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Original article

# Acute and chronic urine retention among adults at the urology section of the Accident and Emergency Unit of Komfo Anokye Teaching Hospital, Kumasi, Ghana



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## KEYWORDS

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## Abstract

**Introduction:** The causes and management of acute urine retention (AUR) and chronic urine retention (CUR) are different and varied in both gender and age. Urine retention has been well studied among males worldwide, while data on urine retention among women are sparse. This study aimed at determining the causes and management of AUR and CUR among adults at the Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana.

**Subjects and methods:** A prospective study was conducted during 8 months period. The study was carried out at the Urology and Accident and Emergency Units of KATH. A complete work-up to establish the cause of urine retention preceded data collection. The subject's demographic data, causes and management of urine retention with outcomes were recorded on data sheet. Data was analyzed using Stata version 12.0.

**Results:** Two hundred and six subjects were enrolled in the study. There were 198 men and 8 women with mean ages of  $62.8 \pm 16.8$  and  $55.4 \pm 18.4$  years respectively. The prevalence of AUR and CUR in the population were 172 (83.5%) and 34 (16.5%) respectively. Among the males 169 (85.4%) presented with AUR while 29 (14.6%) presented with CUR. The causes of AUR or CUR in men were: benign prostatic enlargement (BPE) 115 (58.1%), urethral stricture 29 (14.7%), carcinoma of the prostate 26 (13.1%), traumatic urethral injury 26 (13.1%) and others 1%. AUR was found in 3 (37.5%) and CUR in 5 (62.5%) of the women studied. Two women each had bladder carcinoma and neurogenic bladder respectively.

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One each of utero-vaginal prolapse, bladder stones, urethral tumour and urethral trauma respectively were also found. Urinary tract infection occurred in 20 (9.7%) and renal insufficiency in 32 (16.5.0%) of respondents. The mean volume of urine drained on catheterization was  $800.0 \pm 161.7$  ml.

The immediate treatment was by urethral catheterization in 146 (70.9%) and suprapubic cystostomy in 60 (29.1%). The definitive treatment for the underlying causes of urine retention was varied.

**Conclusions:** Acute and chronic urine retention is not uncommon, but credible baseline data on this condition is nonexistent at KATH, Kumasi. Urine retention found among the participants was mainly AUR. Men were the most affected with benign prostatic enlargement, being the leading cause. Among women, acute or chronic urine retention was caused mainly by bladder cancer and neurogenic bladder. Initial and definitive management were varied between causes, gender and age.

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## Introduction

Urinary retention is a common urologic emergency. It may have various causes which differ depending on gender and age. Age is an important risk factor for developing acute urinary retention (AUR). One in 10 men in their seventies and a third of all men in their eighties may be affected by this condition [1]. AUR is associated with a sudden and often painful inability to pass urine despite bladder fullness and requires intervention to relieve the symptoms [2,3]. Chronic urinary retention (CUR) is a painless retention associated with significant amounts of post-void residual urine [4–6]. AUR is associated with a significantly impaired quality of life, stigmatization and a substantial socioeconomic burden [7–11].

Definitive management of urinary retention depends on the underlying cause and may be medical or surgical. Immediate treatment of AUR consists of bladder drainage by either passing a urethral catheter or performing suprapubic cystostomy [12–14]. Treatment of CUR is more complex, and catheterization is less urgent because the condition is painless. Catheterization is indicated, when there is an abnormal renal function or when the patient has lower urinary tract symptoms with a poor detrusor function on urodynamic studies.

Prospective studies on acute and chronic urinary retention are sparse in Ghana, and little is known about the prevalence of this condition in Kumasi. In view of this, there was the need to generate credible baseline data in the area of acute and chronic urinary retention. Our study therefore aimed at determining the causes and management of AUR and CUR in adults at the Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana.

