International Journal of
Health Sciences
(IJHS)

MANAGEMENT OF HAEMATURIA IN A TERTIARY HEALTH INSTITUTION IN NIGERIA

CARI Journals

International Journal of Health Sciences
ISSN: 2710-2564 (Online)
Vol. 5, Issue No. 2, pp 16 - 29, 2022
www.carijournals.org

MANAGEMENT OF HAEMATURIA IN A TERTIARY HEALTH INSTITUTION IN NIGERIA

ABHULIMEN VICTOR

Division of Urology, University of Port Harcourt

Teaching Hospital, Port Harcourt, Rivers State, Nigeria

Corresponding author;

OFURU VITALIS OBISIKE

Division of Urology, University of Port Harcourt

Teaching Hospital, Port Harcourt, Rivers State, Nigeria, PMB 6173, Port Harcourt.

Email: vitalisoofuru@gmail.com

ABSTRACT

Purpose: Haematuria is a very important sign and symptom of a urological disease. It may be due to a urological malignancy. Careful history, physical examination, investigation and monitoring is necessary to identify cause and adequately treat patient with haematuria. This study aims to highlight the management of haematuria in Port Harcourt, Nigeria.

Methodology: This was a retrospective study of patients who presented with visible haematuria between January 2012 and December 2021. The patients' history, physical examination findings, investigations and treatment received were analysed. The form of treatment received was noted.

Findings: Three hundred and forty-six patients were evaluated. Two hundred and fifty-six (74%), seventy-two (20.8%) and eighteen (5.2%) patients presented within a week, between two and three weeks and above 3 weeks respectively. Twenty-seven (7.81%) patients had emergency surgery for haematuria. Sixteen of these had prostatectomy, 3 had TURBT/ chemotherapy, and eight had nephrectomy. The others were managed conservatively.

Unique contribution to theory, practice and policy: Many patients with surgical haematuria present early. The commonest cause of haematuria is benign prostatic enlargement and the commonest emergency surgery is open prostatectomy. Haematuria is mainly managed conservatively. Careful monitoring of patients' vital signs is critical in identifying patients who begin to decompensate during conservative treatment. When the need arises, immediate surgical intervention should be carried out.

Keywords: *Haematuria, surgical, conservative, management*.

Introduction

Haematuria refers to the presence of blood in the urine.[1] It could be grossly visible and termed macroscopic, gross or visible haematuria.[1,2] It may also only be detectable with microscope or dipstick test in which case it is termed microscopic or non-visible haematuria.[1,2]Microscopic haematuria is defined as the presence of three or more red blood cells per high power field.[3,4]The presence of haematuria should be properly evaluated because it may be a symptom or a sign of urological malignancy.[2]

Some drugs and food substances may make urine red without the presence of blood in urine, this is termed pseudohaematuria or false haematuria.[3] Drugs like rifampicin, sulphonal, dindevan and trianol may make the urine colour red or brown even in the absence of blood in urine[3]. Food substances like beetroots also make urine red in colour. Haematuria may also be due to contamination from the vagina (menstrual blood), or rectal bleeding.[5] Strenuous exercise can also lead to transient haematuria.[3,5] Haematuria is significant when it is visible, occurs in the absence of a transient cause and is persistent.[1] Visible haematuria is sometimes called surgical haematuria.

In the management of haematuria, a focused history, physical examination and laboratory investigations are important in identifying the cause and subsequent treatment of the patient.[6] Failure to identify patients that will require urgent intervention can have grave consequences. Previous studies have been carried out in our centre on haematuria of prostatic origin and focused on medical therapy only.[7,8] Another study focused on aetiology of surgical haematuria.[9] This study outlines methods used in identifying patients with haematuria that require immediate surgical intervention and discusses the appropriate surgical options. It also highlights conservative measures used in treating surgical haematuria of less severity in Port Harcourt, Southern Nigeria.

Materials and methods

This was a retrospective study. Patients who presented to the hospital with haematuria between January 2012 and December 2021 were included. The study was carried out at the Urology unit of University of Port Harcourt Teaching Hospital, Port Harcourt. Port Harcourt is a major capital city in the Niger Delta, the oil and gas zone in Nigeria. Data was obtained from ward admission registers, theatre, accident and emergency, and discharge records. The information gotten included history, duration of haematuria, examination findings and investigations done.

