



AUA White Paper on Nonneurogenic Chronic Urinary Retention: Consensus Definition, Treatment Algorithm, and Outcome End Points

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Purpose: The AUA (American Urological Association) QIPS (Quality Improvement and Patient Safety) committee created a white paper on the diagnosis and management of nonneurogenic chronic urinary retention.

Materials and Methods: Recommendations for the white paper were based on a review of the literature and consensus expert opinion from the workgroup.

Results: The workgroup defined nonneurogenic chronic urinary retention as an elevated post-void residual of greater than 300 mL that persisted for at least 6 months and documented on 2 or more separate occasions. It is proposed that chronic urinary retention should be categorized by risk (high vs low) and symptomatology (symptomatic versus asymptomatic). High risk chronic urinary retention was defined as hydronephrosis on imaging, stage 3 chronic kidney disease or recurrent culture proven urinary tract infection or urosepsis. Symptomatic chronic urinary retention was defined as subjectively moderate to severe urinary symptoms impacting quality of life and/or a recent history of catheterization. A treatment algorithm was developed predicated on stratifying patients with chronic urinary retention first by risk and then by symptoms. The proposed 4 primary outcomes that should be assessed to determine effectiveness of retention treatment are 1) symptom improvement, 2) risk reduction, 3) successful trial of voiding without catheterization, and 4) stability of symptoms and risk over time.

Conclusions: Defining and categorizing nonneurogenic chronic urinary retention, creating a treatment algorithm and proposing treatment end points will hopefully spur comparative research that will ultimately lead to a better understanding of this challenging condition.

Key Words: urinary retention, treatment outcome

NONNEUROGENIC chronic urinary retention can be challenging to diagnose and treat because there are no consensus criteria that define the condition. CUR can be caused by different pathologies that create an underactive detrusor and/or result in

chronic outlet obstruction (fig. 1). The condition is important because it can be associated with significant morbidity such as hydronephrosis, chronic renal insufficiency and chronic UTIs as well as bothersome urinary symptoms such as incontinence, slow

Abbreviations and Acronyms

AUA = American Urological Association
 CUR = nonneurogenic chronic urinary retention
 PVR = post-void residual
 QIPS = Quality Improvement and Patient Safety Committee
 UTI = urinary tract infection

Accepted for publication January 26, 2017.
 No direct or indirect commercial incentive associated with publishing this article.

The corresponding author certifies that, when applicable, a statement(s) has been included in the manuscript documenting institutional review board, ethics committee or ethical review board study approval; principles of Helsinki Declaration were followed in lieu of formal ethics committee approval; institutional animal care and use committee approval; all human subjects provided written informed consent with guarantees of confidentiality; IRB approved protocol number; animal approved project number.

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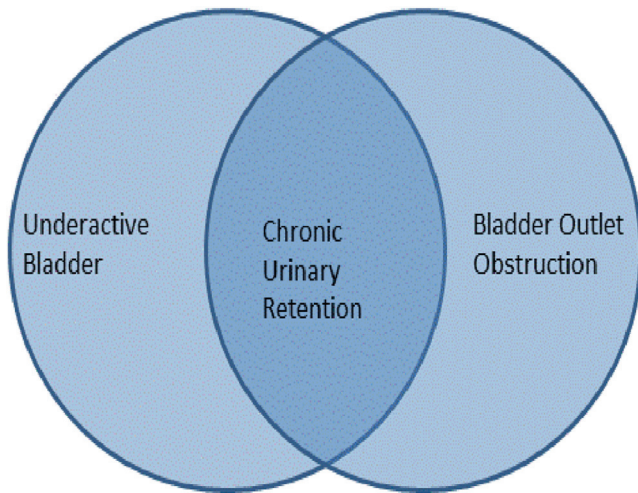


Figure 1. Overlap of chronic urinary retention with clinical syndromes of underactive bladder and bladder outlet obstruction.

urinary stream and feelings of incomplete bladder emptying. However, not all patients with CUR necessarily require treatment to address a specific safety or symptom concern, and CUR treatments can potentially cause injury or adverse effects.¹ Consequently, it is important that clinicians identify patients with CUR who can benefit from treatment but not expose all patients with CUR to costly and even potentially harmful interventions.

The AUA QIPS committee has sought to address the knowledge gap related to CUR by creating this white paper to 1) characterize men and women (older than 18 years) with CUR into clinically definable index populations, 2) propose treatment algorithms for these index populations and 3) propose treatment outcome end points for patients with CUR. Recommendations for this white paper are based on a review of the literature and consensus expert opinion of the CUR white paper panel. The target audience for this white paper is primary care providers who may initially encounter CUR as well as urology and urogynecology providers who follow and treat these patients.