## Subjects and methods

A prospective hospital-based study was conducted at the Urology and Accident and Emergency Units of KATH over an 8-month period from April 1st to November 30th, 2012. It included 198 men and 8 women with a mean age of  $62.8 \pm 16.8$  (range 19–99) and  $55.4 \pm 18.4$  (range 27–83) years, respectively. The male-to-female ratio was 25:1. 172 (83.5%) patients presented with AUR, 169 of them were men. Of the 34 (16.5%) patients presenting with CUR, 29 were men. A complete work-up to establish the cause of urinary retention in each patient preceded data collection. The patients'

demographic data, the causes and the management of urinary retention, as well as the outcomes were recorded on a data sheet. The data were analyzed using Stata version 12.0.

## Results

The causes of AUR and CUR are illustrated in Fig. 1. The median prostate volume measured on transrectal ultrasound was 86.7 ml (interquartile range 61–132). The corresponding data on urethral stricture-related risk factors in men presenting with urinary retention are shown in Table 1.

The 34 patients (16.5%) with CUR had renal insufficiency which was confirmed by elevated serum creatinine levels. Renal ultrasound scan revealed hydronephrosis in 4.4% ( $n=9$ ) of the total population. The mean residual urine volume was  $800.0 \pm 161.7$  ml (range 310–1650).

Urinary tract infection found in 20 (9.7%) patients with urinary retention was mainly due to *Escherichia coli* ( $n=11$ , 55.0%), *Klebsiella* species ( $n=9$ , 45.0%) and mixed bacterial growth ( $n=3$ , 15.0%).

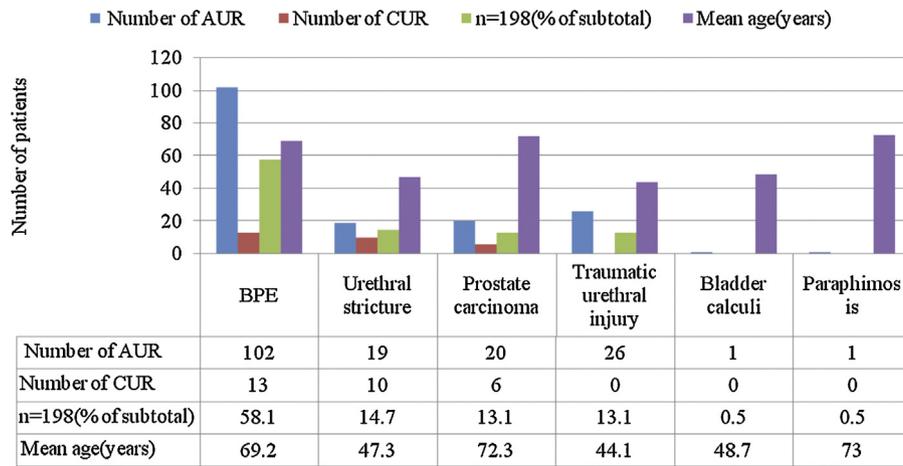
AUR was found in 3 (37.5%) and CUR in 5 (62.5%) of the 8 female patients studied. Two each had bladder carcinoma and neurogenic underactive bladder. Utero-vaginal prolapse, bladder stones, urethral tumour and urethral trauma were found in one female patient each.

### Treatment of AUR in men

The initial treatment for patients presenting with urinary retention consisted of bladder drainage. 146 (70.9%) patients received a

**Table 1** Urethra stricture-related risk factors in patients presenting with urinary retention ( $n=55$ ).

Variable	Total (%)
Traumatic urethral injury	26 (47.3%)
Idiopathic strictures	16 (29.1%)
Gonococcal urethral strictures	13 (23.6%)



**Figure 1** Causes of acute and chronic urinary retention in men. *Note:* The mean age of patients presenting with BPE, urethral stricture and prostate cancer was 69.2 ± 10.3, 47.3 ± 18.9 and 72.3 ± 11.9 years, respectively.

urethral catheter, while suprapubic cystostomy was performed in 60 (29.1%).

Various delayed treatment modalities were instituted. The treatment modalities used in the 115 men with AUR due to BPE are listed in Table 2. A trial of micturition without catheter (TWOC) was preceded by treatment with alpha-adrenergic blockers for 7 days.