Investigations done included urinalysis and urine culture, full blood count, serum electrolytes, urea and creatinine, genotype, ultrasound scan, intravenous urography, computerized tomography scan, rigid cystoscopy and biopsy.

All cases of visible haematuria in all ages seen within the study duration were included in the study.

The form of treatment received by each patient was noted. Patients with incomplete records, and patients we suspected had medical haematuria such as those with proteinuria on urinalysis, patients with known kidney diseases, patients with poor corticomedullary differentiation on ultrasound scan or CT scan and patients with exercise induced haematuria were excluded from the study. The data from the folders were collated and entered using Microsoft Excel 2016 version and transferred into the statistical package for social sciences (SPSS) for windows (version 20) (IBM SPSS Inc. Chicago, IL) for analysis. Categorical data was presented in the form of frequencies and percentages using tables. Continuous variables were presented in means and standard deviation. Results were presented in tables and charts.

Results

Three hundred and forty-six patients had complete records and met the inclusion criteria.

The time from onset of haematuria to presentation in the hospital by respondents is as follows:

Table 1: Duration of symptoms before presentation at the hospital.

Time	Number of patients	Percentage
Less than 1week	256	74
Between 2nd and 3rd week	72	20.8
After 3weeks	18	5.2
Total	346	100

Two hundred and fifty-six (74%) of respondents presented within the first week of onset of symptoms.

The level of education of the respondents was as follows:

Table 2: Level of education of respondents.

Level of education	Number (n)	Percentage %
Primary	65	18.9
Secondary	212	61.3
Tertiary	69	19.8
Total	346	100

Two hundred and twelve (61.3%) respondents had secondary level of education and 69 (19.8%) respondents had tertiary level of education

The mode of presentation of respondents to the hospital is as shown below:

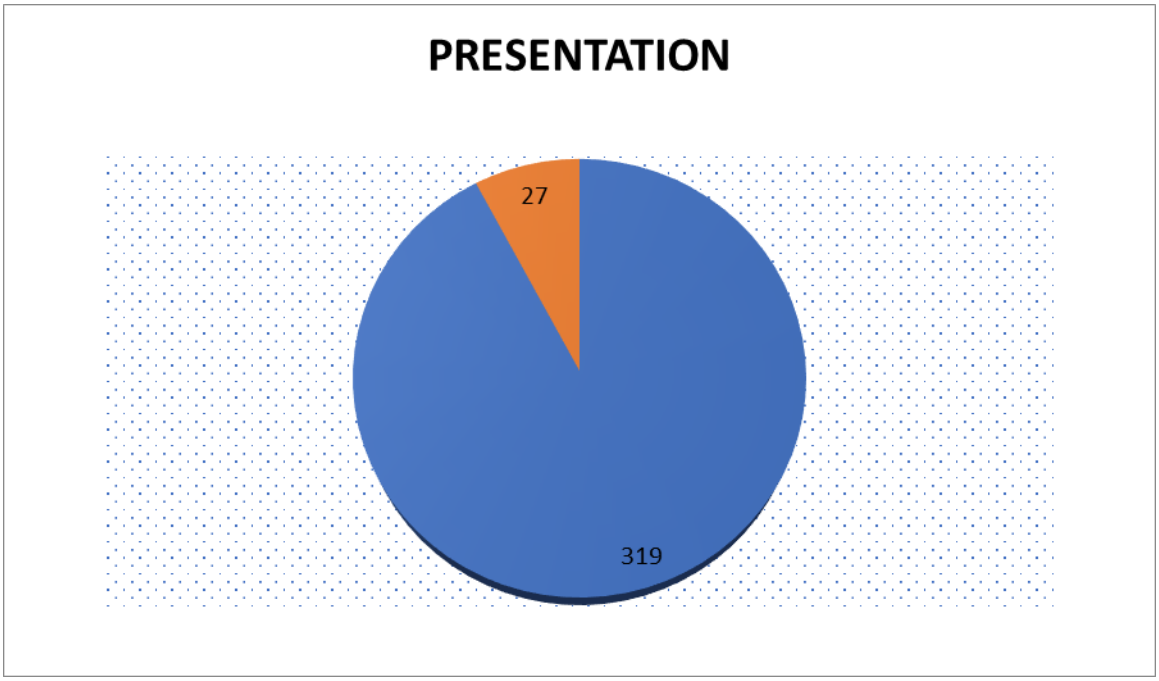

Figure 1: Mode of presentation to the hospital.

