ORIGINAL RESEARCH

Diagnosis and Treatment of Urologic Malignancies in the Philippines: A Multi-center Prospective Cohort Study (PUMA Study)

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Objective: To create a pilot urologic malignancy registry using demographic and clinical data of a cohort of patients newly diagnosed to have urologic malignancies in the year 2021.
Methods: This was a prospective cohort study conducted in four study sites: National Kidney and Transplant Institute, East Avenue Medical Center, UP-Philippine General Hospital and Batangas Medical Center.
Results: A total of 243 patients with newly diagnosed urologic cancers were enrolled. The median age was 61 years, with a wide range of 1 to 87 years. Most of the patients (81.47%) were male, while there were 45 females (18.52%) who had either urinary bladder, kidney or upper urothelial cancer. The most common type of malignancy was prostate cancer (34.57%), followed by kidney cancer (30.04%) and urinary bladder cancer (24.69%), consistent with the currently observed worldwide incidence. There were also 3 patients (1.23%) noted with multiple primaries. More than half of the patients (63.37%) received surgery as active treatment. After the two-year follow-up period, thirteen patients (5.35%) developed progressive disease, and 14 patients (5.76%) died.
Conclusion: This urologic cancer registry represents the first multi-center, investigator-initiated epidemiologic study of its kind in the Philippines. As a proof-of-concept (POC) project, it demonstrates the feasibility of establishing a national database capturing baseline data on the country's most common urologic malignancies.

Key words: Epidemiology, urologic cancers, hospital-based cancer registry

Introduction

A global shift from communicable to non-communicable disorders has been observed over the past few years, influenced by various factors, from improvements in technology and health care to different environmental exposures.[1,2] This is supported by the most recent data from the World Health Organization (WHO) showing that cardiovascular disease, followed by cancer, are the leading causes of death in 127 countries, including the Philippines.[1] Such observations have also been seen in the field of Urology, as malignancies involving the prostate, kidney and bladder have now ranked 5th, 16th and 18th, respectively, as causes of cancer morbidity and mortality worldwide.[2,3]

Urologic cancers, which arise within the urinary tract of men and women and reproductive

organs of men, include cancers of the bladder, kidney, penis, prostate, testes and ureter.[4] These are relatively common, with prostate cancer being the most commonly diagnosed urologic cancer, the 4th most commonly diagnosed cancer in the world, and the 5th most commonly diagnosed cancer in the Philippines (5.2% of all incident cancers).[5]

Urinary bladder and kidney cancer incidences are on the rise globally, being the 9th and 14th most commonly diagnosed cancer, respectively, in 2022, from 12th and 16th in 2020.[5,6]

In the local setting, Raymundo et al. reported that prostate cancer is the most common urologic malignancy in a tertiary hospital in the Philippines. This was followed by malignancies of the bladder and kidneys.[2] The Cancer CARE Registry and Research Philippines Hospital-Based Cancer Registry System (CARE PH HBCR), likewise reported in its 2023 Annual Report, 1,108 prostate and other male urogenital cancers which make up 5.0% of their total 21,816 new registrants for the year 2023.[7]

Although penile cancer, testicular cancer and upper tract urothelial cancer (UTUC) are relatively uncommon compared to other urologic cancers, their numbers are also rising. The 2018 penile cancer worldwide incidence of 0.80 per 100,000 person-years is predicted to increase by more than 56% by 2040, according to the Global Cancer Registries (GLOBOCAN) Cancer Tomorrow prediction tool.[8] The incidence of testicular cancer has been increasing over the last three to four decades, especially in the White population. Though in Southeast Asia, testicular cancer occurs in 0.9/100,000 of the population, similar to 0.5/100,000 cases seen in the Philippines.[9] The incidence of UTUC remains low at 1–3 cases/100,000 people/year, but it is also rising in many nations around the world.[10]

Analyzing the incidence of urological cancer may assist in its early detection and prevention as well as promote a better understanding of the urological cancer patterns in any country.[11] Current practitioners in Urologic Surgery, Nephrology, and Medical Oncology in the Philippines are guided by the National Cancer Comprehensive Network (NCCN) Guidelines[12] and the European Society of Medical Oncology (ESMO) Practice Guidelines.[13] There have been great advances in the diagnosis and treatment of urologic malignancies in the era of molecular medicine, targeted therapy, and immunotherapy, but there is heterogeneity in practice because of disparities in economic capability and healthcare provisions in a developing country like the Philippines. To date, local Clinical Practice Pathways or Clinical Practice Guidelines and Health Technology Assessments have not yet been created.

There is a need to gather baseline epidemiologic data on the diagnosis and treatment of urologic malignancies in the country. Incidence rate, stage upon diagnosis, treatment given, time to treatment, surgical morbidities, remission rates, relapse rates and overall survival data will reveal gaps in current diagnosis and management practices that will help prioritize programs and policies. This will ultimately result in the improvement of the quality of life and survival rates of patients with these common dreaded diseases. The benefits of this study will reach not just the individual patients diagnosed with urologic malignancies but will also help in the creation of clinical practice guidelines and lead to evidence-based public health policy and better healthcare for Filipino cancer patients.

