 1** | 11.91±6.95 | 10.00 | 1.00-34.00 | 93 |
| **Visit 2** | 11.37±7.09 | 10.10 | 1.60-38.40 | 84 |
| **Visit 3** | 11.77±6.43 | 11.60 | 0.90-33.20 | 73 |
| **Visit 4** | 9.55±5.42 | 8.20 | 0.80-27.00 | 73 |

1 Qmax values over 40ml/sec were removed from the analysis as they were probably artifacts. 007-015 at Visit 3, 010-009 at Visit 1 and Visit 3, 010-010 at Visit 4, 012-023 at Visit 3

The International Prostate Symptom Score (IPSS) is a validated questionnaire used to assess baseline and post treatment BPH symptoms. It is based on the answers to seven questions concerning urinary symptoms and one question concerning quality of life. The urinary questions refer to the following urinary symptoms:

Question 1 – Incomplete emptying
Question 2 – Frequency
Question 3 – Intermittency
Question 4 – Urgency
Question 5 – Weak Stream
Question 6 – Straining
Question 7 – Nocturia

Each question concerning urinary symptoms allows the subject to choose one out of six answers indicating increasing severity of that symptom. The answers are assigned points from 0 to 5. The total score can therefore range from 0 to 35 (asymptomatic to very symptomatic): Mild (symptom score less than or equal to 7), Moderate (symptom score range 8-19) and Severe (symptom score range 20-35). For this study, IPSS was collected only at the follow-up visits (Visit 2, 3 and 4) as the study subjects were incapable of voluntary voiding at screening (Visit 1). Since the first time IPSS was recorded was at Visit 2, this was used as the

baseline IPSS for this analysis. Table 10 shows the results of the IPSS by visit for the ITT population.

**Table 10: Exploratory Effectiveness Results IPSS by Visit – ITT**

| Visit | IPSS Total Score | | | |
|---|---|---|---|---|
| | Mean±SD | Median | Min-Max | n |
| **Visit 1** | NA- Subjects were incapable at voluntary voiding at this visit | | | |
| **Visit 2 (Baseline for this analysis)** | 7.70±6.84 | 5 | 0-35 | 89 |
| **Visit 3** | 7.55±6.24 | 6 | 0-29 | 82 |
| **Visit 4** | 7.11±6.17 | 5 | 0-29 | 82 |

Question eight of the IPSS questionnaire refers to the subject's perceived quality of life. The International Scientific Committee (ISC), under the patronage of the World Health Organization (WHO) and the International Union Against Cancer (UICC), recommends the use of only this single question to assess the quality of life. "If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?" The answers range from "delighted" to "terrible". The question codes are:

0 – Delighted
1– Pleased
2– Mostly Satisfied
3 – Mixed
4 – Mostly Dissatisfied
5 – Unhappy
6 – Terrible

Table 11 shows results from the quality of life question (Question #8) of the IPSS for the ITT without imputation population. Subjects consistently maintained a score of ~2 over the course of the study, indicating they are mostly satisfied.

**Table 11: Exploratory Effectiveness Results Quality of Life by Visit – ITT**

| Visit | Quality of Life | | | |
|---|---|---|---|---|
| | Mean±SD | Median | Min-Max | n |
| **Visit 1** | NA - Subjects were incapable at voluntary voiding at this visit and did not complete the IPSS questionnaire | | | |
| **Visit 2 (Baseline for this analysis)** | 2.00±1.60 | 2 | 0-6 | 89 |
| **Visit 3** | 1.95±1.45 | 2 | 0-6 | 82 |
| **Visit 4** | 1.98±1.67 | 1 | 0-6 | 82 |

Subjects completed a custom satisfaction survey at each follow-up visit. The results of this survey are found in Table 12. The majority of the subjects, 68/93 (73.12%), 68/84 (80.95%), and 67/82 (81.70%) at Visits 2, 3, and 4 respectively reported being satisfied with The Spanner device at every visit.