METHODOLOGY

This topic was submitted for development of a comparative effectiveness review from the AHRQ (U.S. Department of Health and Human Services Agency for Healthcare Research and Quality) and was published in September 2014.² The recommendations of the workgroup are based on the AHRQ review and an additional search of the English language literature from 1946 through March 2016 regarding urinary retention. The AUA expanded the key questions of the AHRQ evidence report, providing membership and support through QIPS to develop this white paper. Representatives on the CUR workgroup were also included from the Society for Urodynamics and Female

Pelvic Medicine and Urological Reconstruction and the Society of Genitourinary Reconstructive Surgeons.

DEFINING NONNEUROGENIC CHRONIC URINARY RETENTION

The workgroup defines CUR as an elevated post-void residual of greater than 300 mL that has persisted for at least 6 months and is documented on 2 or more separate occasions. This definition differentiates CUR from either acute/transitory urinary retention or urinary retention caused by a temporally related neurologic, oncologic or situational (iatrogenic or post-procedural) etiology. Urinary retention associated with these conditions is excluded from this definition of CUR as they require that the underlying cause of urinary retention be addressed as part of treatment, and thus need more individual specific recommendations and longitudinal followup. Appendix 1 summarizes conditions that can be associated with CUR.

The workgroup definition of CUR focuses on PVR, a clinically definable parameter for clinicians to measure. Although CUR is often described using terms such as underactive or acontractile detrusor, this term is a urodynamic description of absence of detrusor contractility and can be used only in the context of urodynamic data. Furthermore, diagnosis of an atonic detrusor during urodynamic study does not always imply that the detrusor is unable to contract but only that it was not seen during the study. More recently CUR has been linked with the terms primary bladder muscle underactivity and underactive bladder. The ICS (International Continence Society) has described primary bladder muscle underactivity as “a contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or failure to achieve complete bladder emptying within a normal time span.”^{3–5} However, they have not established a measurable deliverable for diagnosing the condition. Thus, the workgroup definition of CUR overlaps with the definitions of urodynamic detrusor underactivity and underactive bladder but differs because it is a clinical definition based on a measurement threshold and does not require urodynamic testing to investigate detrusor function.

The CUR workgroup chooses greater than 300 mL as the threshold value based on previously published convention and lack of other directional guidance from the literature. The most specific urinary retention definition comes from the ICS, which has defined subcategories of retention as 1) ability of patient to release any urine (complete or partial), 2) duration (acute or chronic), 3) symptoms (painful or silent), 4) mechanism (obstructive or nonobstructive) and 5) urodynamic findings (high or low pressure).⁶ This definition does not define PVR

volume ranges for urinary retention but the ICS notes that greater than 300 mL is commonly used as a research definition because Abrams et al reported that this is the minimal volume at which a bladder becomes palpable.³ The UK National Institute for Health and Clinical Excellence guidelines for lower urinary tract symptoms use a broader characterization of chronic retention and define it as a PVR of greater than 1000 mL in men.⁷ The NHS (National Health Service) subsequently developed a treatment algorithm for retention in men based on this definition but the pathway is not commonly used outside the NHS and does not apply to women.⁸ Few other resources exist regarding a consensus CUR definition and ranges of PVR in the literature are considerable when describing CUR.^{9–11} As mentioned, the value of greater than 300 mL is commonly used in the urinary retention literature^{9,12–17} but the workgroup recognizes that no single PVR value independently and sufficiently defines CUR. They also acknowledge that caregivers can initiate a CUR evaluation if there is clinical suspicion that measured PVR may be inaccurately low or if upper tract compromise is suspected.

The CUR workgroup recommends at least 2 documentations of a PVR greater than 300 mL to reduce the potential of situational false-positives, such as supra-physiological fluid intake, inadequate time to complete void and anxiety. Measuring PVR by any modality (ie catheterization or bladder scanner) is also acceptable. The definition will also apply to men and women since differentiating data do not currently exist. When creating the definition, the workgroup discussed defining CUR based on a percentage of the total volume remaining after voiding. Although the workgroup recognizes the potential value of this calculation, it was not included in the current definition due to a paucity of data on creating a reference range, and the challenges associated with attempting to accurately measure and calculate true voided versus retained volumes.