Twenty-seven (7.81%) patients presented as an emergency to the hospital while 319 (92.19%) presented as non-emergent cases

The causes of severe haematuria which resulted in surgical intervention are shown below:

Table 3: Causes of severe haematuria

Presentation	Frequency	Treatment
BPE	16	Prostatectomy
CA Bladder	3	TURBT/chemotherapy
Trauma	7	Nephrectomy
Renal cell carcinoma	1	Radical Nephrectomy
Total	27	

Causes of severe haematuria which presented as emergency and the type of treatment received. Sixteen patients had emergency prostatectomy for bleeding BPE.

The list of causes of haematuria are shown below:

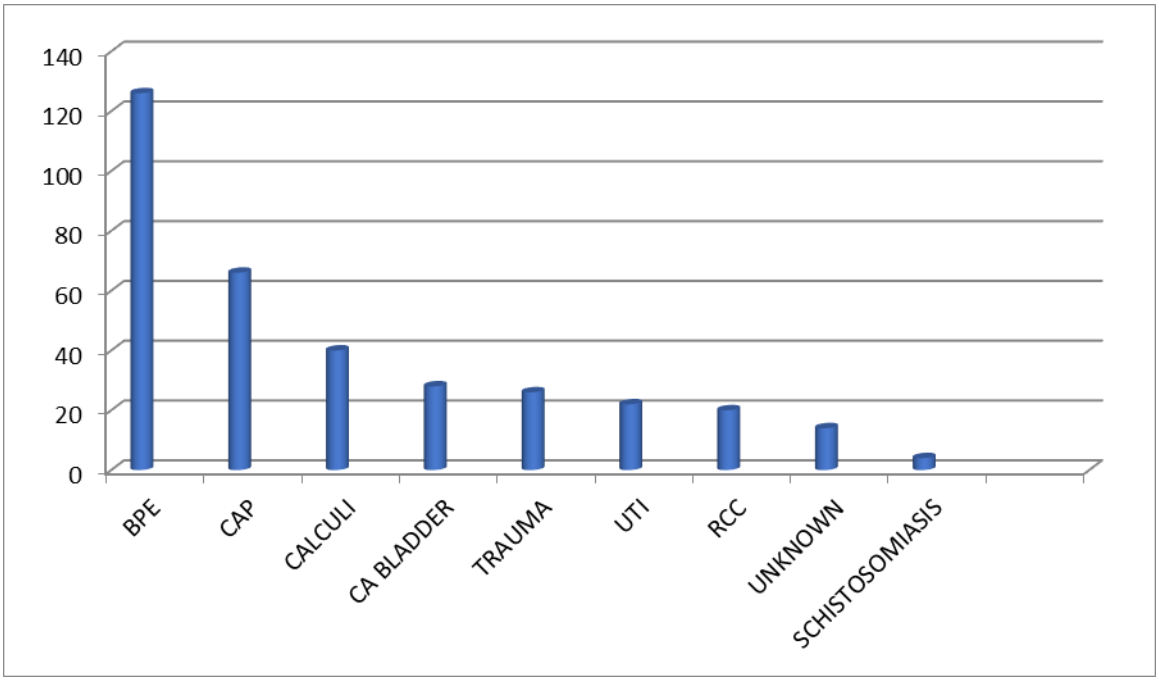

Figure 2: List of diseases causing haematuria arranged according to their significance.

Discussion

In Africa, and other developing economies there is a poor health seeking behaviour and many people who are ill present to patent medical vendors, herbalists, churches or mosques over a health care professional because of lack of money for adequate healthcare.[10-13] Sometimes these delays make the cost of healthcare more expensive as some patients develop complications before they present to a healthcare professional.[12]However, because the presence of surgical haematuria is alarming, many patients present early to the hospital for treatment. In our study as much as 74% of respondents presented within the first week of onset of haematuria as shown in Table 1. This finding was different from the finding of older studies on haematuria conducted in Northern and South Western Nigeria which revealed late presentation with advanced diseases.[14,15] The early presentation to the hospital in this study may be a reflection of increased awareness about haematuria and the level of education of the respondents. In extreme cases as seen in schistosoma endemic regions in Africa, haematuria is seen as male menstruation[16]and patients with these beliefs most often do not present to the hospital.