The patients with prostate carcinoma presented with advanced disease and were offered androgen deprivation therapy. Bilateral total orchidectomy (surgical castration) was performed in 17 (65.0%), whereas medical castration was instituted in 9 (35.0%).

Of those diagnosed with urethral strictures, urethral dilatation was performed in 28 (50.9%), urethroplasty in 26 (47.3%) and otis internal urethrotomy in 1 (1.8%).

Open cystolithotomy and circumcision were performed in the patients with bladder calculi and paraphimosis, respectively.

*Treatment of urinary retention in female patients*

Various treatment modalities were used for definitive treatment of women with acute or chronic urine retention. Radiotherapy was the treatment of choice for the two women with advanced bladder carcinoma and one with advanced urethral carcinoma. The

woman with a utero-vaginal prolapse was subjected to total vaginal hysterectomy with pelvic floor repair. A bladder calculus was removed by open cystolithotomy in one woman, while immediate urethral repair was done for the patient with urethral trauma following an impalement injury. Two women with neurogenic underactive bladder were instructed to do clean intermittent self-catheterization.

**Discussion**

The reason for carrying out this study was the fact that, despite the worldwide interest in the subject, there exists only a limited amount of data with respect to the prevalence, causes and common management of acute and chronic urinary retention at the KATH, Kumasi.

Age is an important risk factor for developing AUR or CUR. The mean age and underlying causes of AUR or CUR differ among the various studies in the literature. Similarly, this study revealed a different mean age for BPE, urethral stricture and prostate carcinoma. Ten percent of men in their seventies and one third of men in their eighties are likely to develop AUR as reported by Jacobsen et al. [1]. In West Africa, researchers in this field report the mean age of patients presenting with AUR to be between 57.5 and 69.5 years [15–17].

In Europe, the prevalence of AUR has been reported to be 44–52.3% [14,18]. In the present study, the prevalence of AUR was found to be 83.5%, while CUR accounted for 16.5%. In view of the lack of an international consensus on the definition of CUR, most prospective studies excluded patients with CUR because of the difficulty associated with the design of the study and the interpretation of results, and the possibility of associated complications and the anticipation of an adverse outcome [19].

*Causes of AUR in male patients*

Across Africa, there are ongoing changes in life expectancy. According to the Ghana Statistical Service (GSS), the population trends among Ghanaians indicate that the ageing of the population will continue in the 21st century. The GSS revealed that by the year

**Table 2** Treatment of men with benign prostatic enlargement (n = 115).

Variable	Total (%)
Attempt at TWOC was preceded by administration of alpha-adrenergic blockers for 7 days	49 (42.6%)
TURP after failed TWOC	1 (0.9%)
Open simple prostatectomy after failed TWOC	20 (17.4%)
Refractory urinary retention due to BPE with catheter in situ awaiting surgery	45 (39.1%)

2010 the population of the elderly had increased to more than seven-fold since the 1960 census. The GSS 2010 Population and Housing Census Report noted an increasing proportion of the population surviving up to 60 years and beyond [20]. An association between this rise in the proportion of the ageing population and an increase in the number of patients with urinary retention may be assumed.

BPE is the leading cause of AUR among men worldwide, accounting for some 65% [14,18,21]. According to Ikuerowo et al. in Nigeria the top two causes of AUR among adult males in the West African sub region were BPE (64%) and urethral trauma in descending order [17]. Likewise, according to a study carried out in Accra, Ghana, the commonest causes of AUR in males were BPE, urethral rupture, urethral stricture, and carcinoma of the prostate (in descending order) [15]. This complies with the results of our study where BPE was also found to be the leading cause of AUR.

Known risk factors for developing urethral stricture include traumatic urethral catheterization and instrumentation, pelvic fracture-related posterior urethral injury, straddle injury involving the bulbar urethra and poorly treated sexually transmitted urethral infections. But there are also urethral strictures of unknown cause. In the developed world, traumatic urethral injury has been recorded as the leading cause of urethral stricture in the long term [22,23], which may partly be due to the frequent use of urethral catheterization and associated traumatic urethral injuries, as well as to the increase in road traffic accidents and their attendant association with pelvic fracture-related urethral injuries. In our study, we found traumatic urethral injuries to be the leading cause of urinary retention among the 55 subjects with urethral stricture-related risk factors for developing urinary retention. Recent reports from the West African sub region suggest post-gonococcal and catheter-related urethritis to be the main causes of urethral stricture [24,25].