CATEGORIES OF NONNEUROGENIC CHRONIC URINARY RETENTION

Because CUR is a clinical sign and not a uniform diagnosis it presents and behaves differently in different populations. For example, the prognosis for a 70-year-old male with CUR resulting in bilateral hydronephrosis, recurrent UTIs, azotemia and elevated serum creatinine differs from that for a 70-year-old asymptomatic male with an incidentally discovered elevated PVR and no additional radiological or laboratory findings. For this reason, categories of CUR were developed based on risk (high versus low) and symptomatology (symptomatic versus asymptomatic).

High Risk CUR

The term high risk defines a subset of individuals with CUR who are at potentially elevated risk for organ system harm or failure resulting from retention. These categories were developed based on consensus expert opinion in combination with a review of the literature, and are subject to further refinement as the evidence base accrues. Appendix 2 demonstrates the radiological findings, laboratory findings, and clinical signs and symptoms believed to be associated with high risk CUR.

Radiological findings implying potential high risk CUR include presence or development of hydronephrosis, hydroureter and/or bladder stones. High risk laboratory findings include indications of stage 3 chronic kidney disease defined as an estimated glomerular filtration rate of 45 to 59 mL/minute/1.73 m² or lower (stage 3A) or 30% to 44% (stage 3B).¹⁸ Recurrent symptomatic UTIs, defined a priori as any pyelonephritis, 3 or more UTIs in a 12-month period and any episode of urosepsis in a 6-month period, are additional indications of high risk CUR.¹⁹ The workgroup considers recurrent UTIs as a high risk category because they can result in significant morbidity to the patient and a burden to the health care system.²⁰ However, the workgroup recommends that UTIs be documented in patients with CUR through urine microscopy and cultures to avoid confusion with other underlying urinary symptoms.

Some subjective signs and symptoms can also be considered high risk in certain clinical scenarios. For example, overflow urinary incontinence can potentially cause perineal and sacral skin ulcerations. In contrast, CUR in association with immunosuppression from medications or disease, including diabetes, does not currently place patients into a high risk category due to the lack of longitudinal and comparative data. Similarly, apart from renal disease and upper tract obstruction, concurrent other medical conditions a priori do not place the patient into a high risk category.

Symptomatic CUR

Symptomatic CUR is defined as 1) having subjectively moderate to severe urinary symptoms impacting quality of life on a validated urinary questionnaire and/or 2) history of requiring catheterization for the treatment of a symptomatic episode of inability to void within the last 6 months, excluding acute, transitory urinary retention or urinary retention caused by oncologic, traumatic or any neurological event. The use of a specific questionnaire is not mandated but questionnaires should be validated, able to assess longitudinal symptomatic change and able to differentiate mild from moderate/severe symptoms. The AUA symptom index is an example of a readily available and

widely used index that would be appropriate to use for this purpose in men.²¹

TREATMENT ALGORITHM

The proposed CUR treatment algorithm is predicated on stratifying CUR first by risk and then by symptoms (fig. 2). All patients being evaluated for CUR should undergo a thorough history and physical examination, including an exam of the genitals and rectum, as multiple medical conditions can present with urinary retention, including neurological conditions and pelvic malignancies in males and

females. Urine should be assessed with a urinalysis for possible UTI and confirmed with a urine culture. Due to the inability to determine risk to the upper tracts at presentation, the workgroup recommends that patients with CUR undergo serum creatinine evaluation and upper tract imaging with renal ultrasound. Although the AUA recommends that men with benign prostatic hyperplasia should not be routinely screened with ultrasound for hydronephrosis,²² this workgroup recommends renal ultrasound for individuals with CUR as relationships between specific PVR volume ranges and upper tract risk have not been defined in the literature.