In our study 81% of the respondents had at least secondary level of education as shown in Table 2. Rivers State is an oil producing state in Nigeria. Many educated individuals reside and do business in the state. A study revealed that Rivers state is the fifth most educated Nigerian State with a literacy level set at 92.11%.[17] This high literacy level may be contributory to the increased awareness and early presentation of patients with haematuria to the hospital in this study.

Most patients (92.19%) in our study had conservative treatment for haematuria as against 7.81% who had emergency surgery as shown in Figure 1. These patients presented with haematuria that was either transient, partial or not associated with clots. The goals of treatment in these circumstances were to ensure adequate resuscitation, ensure that urine drained freely, and prevent infection. At the other end of the spectrum were patients who had severe life-threatening haematuria with cardiovascular instability or those who needed multiple blood transfusion and these had surgical intervention. In between were cases of varying severity and the treatment offered included normal saline irrigation and addition of a number of drugs and chemical agents. We consulted opinions of haematologist when the need to identify an underlying haematological disorder arose. We stopped anticoagulants and antiplatelet drugs as part of management protocols. Uncontrolled blood pressure also worsened haematuria and an internists was also called upon if needed.

Benign prostatic enlargement was the commonest cause of haematuria in our study with 36.41% of patients presenting with haematuria. It was also the commonest cause of emergency surgery with 16 out of 27 (59.3%) patients requiring emergency surgery. Conservative management for Benign Prostatic Enlargement BPE depended on the severity of the haematuria. Patients with associated dizziness, fainting spells and passage of clots with cardiovascular instability had immediate resuscitation and if haematuria continued despite adequate resuscitative measures, they had surgery. Sixteen patients in this study had emergency open simple prostatectomy for

bleeding BPE. Patients who presented with less severe bleeding were treated non-operatively and this included passing an appropriately sized catheter, commencing bladder irrigation with normal saline to prevent clot retention and ensure that the bladder was contracted. This we did because contracted bladder tends to bleed less than the distended bladder. We observed that patients with BPE that had been complicated with obstructive nephropathy who presented with haematuria seemed to bleed less as the renal status improved with continuous bladder drainage and other conservative management. Urea is known to impair platelet aggregation.[3]

Addition of some medications help to control haematuria of prostatic origin while managing conservatively. Five alpha reductase inhibitors such as dutasteride and finasteride prevent formation of dihydrotestosterone (DHT). When used in acute haematuria of prostatic origin, the drug removes the inflammatory effect of DHT such as prostatic oedema and vascular permeability thus reducing bleeding.[8,9]

Tranexamic acid is a synthetic reversible competitive inhibitor of the lysine receptor found on plasminogen.[18] The binding of this drug to the receptor on plasminogen prevents plasmin from binding to its receptor. This ultimately stabilizes the fibrin matrix.[18] This drug helps to prevent bleeding by stabilizing fibrin.[18-20] It is actually administered intravenously although oral forms of the drug exist.

Despite these conservative measures patients whose haematuria persisted had surgery. Preoperatively, vital signs should be as good as possible. Sometimes it may be difficult to have them stable and surgery is actually part of resuscitation. We used hypotensive analgesia for these cases to reduce bleeding. We also gave appropriate normal saline before the procedure to dilute the patients' blood and thereby reduce blood loss. Intraoperatively, the use of diathermy also helped to reduce blood loss. After enucleation of the prostate and secure of haemostasis the patient was then transfused. Postoperatively, appropriate antibiotics, continuous normal saline irrigation and adequate analgesia is important in reducing haematuria. Some authors have inflated the balloon of the catheter in the prostatic fossa and applied traction on the prostatic bed, and this is believed to reduce bleeding by tamponading the bleeding vessels.[21] However, this prevents contraction of the prostatic capsule, can cause more bladder spasms and post-operative urethral strictures.[21] We, inflate the catheter to 30mls and put traction for 8hours, then reduce the catheter balloon to 15mls.