Carcinoma of the prostate (CaP) is fairly common among older men and may result in AUR as the disease progresses. Yeboah et al. reported that the prevalence of CaP was between 2.9 and 6.3% in their work on changing patterns of causes of AUR in Ghana [15]. European and American data showed the prevalence of CaP to be between 7.0 and 13.3% in patients with AUR [26,27]. It can therefore be said that prostate carcinoma is a well-known and important cause of AUR.

In this study, the diagnosis of CaP was based on histology with 13.1% of the men diagnosed with the disease presenting with urinary retention. This rate is comparable to the earlier findings by Moul et al. and was a result of our strict adherence to the protocol for screening and diagnosis of CaP. All our patients whose digital rectal examination results were suggestive of CaP and whose prostate specific antigen (PSA) levels were elevated were subjected to further evaluation. Transrectal ultrasound-guided prostate biopsies were done for histological confirmation of the diagnosis. This appears to be the standard practice for CaP and is supported by various scientific authors [28–32].

Other causes of AUR among men in our study were bladder calculi and paraphimosis. In the literature, bladder calculi have been reported to be a cause of AUR in 0.2–2% of cases [18,33,34]. In our study, bladder calculi were the cause of AUR in 0.5% of the male patients, which falls within the range quoted in the literature.

#### *Investigation modalities used in male patients*

Blood urea, serum creatinine and electrolytes are usually checked to rule out an impaired renal function, especially in patients with high pressure chronic renal failure. Recent American Urology Association (AUA) guidelines do not recommend routine serum creatinine measurement in the standard patient with BPE [35,36]. However, for those with complications of BPE such as CUR there is the need to establish renal function, because they may be at risk of developing renal insufficiency. It was shown to be cost effective when additional investigations such as serum creatinine and upper urinary tract imaging were carried out for suspected renal impairment.

Misdiagnosis of underlying renal impairment may be associated with additional costs and health detriments that are likely to outweigh the costs of these tests [37]. In this present study, elevated serum creatinine levels were found in 16.5% of the patients. Upper urinary tract ultrasonography revealed hydronephrosis in 4.4% of the cases. Patients with elevated serum creatinine did not have immediate definitive surgical treatment for the underlying cause of urinary retention until renal function had returned to normal. In the short term, continuous bladder drainage was instituted with follow-up serum creatinine measurements to assess renal function. Once renal function had returned to normal, the catheter was spigotted for the purpose of bladder training. Definitive surgical intervention was then planned. Some of our patients (about 10%) with urinary retention also had urinary tract infection with the major causative organism being *Escherichia coli*, followed by *Klebsiella* spp.; we suspect this might have been catheter-induced. In an earlier study from KATH, Gyasi-Sarpong et al. established that bacterial urinary tract infection among males with lower urinary tract obstruction was mainly due to *Escherichia coli* [38].

#### *Treatment of AUR in male patients*

The immediate treatment of urinary retention consisted of urethral catheterization or suprapubic cystostomy. In this study, urethral catheterization was the commonest modality used. Seventy-one percent of our patients had urethral catheterization, because it was a more familiar method, quick and easy to perform. Also Allardice and Webb successfully passed urethral catheters in the majority of their patients who presented with AUR [39,40]. In the remaining patients we performed suprapubic cystostomy to relieve urinary retention when urethral catheterization failed. This procedure was usually performed by the emergency physician, the urology resident in training or by a urologist. There was no other strategy than urethral catheterization or suprapubic cystostomy to relieve AUR in this study. This is consistent with recommendations from the AUA and the National Clinical Guideline Centre of the United Kingdom [35,37].