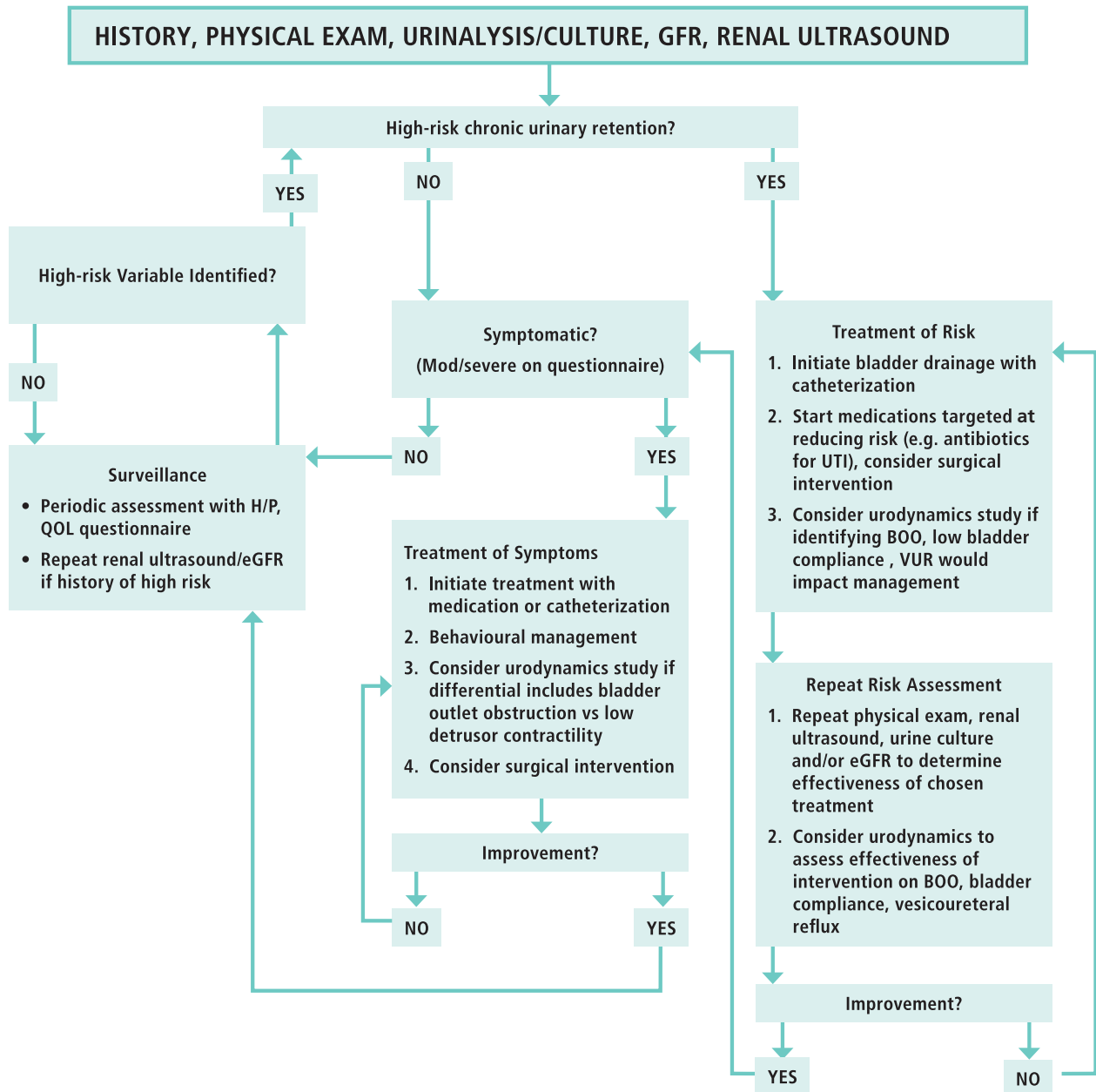


Figure 2. Nonneurogenic chronic urinary retention treatment algorithm. *GFR*, glomerular filtration rate. *Mod*, moderate. *H/P*, history/physical. *eGFR*, estimated GFR. *BOO*, bladder outlet obstruction. *VUR*, vesicoureteral reflux.

In high risk individuals a trial of bladder drainage, such as intermittent catheterization or indwelling catheter, should be considered to determine if improved bladder emptying will reduce the identified high risk variable. Weak evidence suggests that intermittent catheterization is preferable by patients compared to indwelling catheters for bladder drainage.^{23–26} While often assumed, the absolute risk reduction of UTI is unknown when CUR is treated with intermittent catheterization. Future studies should determine the success rates of different treatment strategies in resolving high risk CUR related conditions.

Although indwelling catheterization can be used as immediate short-term management for CUR associated with high risk, it is the panel's expert opinion that intermittent catheterization is preferable long-term care for patients who can physically perform the task or have a caregiver available to assist. Long-term bladder drainage with an indwelling catheter is associated with the risk of morbidity,^{23,27} regardless of whether the catheter is placed intraurethraly or as a suprapubic tube.²⁸ Urodynamic assessment may be considered if a potential therapeutic intervention is considered appropriate. Urodynamic assessment should also be considered if low bladder compliance (less than 15 mL/cm H₂O)²⁹ from benign prostatic hyperplasia or chronic UTIs are suspected, since these also may be associated with observed hydronephrosis or positive urine cultures. Videourodynamics should be performed if vesicoureteral reflux is thought to be contributing to high risk symptoms or signs.