Prostate cancer is the most commonly diagnosed cancer in the Nigerian males. [22] Prostate cancer metastasizes to the bone[22,23] and can lead to a reduction in all cell lines. This can lead to haematuria because of a reduction in platelet count. Also increased urea level from obstructive nephropathy and urinary tract infection can contribute to haematuria.[22]In this study there is no patient with prostate cancer who presented as an emergency.

Cancer of the prostate is the second most common cause of haematuria as shown in Figure 2. Androgen deprvation therapy is a means of treating prostate cancer. Androgen deprivation therapy ADT refers to any form of treatment which reduces the level of testosterone.[24] It is a mode of treating advanced prostate cancer.[24] All the patients with haematuria secondary to prostate cancer were given androgen deprivation therapy because they presented with locally advanced or metastatic prostate cancer. ADT reduces testosterone and leads to reduction in vascularity of the prostate and hence a resolution of the haematuria. Androgen deprivation was administered as a medical method using drugs such as diethylstiboestrol, flutamide, bicalutamide, gonadotrophin releasing hormone analogue and gonadotrophin releasing hormone antagonists. Surgical ADT was in the form of orchidectomy. Medical ADT are quite expensive. [25,26,27]Majority of our patients in Port Harcourt had surgery although they would have opted for medical treatment if not for the costs. There is also the issue of non-availability of these drugs. Some patients commenced intermittent androgen blockade to reduce cost and side effects of ADT but many patients on intermittent androgen blockade were lost to follow up. Some had orchidectomy after relapse. Orchidectomy was a cheaper form of ADT and has been used since the time of Hodges and Huggins.[25] Acceptance of orchidectomy is quite difficult even in patients with testicular cancer.[28] In Africa there is an interplay between sociocultural and economic factors when it comes to treatment of the testes.[29]Many patients in our study who accepted orchidectomy preferred a subcapsular orchidectomy to total orchidectomy because the scrotum would not appear empty. Orchidectomy was also permanent and this made follow up easier. In a randomized controlled trial carried out earlier in our centre, some patients with severe haematuria who continued to bleed several weeks of receiving conservative management had resolution of their haematuria less than 24hours after orchidectomy.[30]

Cancer of the bladder is another important cause of haematuria. Diagnosis was made by a combination of history, examination and investigation. An abdominopelvic ultrasound scan and a CT scan picked up the lesion in each case. A study in Birmingham also noted the use of CT scan in diagnosis of bladder cancer.[31]Cystoscopy and transurethral resection of bladder tumour (TURBT) was needed to make a definitive diagnosis. Three patients in our study (as shown in table 3) had emergency TURBT for haematuria and had intravesical mitomycin C. Intravesical chemotherapy reduces the morbidity of intravenous chemotherapy. During TURBT care was taken to prevent bladder perforation. The diathermy was reduced to a lower voltage and care was taken not to over distend the bladder. Careful resection and cauterisation of the bleeding points helped reduce haematuria in these cases. Mitomycin C (MMC) is an antitumor antibiotic useful in treating bladder cancer. Mitomycin C requires an enzymatic bio reduction to exert its biological effects, this converts MMC to a bis-electrophilic intermediate that alkylates cellular nucleophiles.[32] Other modes of action include alkylation of DNA, redox cycling and inhibition of RNA.[32] It helps to prevent tumor recurrence and prevent tumour progression in low risk non-muscle invasive bladder cancer.[33] Intravesical Bacille Calmette Guerin (BCG) is another agent

used in treating bladder cancer. However, we did not use Intravesical BCG in our patients with haematuria. BCG appears to be the most efficacious intravesical therapy for carcinoma insitu but should not be used when patients have on going haematuria.[33]

Palliative radiotherapy has been used for patients with gross haematuria from bladder and prostate cancer.[34,35] Radiotherapy is minimally invasive and many patients have good response to radiation therapy. None of the patients in this study had radiation for haematuria as it is currently unavailable in Port Harcourt.