When asked if they would recommend The Spanner to other men, most of the subjects would definitely recommend the device. There were 77/93 (82.79%), 74/84 (88.09%) and 77/82 (93.90%) subjects at Visits 2, 3, 4 respectively, who reported they would probably or definitely recommend The Spanner device to another man.

**Table 12 – The Spanner Satisfaction Assessment**

| **Subject satisfaction with The Spanner to date** | **Visit 2** | **Visit 3** | **Visit 4** |
|---|---|---|---|
| | **n/N(%)** | | |
| Very Satisfied | 30/93(32.26%) | 23/84(27.38%) | 39/82(47.56%) |
| Satisfied | 38/93(40.86%) | 45/84(53.57%) | 28/82(34.15%) |
| Neutral | 11/93 (11.83%) | 9/84(10.71%) | 7/82(8.54%) |
| Unsatisfied | 3/93(3.23%) | 1/84(1.19%) | 3/82(3.66%) |
| Very Unsatisfied | 7/93(7.53%) | 4/84(4.76%) | 5/82(6.10%) |
| Missing [1,2] | 4/93(4.30%) | 2/84(2.38%) | 0/82(0.00%) |
| **Likelihood of subject recommending The Spanner to another man** | **Visit 2** | **Visit 3** | **Visit 4** |
| | **n/N(%)** | | |
| Definitely Would | 47/93(50.54%) | 49/84(58.33%) | 47/82(57.32%) |
| Probably Would | 30/93(32.26%) | 25/84(29.76%) | 30/82(36.59%) |
| Not Sure | 6/93(6.45%) | 5/84(5.95%) | 3/82(3.66%) |
| Probably Would Not | 4/93(4.30%) | 2/84(2.38%) | 2/82(2.44%) |
| Would Not | 2/93(2.15%) | 1/84(1.19%) | 0/82(0.00%) |
| Missing [1,2] | 4/93(4.30%) | 2/84(2.38%) | 0/82(0.00%) |

1 At Visit 2 the following subjects declined to respond: 003-001, 005-003, 005-004, 005-006
2 At Visit 3 the following subjects declined to respond: 005-006

3. Subgroup Analyses

The following preoperative characteristics were evaluated for potential association with outcomes:

- Age
- Use of Clean Intermittent Catheterization (CIC)
- Presence of the most prevalent comorbidities:
  - Myocardial Infarction (MI)
  - Congestive Heart Disease (CHD)
  - Peripheral Vascular Disease (PVD)
  - Diabetes Mellitus (DM)

Table 13 shows PVR data and primary endpoint results for each visit separated by Subgroup. Overall, 79/107 (73.83%) of the subjects met the study primary endpoint, and each rate for each individual subgroup varied little. Regardless of subgroup, the primary effectiveness endpoint rate ranged from 70.00% to 82.10%.