Once a program of bladder drainage is initiated, high risk variables should demonstrate some improvement and stability if the variables are related to CUR. Therapy, including medications or surgical options, should be discussed to maintain or perhaps improve high risk features. Patients are then stratified by remaining urinary symptoms, although symptoms may have concomitantly improved during treatment of the high risk variable. Symptomatic patients should be treated conservatively if the urinary symptoms cause low impact on quality of life. If bothersome symptoms are present, the patient and physician should target those for treatment, discuss risk and benefits of the treatment plan, and propose a followup plan to determine effectiveness of the treatment. If a symptomatic patient does not respond to catheterization and/or medications, he/she can be reassessed with urodynamics including a pressure flow study if surgical intervention could be beneficial. However, the workgroup recommends that patients in the low risk, asymptomatic CUR category should not be offered intermittent catheterization or any procedure designed to reduce the measured post-void residual (Appendix 3).

The workgroup recommends that patients be followed for changes in risk and urinary symptoms.

Followup should include at least a yearly interval history and physical exam, PVR measurements and assessment of symptoms, preferably with validated quality of life questionnaires. Patients can be followed at shorter intervals if practitioners believe closer surveillance is warranted. Followup for those with previous high risk factors of altered glomerular filtration rate or upper tract findings on imaging should include serum electrolyte measures and renal ultrasound. In the absence of active stone disease, prior findings of hydronephrosis or newly identified high risk factors there is no current clinical indication for longitudinal imaging of the kidneys for patients with low risk CUR. If patients report changes in urinary symptoms or changes are noted on validated questionnaires, the provider should initiate discussion regarding treatment options, risks and benefits.

IDENTIFICATION OF OUTCOME MEASURES FOR CUR

As there has previously been no agreement on a shared definition of CUR, there is a lack of high quality evidence for outcomes of interest for CUR interventions.² The workgroup recommends that 4 primary CUR treatment outcomes, if applicable to the population and intervention, should be assessed in patients being treated for high risk and/or symptomatic CUR. These include 1) symptom improvement as measured by questionnaires; 2) risk reduction, as defined by resolution of hydronephrosis, improvement in renal function, reduced incidence of recurrent UTI and urosepsis episodes, and reduction in secondary complications from overflow incontinence; 3) successful trial of voiding without catheterization; and 4) stability of symptoms and risk over time. Accordingly, the workgroup recommends longitudinal studies to assess the validity for these outcome measures and better understand the prevalence of low risk becoming high risk CUR over time.

CONCLUSION

The AUA white paper workgroup defines CUR as a PVR of greater than 300 mL which persists for at least 6 months and is documented on 2 or more separate occasions. The workgroup proposes that CUR be stratified by identifiable high risk factors and degree of symptoms with appropriate followup and treatment based on these stratifications. Many therapeutic options are available for CUR, and it is proposed that the 4 outcome measures of assessment of symptoms, reduction of risk, ability to void without catheterization and stability of symptoms/risk over time be incorporated into future treatment studies. Defining CUR will hopefully lead to

comparative research for understanding and treating this challenging condition.

ACKNOWLEDGMENTS

AUA staff members Jennifer Bertsch, Heddy Hubbard, Suzanne Pope and Victoria Wilder provided assistance with preparation of this white paper.

APPENDIX 1

Conditions commonly associated with CUR

Outlet obstruction	Poor bladder contractility
<ul style="list-style-type: none"> • Benign prostatic obstruction • Long-term use of medications: <ul style="list-style-type: none"> Antihistamine Alpha adrenergic agonists Antipsychotics • Urethral or bladder neck stricture • Urethral stones, tumors, valves • High grade pelvic floor prolapse • Urethral diverticula in women • Prior anti-incontinence procedure • Prior vaginal vault prolapse repair • Primary bladder neck obstruction in men and women • Dysfunctional voiding 	<ul style="list-style-type: none"> • Long-standing outlet obstruction • Long-term use of medication: <ul style="list-style-type: none"> Anticholinergic/antispasmodics Tricyclic antidepressants Beta adrenergic agonists Calcium channel blockers Nonsteroidal anti-inflammatory drugs Opioids Benzodiazepines Antipsychotics • Diabetes mellitus • Constipation • Frailty³⁰ • Idiopathic