Trauma is an important cause of haematuria and this is due to injury to any part of the urinary system. Seven patients (43.8%) of those that had trauma in this study had emergency surgery for severe life-threatening haematuria, making trauma the condition most likely to lead to emergency surgery. Two patients sustained gunshot injuries while five had blunt trauma from road traffic accident. A good history and an abdominal CT scan were important tools in identifying the grade and hence management of renal injury.[36]Abdominal CT revealed that 4 patients had grade V renal injury and three had grade IV injury with associated bowel injury. Surgery was lifesaving in these cases as the patients would have bled to death. Patients with less severe injuries were managed conservatively. Studies in India have also noted that patients with less severe injuries were treated conservatively with good outcome.[37] These patients were monitored to ensure they were haemodynamically stable. A urine rack was kept and it showed that the urine became clearer with time. Angioembolization can also be used to treat high grade renal trauma. The renal vessels can be embolized to contain bleeding. No patient had angioembolization in this study as it is currently unavailable in our centre.

Renal cell carcinoma (RCC) accounts for 2% of global cancer diagnoses and deaths.[38] However, its incidence has doubled in the last 50years in the developed world. RCC makes up 90% of all kidney cancers and is more prevalent in Blacks.[39] RCC presents with a triad of loin swelling, loin pain and haematuria. This triad is termed the too late triad.[40]Patients who present with incidental diagnosis of RCC tend to fare better than those who develop symptoms. One patient presented with severe haematuria, he was resuscitated and had an emergency radical nephrectomy due to severe persistent haematuria.

The urinary tract from the kidney to the urethral meatus can be infected by bacteria. Urinary Tract Infection (UTI) refers to inflammatory response of the urothelium to bacterial invasion.[41] UTI can present as haematuria. Twenty-two patients in this study presented with haematuria secondary to UTI. They were all managed conservatively using culture directed antibiotic therapy. Prior to culture results broad-spectrum antibiotics were used.

Sometimes despite all the measures deployed haematuria persists and it is said to be refractory. Agents like aminocaproic acid (which inhibits plasmin and counteracts urokinase), formalin (which hydrolyses proteins and coagulates tissues) alum (which causes protein precipitation over

bleeding surfaces), silver nitrate (which causes protein precipitation and induces clot formation) and use of hyperbaric oxygen (which causes vasoconstriction).[15,42] These agents should be used with care because of their side effects.[42]

Limitations of the study

This was a retrospective study and some data that was sought could not be gotten and these patients were excluded from the study and this affected the sample size.

Conclusion

Many patients with surgical haematuria present early**.** The commonest cause of haematuria is benign prostatic enlargement and the commonest emergency surgery is open prostatectomy. Haematuria is mainly managed conservatively. Careful monitoring of patients' vital signs is critical in identifying patients who begin to decompensate during conservative treatment. When the need arises, immediate surgical intervention should be carried out.

Recommendations

1. Management of haematuria should mainly be conservative except in severe, persistent or life-threatening cases.
2. Careful monitoring of patients with haematuria should be considered a priority to identify those that will need surgical intervention as early as possible.
3. Although endoscopic procedures like transurethral resection of the prostate and Holmium laser enucleation of the prostate are considered the new gold standards for treating patients with BPE,[43] open prostatectomy should remain a valuable tool in management of patients with haematuria secondary to BPE in areas where this technology is unavailable.
4. Multidisciplinary approach to management is important; a haematologist and an internist should be called upon every time the need arises.

Conflict of interest

The authors declare there were no conflict of interest in this study.

Source of funding

This study was self-funded by the authors.

References

Reynard J, Brewster S, Bier S. Oxford Handbook of Urology. Third Edition. UK: Oxford University Press,2013: 8 -14.

Bolenz C, Schröppel B, Eisenhardt A, Schmitz-Dräger BJ, Grimm MO. The investigation of hematuria. Deutsches Ärzteblatt International. 2018 Nov;115(48):801.

Badoe EA, Archampong EQ, Rocha-Afodu JT, (editors). Principles and practice of surgeryincluding pathology in the tropics 4th edition, Accra:Assemblies of God literature centre Ltd,2009: 967- 972.

Mcdonald MM, Swagerty Jr DL, Wetzel L. Assessment of microscopic hematuria in adults. American family physician. 2006 May 15;73(10):1748-54.