Delayed treatment of AUR was varied. Both alpha blockers and transurethral resection of the prostate (TURP) are clinically effective and cost effective treatment options for patients with BPE [41]. Various authors have demonstrated the cost effectiveness of the use of alpha blockers followed by TWOC in patients with AUR, without the need for re-catheterization [42–47]. In the present study, satisfactory TWOC in the short term was found in 43% of those patients in whom AUR was caused by BPE. In this group alpha-adrenergic blockers were administered prior to the procedure, which may have accounted for satisfactory voiding. Tamsulosin was the main

medication administered to the patients in this study. It was used in about 43.0% of the cases with AUR secondary to BPE. The remaining patients who failed TWOC were discharged home with either a urethral or suprapubic catheter in situ. They were followed up for at least 2 months before definitive treatment was administered. During this waiting period, they were seen at regular intervals to ensure that they remained healthy and did not have any infection connected with the catheter left in situ. The median prostate volume of our patients was about 87 ml. Since larger prostates are less likely to benefit from TWOC [43,44], a substantial number of our patients were expected to fail primary TWOC or to eventually go into retention again. Such patients may require immediate re-catheterization, later followed by surgery.

This study was limited with regard to long-term follow up and determination of the outcome of TWOC of the remaining 57.0% of the patients.

Some authors suggested that patients above the age of 80 with a mean catheterized residual urine volume greater than 900 ml are at a high risk of treatment failure using TWOC [43,48,49]. In our study, the mean catheterized residual urine volume was  $800 \pm 167$  ml. This could account for some of the failed TWOC.

TURP is the gold standard treatment for BPE with complications. It is both clinically and cost effective [41,50]. Only one patient in our study was subjected to TURP. This was due to the fact that endoscopic services were not yet available at our institution at the time of this study.

Urologists practicing under similar circumstances in Africa, where resources are limited, may be unable to offer TURP which is a well-known clinical and cost effective treatment option for BPE in developed countries. Definitive treatment of our patients with AUR/CUR due to BPE was performed via open surgery in 17% of the cases. This could only be done after 60 days because of the large number of patients and the lack of theatre space. Open transvesical prostatectomy was suitable not only because of the lack of endoscopic equipment, but also because of the large prostates these patients presented with.

The remaining patients in this study are awaiting definitive surgery. None of the patients was subjected to emergency prostatectomy during the study period.

Practicing urologists are requested to be familiar with various surgical techniques to deal with urethral strictures, as not every technique is appropriate in all situations [51,52]. In hospitals located in resource-endowed areas, minimally invasive techniques such as dilatation and optical internal urethrotomy are more commonly practised treatment options for urethral strictures than open urethroplasty [53,54]. However, many patients may require potentially curative open surgical repair because of the high recurrence rate of dilatation and optical urethrotomy [53]. Open surgical repair of urethral strictures is considered to be more cost effective than repeated urethrotomy [55]. Following advances in urethral surgery and the excellent success rates of urethroplasty, reconstructive specialists now favour open surgical treatment over endoscopic treatment of most strictures [51,52,56–58].

In the present study, urethral dilatation was the procedure of choice in over half (51%) of the patients in whom AUR was due to urethral

strictures. In the working environment of the author, where patients have to queue for several months to have their turn for urethroplasty, it was prudent to improve their quality of life with repeated dilatation so that they could return to work early. Mensah et al. who worked under similar circumstances lacking operating space used urethral dilatation as an option in 44% of their patients [25].

In the present study, internal urethrotomy was performed in only one patient (2.0%) of those with urethral strictures, which is due to the fact that the centre lacked endoscopic equipment – a basic requirement for successful visual urethrotomy. The remaining patients (47.0%) were subjected to urethroplasty. These findings suggest a drift towards open surgical reconstruction of urethral stricture disease in our centre in contrast to the well-endowed centres of the world, where endoscopic treatment is preferred.

Our patients with urinary retention due to CaP presented with advanced disease. As a result, androgen deprivation therapy was instituted (mainly bilateral total orchidectomy). Other uncommon causes of AUR or CUR encountered in the course of the study (neurogenic bladder, urethral tumour, phimosis and paraphimosis) were managed appropriately as per our hospital's protocol.