This study aimed to determine the feasibility of creating a registry containing demographic and clinical data of a cohort of patients newly diagnosed to have urologic malignancies in the year 2021, as a proof-of-concept. Starting the registry in a subset of hospitals will allow for the observance and determination of best practices and optimal data flow, before eventually rolling out the registry on a nationwide scale.

Methods

Study Population

Patients newly diagnosed to have a urologic malignancy (based on a surgical pathology report or a letter of referral from an oncologist or urologist) or treated for a newly diagnosed urologic malignancy at the study site from 01 January 2021 to 31 December 2021 were included in the study. The study sites included were: National Kidney and Transplant Institute, Philippine General Hospital, East Avenue Medical Center, and Batangas Medical Center, which have training programs in Urology

recognized by the Philippine Society of Urologic Oncology (PSUO).

Research Design

This was a prospective cohort study. Clinical data was collected from the patients at baseline, then in 6-month intervals or whenever there was a status change, until the study ended in 2023, or the death of the patient, whichever came first. No other procedures were done on the participants aside from procedures decided by their attending physicians on their standard-of-care visits.

Data Collection and Monitoring

Case Identification

All cases with urologic malignancies registered with new patient identification numbers (PIN) in the 2021 Hospital Cancer Registry of the participating hospitals, and 2021 census of the Department of Surgery or Division of Urology were included in the study masterlist. Logbooks of patients seen in the radiation, chemotherapy units, and surgery suites of the hospitals, as well as surgical pathology logbooks, were also reviewed. Each patient was assigned a non-identifiable study identification (ID) number.

Data Collection and Data Collection Instruments

A new record for each patient using only the study ID number containing de-identified patient data (demographic information, details of diagnosis and treatment) was created through an electronic data collection form (eDCF) RedCap, a web application for building and managing online surveys and databases developed by Vanderbilt University. The database is hosted on secure servers, and accessible only to trained and Good Clinical Practice (GCP) certified site clinical personnel.

The clinical status and outcomes of patients were monitored for 2 years, until the end of 2023. Follow-up data were recorded through chart review by noting patient status at six-month intervals from date of diagnosis. Any status change/s in between set intervals were also recorded.

Ethical Considerations

This study involved the gathering of data from human participants which were first de-identified before analysis. It was approved by all concerned hospital Ethics Boards, and conducted in compliance with the National Ethical Guidelines for Health and Health-Related Research (NEGHHRR) on the ethical conduct of clinical research.

Results

A total of 243 patients with newly diagnosed urologic cancers were enrolled from four study sites. The median age was 61 years, with a wide range of 1 to 87 years. Most of the patients (81.47%) were male, while there were 45 females (18.52%) who had either bladder, kidney or upper urothelial cancer. Table 1 shows the proportion of patients identified according to type of malignancy stratified according to sex and age.

The most common type of malignancy was prostate cancer (34.57%), followed by kidney cancer (30.04%) and bladder cancer (24.69%), consistent with the currently observed worldwide incidence.[5] There were 3 patients (1.23%) noted with multiple primaries.

More than half of the patients (63.37%) received surgery as active treatment.

After the two-year follow-up period, thirteen patients (5.35%) developed progressive disease, and 14 patients (5.76%) died. The rest of the treatment outcomes of the patients are shown in tables 2 and 3.

Table 2 shows the disease characteristics of patients with urologic cancers specific to males, which includes prostate, testicular and penile cancers. Patients with cancer with multiple primaries are also included as they all had prostate and bladder cancers. The table shows the percentage of those diagnosed with the specific cancers, the most common histologic subtypes, laterality, staging details, treatments received and patient response, as well as disease outcomes.

Prostate cancer, the most common type of cancer among patients enrolled, is noted to have a middle-aged to elderly patient population, with a median age of 66 years (range 46-83 years). More than a quarter of patients presented with high risk

Table 1. Age and sex of patients according to type of malignancy. (N 243)

Malignancy Type	n	% of total	Age in years (Median, Min-Max)	Males	%Males	Females	%Females
Prostate	84	34.57%	66 (46-83)	84	100.00%	N/A	N/A
Kidney	73	30.04%	56 (1-78)	51	69.86%	22	30.14%
Urinary bladder	60	24.69%	62.5 (30-87)	40	66.67%	20	33.33%
Testicular	13	5.35%	33 (18-48)	13	100.00%	N/A	N/A
Penile	6	2.47%	51 (29-68)	6	100.00%	N/A	N/A
Upper urothelial	4	1.65%	64 (59-74)	1	25.00%	3	75.00%
Multiple primaries	3	1.23%	69 (63-74)	3	100.00%	0	0.00%
TOTAL	243	100.00%	61 (1-87)	198	81.47%	45	18.52%

Table 2. Disease characteristics of patients with male-specific urologic cancers.