Chen J, Zeng R. Hematuria. In: Handbook of Clinical Diagnostics 2020 (pp. 71-73). Springer, Singapore.

Pang KH, Catto JW. Haematuria: Evaluation and Management. InUrologic Principles and Practice 2020 (pp. 281-286). Springer, Cham.

Ofuru VO. The role of dutasteride in the treatment of gross haematuria due to benign prostatic hyperplasia and adenocarcinoma of the prostate. Faculty of Surgery, 2014-dissertation.npmcn.edu.ng.

Ofuru VO, Obiorah CC. The role of dutasteride in acute prostatic haematuria. Int J Clin Med 2017; 8: 1-7.

Ofuru VO, Abhulimen V. Surgical Haematuria: An Analysis of Causes in a Southern Nigerian State. Open Journal of Urology. 2022 Jul 15;12(7):401-9.

Olasehinde N. Healthcare seeking behavior in Nigeria. Journal of Population and Social Studies [JPSS]. 2018 Jul 3;26(3):207-18.

Latunji OO, Akinyemi OO. Factors influencing health-seeking behaviour among civil servants in Ibadan, Nigeria. Annals of Ibadan postgraduate medicine. 2018 Jul 17;16(1):52-60.

Tanimola MA, Owoyemi JO. Healthcare-seeking behaviour in Anyigba, North Central, Nigeria. Research Journal of Medical Sciences. 2009;3(2):47-51.

Brieger WR, Osamor PE, Salami KK, Oladepo O, Otusanya SA. Interactions between patent medicine vendors and customers in urban and rural Nigeria. Health policy and planning. 2004 May 1;19(3):177-82.

Dawam D, Kalayi GD, Osuide JA, Muhammad I, Garg SK. Haematuria in Africa: is the pattern changing? BJU international. 2001 Mar;87(4):326-30.

Osegbe DN, Amaku EO. Haematuria in Nigerians: a prospective study. The Journal of Tropical Medicine and Hygiene. 1984 Jun 1;87(3):115-7.

Visclosky T, Hashikawa A, Kroner E. Discovery of a Hidden Schistosomiasis Endemic in the Salamat Region of Chad, Africa. Global Health: Science and Practice. 2022 Feb 28;10(1).

Mfonobong Daniel. Top 10 most educated states in Nigeria (2022). Available at: http://www.nigerianinfopedia.com.ng/most educated-states-innigeria/. (Accessed June 12,2022).

Chauncey JM, Wieters JS. Tranexamic acid. InStatPearls [Internet] 2021 Jul 28. StatPearls Publishing.

Karkhanei B, Musavi-Bahar SH, Bayat M, Kaseb K, Rezaee H, Moradi A, Moradi M. Safety and efficacy of intraoperative administration of intravenous tranexamic acid in transurethral resection of prostate: A doubleblind, randomised, placebo-controlled trial. Journal of Clinical Urology. 2020 Mar;13(2):125-31.

Samir M, Saafan AM, Afifi RM, Tawfick A. Can high-dose tranexamic acid have a role during transurethral resection of the prostate in large prostates? A randomised controlled trial. Arab Journal of Urology. 2022 Jan 2;20(1):24-9.

Sekar H, Palaniyandi V, Krishnamoorthy S, Kumaresan N. Post-transurethral resection of prostate urethral strictures: Are they often underreported? A single-center retrospective observational cohort study. Urology Annals. 2021 Oct;13(4):329.

Raphael JE, Abhulimen V. Retrospective Analysis of Complications from Prostate Cancer among Nigerians. Saudi J Med. 2022;7(2):99-104.

Liu D, Kuai Y, Zhu R, Zhou C, Tao Y, Han W, Chen Q. Prognosis of prostate cancer and bone metastasis pattern of patients: a SEER-based study and a local hospital-based study from China. Scientific reports. 2020 Jun 4;10(1):1-1.

Yu EM, Aragon-Ching JB. Advances with androgen deprivation therapy for prostate cancer. Expert Opinion on Pharmacotherapy. 2022 Feb 3:1-9.

Klotz L. The history of intermittent androgen deprivation therapy—A Canadian story. Canadian Urological Association Journal. 2020 Jun;14(6):159.