## Table 13: PVR Data and Primary Endpoint Results for Each Visit by Subgroup

| | Age 50-77 | Age 78-97 | Foley | CIC | MI | CHD | PVD | DM | Overall Study Data |
|---|---|---|---|---|---|---|---|---|---|
| **Number and % of Subjects in Subgroup** | | | | | | | | | |
| n | 50 (46.73) | 57 (53.27%) | 63 (58.88%) | 40 (37.38%) | 40 (37.38%) | 34 (31.78%) | 25 (23.4%) | 28 (26.2%) | 107 |
| **Met Primary Effectiveness Endpoint of PVR ≤ 150 ml for all Visits** | | | | | | | | | |
| n/N | 36/50 | 44/57 | 47/63 | 30/40 | 28/40 | 27/34 | 18/25 | 23/28 | 79/107 |
| (%) | 72.00% | 77.19% | 74.60% | 75.00% | 70.00% | 79.41% | 72.00% | 82.10% | 73.83% |
| **Visit 1** | | | | | | | | | |
| Mean | 72.16 | 59.94 | 64.07 | 65.07 | 78.82 | 63.76 | 69.57 | 689.00 | 65.63 |
| SD | 88.41 | 119.90 | 115.26 | 94.13 | 142.29 | 143.49 | 105.68 | 97.922 | 107.11 |
| Min | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 |
| Max | 519.00 | 856.79 | 856.79 | 519 | 856.79 | 856.79 | 519.00 | 519.00 | 856.79 |
| Median | 37.00 | 29.00 | 35.00 | 30.00 | 36.50 | 35.00 | 31.00 | 36.50 | 35.00 |
| n | 47 | 54 | 59 | 40 | 38.00 | 34 | 23 | 28 | 101 |
| **Visit 2** | | | | | | | | | |
| Mean | 48.25 | 43.09 | 45.87 | 42.89 | 48.96 | 41.55 | 47.50 | 52.40 | 45.38 |
| SD | 44.33 | 42.03 | 40.43 | 46.69 | 46.67 | 38.95 | 46.93 | 40.49 | 43.39 |
| Min | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 |
| Max | 140.00 | 176.00 | 176.00 | 140.00 | 176.00 | 140.00 | 147.00 | 140.00 | 176.00 |
| Median | 29.00 | 32.00 | 34.00 | 19.50 | 40.00 | 26.00 | 35.00 | 40.00 | 30.00 |
| n | 39 | 49 | 53 | 34 | 33.00 | 29 | 20 | 26 | 88 |
| **Visit 3** | | | | | | | | | |
| Mean | 48.09 | 45.57 | 40.38 | 59.19 | 45.93 | 42.14 | 38.55 | 56.24 | 45.38 |
| SD | 98.08 | 57.29 | 32.48 | 117.33 | 55.64 | 58.65 | 36.25 | 115.70 | 43.39 |
| Min | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 |
| Max | 547.11 | 373v | 121.00 | 547.11 | 293.00 | 293.00 | 120.00 | 547.11 | 176.00 |
| Median | 23.00 | 29.00 | 31.00 | 18.00 | 33.00 | 25.00 | 28.00 | 28.00 | 30.00 |
| n | 38 | 46 | 49 | 33 | 30.00 | 28 | 20 | 25 | 88 |
| **Visit 4** | | | | | | | | | |
| Mean | 55.93 | 51.38 | 42.05 | 68.01 | 63.75 | 70.38 | 35.63 | 73.74 | 53.49 |
| SD | 88.28 | 36.99 | 34.29 | 93.28 | 95.63 | 95.33 | 26.61 | 102.31 | 66.37 |
| Min | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 |
| Max | 537.00 | 136.55 | 136.55 | 537.00 | 537.00 | 537.00 | 100.00 | 537.00 | 537 |
| Median | 30.00 | 40.50 | 35.00 | 36.00 | 38.50 | 42.50 | 33.00 | 36.00 | 36.00 |
| n | 38 | 44 | 48 | 32 | 30 | 28 | 19 | 25 | 82 |

4. Pediatric Extrapolation
In this premarket application, existing clinical data was not leveraged to support approval of a pediatric patient population.

5. Protocol Deviations and Impact
A total of 151 protocol deviations (PDs) were reported for 64/107 (59.8%) subjects during the study endpoint period. These PDs were classified by PD type, importance, and PD rates. All informed consent, effectiveness and/or safety, and inclusion/exclusion PDs were categorized as important. In addition, there were two protocol deviations that affected multiple subjects at two sites.

The Table 17 shows all PDs reported during the study endpoint period by PD type. The most reported PD type was missed tests (91/151; 60.26%), followed by test not performed per protocol (25/151; 16.56%), and inclusion/exclusion protocol (16/151; 10.60%).