#### *Treatment of CUR in male patients*

CUR is a painless retention of urine associated with a significant post-void residual urine (PVR) volume [5]. Abrams et al. assigned an arbitrary figure of 300 ml of residual urine after voiding as the minimum volume required for the definition of CUR [59]. Some investigators defined CUR as PVR urine of more than 400 ml [60], or a post-void volume of 100–500 ml [61]; others have not given it a definite volume [62]. George et al. defined high-pressure CUR as raised intrinsic detrusor pressure during the filling phase of micturition [63] with an intravesical pressure above 25 cmH<sub>2</sub>O, leading to a bladder volume of >800 ml and often accompanied by hydronephrosis [64–66]. Over time this leads to renal failure with associated elevated serum creatinine. Low pressure chronic retention refers to large-volume retention in a very compliant bladder with no hydronephrosis or renal failure. Usually, both the detrusor pressure and flow rates are low [59,65]. In the present study, CUR was found in about 17% of the patients. These patients had renal insufficiency confirmed by the presence of elevated serum creatinine levels. Renal ultrasound scan also revealed hydronephrosis in about 4% of the total population investigated. This last group of patients had catheters connected to a urine bag for continuous bladder drainage until renal function returned to normal. The mean PVR urine volume in these patients was  $800.0 \pm 161.7$  ml.

Over three decades ago, Young and Mitchell reported that the mean volume of urine withdrawn after catheterization in patients with CUR was at least 800 ml [66]. In our work no urodynamic studies were done for this category of patients, and they are awaiting definitive treatment after relief of CUR.

#### *Treatment of urinary retention in female patients*

The incidence of urinary retention in women is not well documented in the world literature. Female urinary retention is more frequently described in small case series/reports with unusual causes. Many cases of AUR are transient with no apparent cause, which renders the management of these patients more challenging. The incidence of AUR in women is estimated to be

7/100,000 persons [67]. AUR was found in 37.5% of the women in the present study, while 62.5% presented with CUR. Medical practitioners use various treatment modalities for women with urinary retention. As such, treatment outcomes are more difficult to predict when compared to male patients [68]. In women, immediate management of AUR requires immediate bladder decompression with urethral catheterization, either with indwelling catheters or intermittent catheterization [69,70]. In this series, the majority of the female patients presented with bladder cancer and neurogenic bladder. Both patients with bladder carcinoma presented with advanced disease, and they were managed with urethral catheterization and manual evacuation of blood clots. Each of these patients was then hemodynamically stabilized prior to taking tissue samples for histological confirmation of the clinical diagnosis. Both were referred for radiotherapy. Hysterectomy with McCall's culdoplasty and anterior vaginal colporrhaphy was performed by the gynaecologist for the patient with utero-vaginal prolapse. The patient with bladder stones was successfully treated with open cystolithotomy. The woman with a urethral tumour was offered radiotherapy when the histology results revealed squamous cell carcinoma. Oncological treatment was still ongoing for these cancer patients at the oncology unit at KATH during the period of this present study. The pelvic fracture-related urethral trauma was repaired primarily. The two women with neurogenic underactive bladder were instructed to do clean intermittent self-catheterization while awaiting definitive treatment.

### Conclusion

Acute and chronic urinary retention is not uncommon, but there are no credible baseline data on this condition at KATH, Kumasi. The type of urinary retention encountered in this study was mainly acute urinary retention. Men were affected more frequently, with benign prostatic enlargement being the leading cause. In the female patients, acute or chronic urinary retention was mainly caused by bladder cancer and neurogenic bladder. Initial and definitive management varied, depending on the causes, gender and age.

### Conflict of interest

None declared.

### Authors' contributions

YEMT planned and designed the study protocol, carried out the study and headed the writing of the manuscript. AK and G-SCK supervised the study and contributed to the writing of the manuscript. AR and AAA contributed to the study and writing of the manuscript. All the authors have read and approved the manuscript.

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