Edmunds K, Reeves P, Scuffham P, Galvão DA, Newton RU, Jones M, Spry N, Taaffe DR, Joseph D, Chambers SK, Tuffaha H. Cost-effectiveness analysis of supervised exercise training in men with prostate cancer previously treated with radiation therapy and androgen-deprivation therapy. Applied Health Economics and Health Policy. 2020 Oct;18(5):727-37.

Shah A, Shah R, Kebede N, Mohamed A, Botteman M, Waldeck R, Hussain A. Real-world incidence and burden of adverse events among non-metastatic prostate cancer patients treated with secondary hormonal therapies following androgen deprivation therapy. Journal of Medical Economics. 2020 Apr 2;23(4):330-46.

Ugwumba FO, Aghaji AE. Testicular cancer: Management challenges in an African developing country. S Afr Med J. 2010; 100:452–5.

Abhulimen V, Raphael EJ. Testicular cancer at the University of Port Harcourt Teaching Hospital: A 10-year retrospective review. Journal of the West African College of Surgeons. 2019 Jul;9(3):21.

Ofuru VO, Obiorah CC. Pre-androgen ablation prostatic cancer patients who bleed do well with 5alpha reductase inhibitors. OJU 2018; 6:184-192.

Galgano SJ, Porter KK, Burgan C, Rais-Bahrami S. The role of imaging in bladder cancer diagnosis and staging. Diagnostics. 2020 Sep;10(9):703.

Paz MM, Zhang X, Lu J, Holmgren A. A new mechanism of action for the anticancer drug mitomycin C: mechanism-based inhibition of thioredoxin reductase. Chemical research in toxicology. 2012 Jul 16;25(7):1502-11.

Badrinath KR, Carroll PR. In: McAninch JW, Lue FT (Editors). Smith and Tanagho's General Urology. 19th edition, New York; USA: Mc Graw Hill,2020: 317 – 319.

Ogita M, Kawamori J, Yamashita H, Nakagawa K. Palliative radiotherapy for gross hematuria in patients with advanced cancer. Scientific Reports. 2021 May 5;11(1):1-9.

Tey J, Ho F, Koh WY, Chia D, Ooi KH, Tuan JK, Vellayappan B, Soon YY. Palliative radiotherapy for bladder cancer: a systematic review and metaanalysis. Acta Oncologica. 2021 May 4;60(5):635-44.

Kidd M, Beviss-Challinor KB, Pitcher RD. How useful are clinical details in blunt trauma referrals for computed tomography of the abdomen? SA Journal of Radiology. 2020 Jan 1;24(1):1-6.

Choudhury S, Ray P, Pal DK. Changing paradigms of management of isolated blunt renal trauma. Trauma. 2020 Nov 5:1460408620965446.

Padala SA, Barsouk A, Thandra KC, Saginala K, Mohammed A, Vakiti A, Rawla P, Barsouk A. Epidemiology of renal cell carcinoma. World journal of oncology. 2020 Jun;11(3):79.

Callahan CL, Schwartz K, Corley DA, Ruterbusch JJ, Zhao WK, Shuch B, Graubard BI, Rothman N, Chow WH, Silverman DT, Purdue MP. Understanding racial disparities in renal cell carcinoma incidence: estimates of population attributable risk in two US populations. Cancer Causes & Control. 2020 Jan;31(1):85-93.

Alfalahi S, Al-Ba'adani TH, Babakri M, Ghilan A. Renal Cell Carcinoma in Yemeni Patients: A Review of 67 Cases. Urol Nephrol Open Access J. 2016;3(2):00075.

Raphael JE, Abhulimen Victor. Sensitivity and resistance patterns of Gram negative uropathogens isolated from the urine of patients with upper/lower urinary obstruction in Nigeria. Journal of advances in medicine and medical research. 2022; 34(9): 11-19. https://www.sdiarticle5.com/reviewhistory/86471.

Wieder AJ. Pocket guide to Urology 4th edition,USA: J Wieder medical in association with Griffith publishing,2010: 222-228.

Shvero A, Calio B, Humphreys MR, Das AK. HoLEP: the new gold standard for surgical treatment of benign prostatic hyperplasia. Can J Urol. 2021 Aug 1;28(S2):6-10.