**Table 14: Protocol Deviations by Type**

| Protocol Deviations by Type | | Site | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 001 | 003 | 005 | 006 | 007 | 009[1] | 010 | 012 | |
| Effectiveness | | 1 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | **8** |
| Safety | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **1** |
| Informed consent | | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | **4** |
| Other | Test missed | 1 | 0 | 6 | 31 | 5 | 0 | 29 | 19 | **91** |
| | Inclusion/ Exclusion | 3 | 3 | 6 | 2 | 0 | 0 | 1 | 1 | **16** |
| | Out-of-window | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | **4** |
| | Safety and effectiveness | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| | Test not per protocol | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 21 | **25** |

1 Note that Site 9 was not included in the PD Adjudication process as no PDs were identified during monitoring. However, the site was closed early due to non-compliance. It was added to the table during formatting for completeness

The majority of PDs (118/151; 78.15%) reported were categorized as not important. Thirty-three PDs (33/151; 21.85%) were categorized as important. Sites 003 and 005 accounted for 19 of the 33 important deviations (19/33; 57.58%) and had higher rates of important deviations compared to the other sites. These sites had important PD rates of 2.5 and 2.0 respectively. When compared to the study mean important PD rate of 0.31, Sites 003 and 005 had much greater rates suggesting greater issues in conducting the study in a compliant manner.

The SRS team and Medical Monitor decided to close Sites 003, 005 and 009 before the end of the study enrollment since their protocol deviations rates were higher than the study mean. Site 003 was closed on November 16th, 2017 after the last subject visit on October 4th, 2017 due to non-compliance, as indicated by the high important PD rate. This was approximately two months after site activation. Site 005 was closed on May 9th, 2017 due to lack of staff to effectively run the study which led to non-compliance issues. Site 009 was closed on November 14th, 2018 after enrolling

only one subject. No further enrollments were allowed, and the site was closed after the Sponsor became made aware of the site's inability to complete the trial according to the clinical investigation plan. The site was terminated one month after subject enrollment. Sites were closed when there were no active subjects at those sites. No subjects were terminated from the study due to site termination.

### E. Financial Disclosure

The Financial Disclosure by Clinical Investigators regulation (21 CFR 54) requires applicants who submit a marketing application to include certain information concerning the compensation to, and financial interests and arrangement of, any clinical investigator conducting clinical studies covered by the regulation. The pivotal clinical study included 8 investigators. None of the clinical investigators had disclosable financial interests/arrangements as defined in sections 54.2(a), (b), (c), and (f). The information provided does not raise any questions about the reliability of the data.

## XI. PANEL MEETING RECOMMENDATION AND FDA'S POST-PANEL ACTION

In accordance with the provisions of section 515(c)(3) of the act as amended by the Safe Medical Devices Act of 1990, this PMA was not referred to the Gastroenterology and Urology Devices Advisory Panel, an FDA advisory committee, for review and recommendation because the information in the PMA substantially duplicates information previously reviewed by this panel.

## XII. CONCLUSIONS DRAWN FROM PRECLINICAL AND CLINICAL STUDIES

### A. Effectiveness Conclusions

Effectiveness of The Spanner was based upon the 107-subject prospective, multicenter, single-arm, open-label clinical study in the United States.

The Spanner demonstrated clinically meaningful PVR volume values of ≤ 150 mL, marked by a 73.83% (79/107) responder rate at each 30 day visit out to 3 months (95% CI 0.644, 0.819).

Clinically meaningful PVR volume values were also seen at the secondary endpoints with a total of 86/107 (80.37%) subjects meeting the first secondary endpoint with a PVR volume ≤150 ml over 30 days (as measured at Visits 1 and 2), 87/107 (81.31%) subjects successfully measured a PVR volume ≤250 ml over 30 days (as measured at Visits 1 and 2), and 79/107 (73.83%) subjects successfully completed the third secondary endpoint by measuring a PVR volume ≤250 ml over 90 days (as measured at Visits 1, 2, 3 and 4).

## B. Safety Conclusions

The risks of the device are based on nonclinical laboratory studies and data collected in a clinical study conducted to support PMA approval as described above. Through approximately 105 days of follow-up there were 173 adverse events reported by 81 subjects (75.7% of subjects experienced an adverse event). 43.9% of subjects reported device and/or procedure-related adverse events. Of those related, bacteriuria (25/107; 23.36%), pain (10/107; 9.35%), and urinary urgency (8/107; 7.48%) were the most common AEs. Most adverse events were mild and zero serious adverse events related to the device or procedure occurred.