APPENDIX 2

Indications of high risk CUR

Radiological findings:

- Hydronephrosis
- Hydroureter

Laboratory findings:

- Stage 3 chronic kidney disease (estimated glomerular filtration rate 30 to 59 mL/minute/1.73 m²)
- Recurrent, symptomatic, culture proven UTI
- Culture proven systemic urosepsis

Signs and symptoms:

- Urinary incontinence associated with perineal skin changes
- Urinary incontinence associated with sacral decubitus ulcers

APPENDIX 3

Treatment recommendations for CUR stratified by symptoms and risk

	Low Risk	High Risk
Asymptomatic	Do not treat	1. Drain bladder, reassess risk 2. Treat CUR if associated with risk
Symptomatic	Discuss symptom specific treatment options	1. Drain bladder, reassess risk 2. Treat CUR if associated with risk 3. Discuss symptom specific treatment options

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EDITORIAL COMMENTS

The term “urinary retention” remains a poorly defined conceptual construct, enshrouded in urological lore, encumbered by incomplete evidence and confounded by irrational therapeutic intervention. Historically, this entity has been associated with the absolute requirement for urinary catheterization, and yet more recent experience derived from neurotoxin or neuromodulation clinical experience has identified the variability of an isolated PVR evaluation and subsequent impact on health status. The concern with PVR assessment is its inherent variability in bedside diagnostic methods. Additionally, post-void residual volumes are reflective of multiple factors, including bladder contractility, bladder outlet obstruction and the innate functional capacity of the owner of the bladder. Without knowing an individual’s functional capacity (performance status or perhaps best stated as “frailty”), an isolated post-void residual volume may or may not be indicative of risk. The risks associated with

this condition may include renal deterioration, urinary tract infection, ultimate bladder compromise resulting from over distention and any associated symptoms (or complete lack thereof).

For the individual patient, how best to assess unique risk and appropriate management method? PVR must be assessed in light of symptoms, ongoing and/or history of urinary tract infection, and ongoing or history of renal decompensation or renal dysfunction that may have a potential link to this condition. The patient’s willingness to perform intermittent catheterization or tolerate other alternatives for catheterization very much dictate the long-term compliance with and success of any treatment algorithm.

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“Dr. Consensus, we just received a referral for man with a PVR of 750 ml. The referring internist is requesting that you place a catheter and see him right away.” How many times have we all received such calls?

This white paper from the AUA QIPS committee provides a thoughtful approach to caring for patients with chronically (greater than 6 months)

elevated (greater than 300 ml) post-void residual urine. While the cutoffs themselves are to some extent arbitrary, by necessity, the recommendation of the committee to group the patients with chronic urinary retention into high risk/low risk and symptomatic/asymptomatic categories is pragmatic and informative. Interestingly, the committee strongly recommends that no intervention (other

than surveillance) be undertaken in those asymptomatic and at low risk regardless of PVR volume. This approach is not unreasonable (particularly the recommendation not to catheterize) since higher residual urine has been associated with greater overall severity of renal insufficiency and poorer (albeit acceptable) outcomes following surgical resection of the prostate.¹ However, it seems reasonable to selectively consider a more proactive diagnostic approach even in those asymptomatic

men with no apparent risk factors found to have an elevated PVR. In which patient and at what PVR that evaluation should be triggered remains uncertain.

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REFERENCE

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REPLY BY AUTHORS

The thoughtful commentaries from Drs. Lemack and Dmochowski raise good followup points regarding the need for longitudinal and investigative studies of patients with chronic urinary retention. When writing this white paper, the CUR workgroup developed a partial list of needed research studies.

It was determined that a multi-institutional cohort study of men and women using a standardized definition of CUR would allow urologists to follow better the natural history of CUR and identify risk factors for progressive morbidity. Case specific use of urodynamics should also be studied in these cohorts to find associations between urodynamic data and risk of CUR related morbidity over time.

Identification of molecular markers of the decompensated bladder would allow urologists to

understand CUR at a more detailed physiological level. Biomarkers, so commonplace in the cancer realm, are virtually nonexistent in benign urology conditions. If an underlying physiology at the cellular level is the ultimate cause of CUR, then measurement of shed cells, proteins and genetic traces such as RNA may not only determine causality but predict future outcomes.

Finally, investigations are needed for pharmacological and neurological interventions that can reliably stimulate underactive or atonic bladder detrusor tissue.

It is the hope of the workgroup that this white paper stimulates further discussion and investigation into these and other CUR related research activities.