## C. Benefit-Risk Determination

The probable benefits of the device are based on data collected in a clinical study conducted to support PMA approval as described above. Effectiveness was demonstrated by demonstrating clinically meaningful PVR volume values at 30-day increments up to 3 months. Potential benefits include decreasing the risk of infection associated permanently indwelling Foley or suprapubic catheter, which require tubing for drainage to the external environment.

The probable risks of the device are also based on data collected in a clinical study conducted to support PMA approval as described above. The clinical study data up to approximately ~105 days of follow-up showed a 0% incidence rate of SAEs related to the device or procedure. While 43.9% of subjects reported device and/or procedure-related adverse events, most AEs were mild and treatable. Additional risks with use of The Spanner include a potential for higher PVR volumes compared to available alternatives. This risk is mitigated by the fact that The Spanner would not continue to be used in individuals who did not achieve a PVR < 150cc.

There is uncertainty with respect to repetitive use over time with the possibility of adverse events, as the clinical study did not evaluate use past 90 cumulative days. There also were a significant number of protocol deviations (i.e., 151 PDs in 64/107 (59.8%) of the subjects) during the study, which raises uncertainty regarding the data reliability. The most reported PD types were missed tests (91/151; 60.26%), test not performed per protocol (25/151; 16.56%), and inclusion/exclusion protocol (16/151; 10.60%). Thirty-three PDs (33/151; 21.85%) were categorized as important. Sites 003 and 005 accounted for 19 of the 33 important deviations (19/33; 57.58%) and had higher rates of important deviations compared to the other sites. These sites were closed given the issues with protocol deviations.

1. Patient Perspective

   Patient perspectives considered during the review included:

   - Patient reported outcome measures (PRO) on how a patient feels or functions.
   - Custom assessments which captures information on relative desirability or acceptability of outcomes or other attributes that differ among alternative

health interventions to patients, the value patients place on the treatment or diagnosis.

In conclusion, given the available information above, the data support that for temporary use (up to 30 days) to maintain urine flow and allow voluntary urination for patients who are not candidates for pharmacologic, minimally invasive or surgical treatment of the prostate, the probable benefits outweigh the probable risks.

### D. Overall Conclusions

The data in this application support the reasonable assurance of safety and effectiveness of this device when used in accordance with the indications for use. The effectiveness evidence for the investigational device in the pre-specified analysis population met the defined 50% performance goal for this device type. Seventy-nine (79) of the 107 (73.83%) subjects enrolled achieved adequate bladder drainage over 90 days ($p < 0.0001$) as defined by PVR ≤ 150 mL. The secondary endpoints and exploratory endpoints were supportive of the primary endpoint. In the safety analysis of the study there were 173 AEs reported by 81 subjects. Most AEs were mild and approximately half were related to the device and/or procedure all of which were covered by the instructions for use. Of those related, bacteriuria (25/107; 23.36%), pain (10/107; 9.35%), and urinary urgency (8/107; 7.48%) were the most common AEs. There were 16 reported severe adverse events (SAEs), none of which were deemed related to the device or the procedure. There were no unanticipated adverse events (UADEs) in this study. The results from the non-clinical and clinical evaluations support that a significant portion of the patient population for whom the device is intended can be expected to achieve clinically significant results.

## XIII. CDRH DECISION

CDRH issued an approval order on October 7, 2022.

The applicant's manufacturing facilities have been inspected and found to be in compliance with the device Quality System (QS) regulation (21 CFR 820).

## XIV. APPROVAL SPECIFICATIONS

Directions for use: See device labeling.

Hazards to Health from Use of the Device: See Indications, Contraindications, Warnings, Precautions, and Adverse Events in the device labeling.

Post-approval Requirements and Restrictions: See approval order.

## XV. REFERENCES

1. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. Charlson ME, Pompei P, Ales KL, MacKenzie CR. J Chronic Dis. 1987;40(5):373-83. https://pubmed.ncbi.nlm.nih.gov/3558716/ Accessed 04Jun2020