Characteristic	Prostate	Testicular	Penile	Multiple Primaries
Count	84 (34.57%)	13 (5.35%)	6 (2.47%)	3 (1.23%)
Histologic Subtype	Adenocarcinoma – 49 (58.33%) Acinar adenocarcinoma - 31 (36.90%) Atypical small cell acinar - 1 (1.19%)	Seminoma – 7 (53.85%) Yolk Sac Tumor – 3 (23.08%) Mixed Germ Cell Tumor – 2 (15.35%)	Squamous cell carcinoma – 5 (83.33%) Verrucous carcinoma – 1 (16.67%)	Papillary urothelial carcinoma and Acinar adenocarcinoma – 3 (100.00%)
Laterality				
Left	-	5 (38.46%)	-	-
Right	-	6 (46.15%)	-	-
Bilateral	-	1 (7.69%)	-	-
No data	-	1 (7.69%)	-	-
TNM Staging Clinical				
Stage I	5 (5.95%)	3 (23.08%)	2 (33.33%)	0 (0.00%)
Stage II	16 (19.05%)	2 (15.38%)	2 (33.33%)	1 (33.33%)
Stage III	6 (7.14%)	5 (38.46%)	0 (0.00%)	1 (33.33%)
Stage IV	23 (27.38%)	0 (0.00%)	2 (33.33%)	0 (0.00%)
No data	34 (40.48%)	3 (23.08%)	0 (0.00%)	1 (33.33%)
TNM Staging Pathologic				
Stage I	5 (5.95%)	-	2 (33.33%)	-
Stage II	1 (1.19%)	-	2 (33.33%)	-
Stage III	5 (5.95%)	-	0 (0.00%)	-
Stage IV	11 (13.10%)	-	2 (33.33%)	-
No data	62 (73.81%)	-	0 (0.00%)	-

Treatment Received				
Surgery	46 (54.76%)	11 (84.62%)	5 (83.33%)	2 (66.67%)
Chemotherapy	9 (10.71%)	3 (23.08%)	1 (16.67%)	1 (33.33%)
Radiotherapy	8 (9.52%)	0 (0.00%)	1 (16.67%)	0 (0.00%)
Treatment Response				
Progressive Disease/Tumor Recurrence	2 (2.38%)	-	1 (16.67%)	2 (66.67%)
No data	-	-	-	-
Outcome				
Alive	16 (19.05%)	1 (7.69%)	1 (16.67%)	0 (0.00%)
Dead	5 (5.95%)	2 (15.38%)	0 (0.00%)	0 (0.00%)
Lost to Follow-Up	63 (75.00%)	10 (76.92%)	5 (16.67%)	3 (100.00%)

and advanced disease at diagnosis, as twenty-three patients (27.38%) were placed in the higher risk groups following the National Comprehensive Cancer Network (NCCN) risk stratification, and 23 patients (27.38%) had stage IVB cancer following the TNM clinical staging. Forty-six (54.76%) patients underwent surgery, of which radical prostatectomy was the most common (29.76%); and fifteen patients (17.86%) underwent androgen-deprivation therapy.

Meanwhile, testicular cancer was noted to be more common in the younger age group with the median age at diagnosis at 33 years (range 18-48 years). Most of the patients were also diagnosed at a later stage (38.46%). A total of 11 (84.62%) patients underwent surgery, of which radical orchiectomy was the most common (69.23%).

Penile cancer proved to be one of the rarer types, comprising only 2.47% of the study population. The median age at diagnosis is 51 years with a wide range of 29-68 years. The most common location of the tumor is the glans penis (66.67%), with most of the patients diagnosed at an earlier stage (66.67%). Five (83.33%) patients underwent partial penectomy.

Rarer still are cancers with multiple primaries, which only comprised 1.23% of the study population. The median age at diagnosis was older at 69 years (range 63-74 years). Interestingly, all patients had both bladder and prostate cancer, with papillary urothelial carcinoma and acinar adenocarcinoma as histologic subtypes, respectively. Staging was varied with all three patients diagnosed with both primaries at different stages.

All patients underwent surgery, either radical cystectomy or transurethral resection of the bladder tumor. This type of cancer showed a high proportion of disease progression, with 2 out of 3 patients (66.67%) noted to have tumor recurrence.

Table 3 shows the disease characteristics of patients with urologic cancers which can affect both males and females, including kidney, bladder and upper tract urothelial cancers. It shows the percentage of those diagnosed with the specific cancers, the most common histologic subtypes, laterality, staging details, treatments received and patient response, as well as disease outcomes.

Kidney cancer is the second most commonly diagnosed type of cancer among the study population, comprising mostly males (69.86%), with the median age at diagnosis at 56 years (range 1-78 years). The most common histologic subtype is clear cell renal cell carcinoma (68.49%), and all the patients had unilateral disease, with more than half of them developing cancer in the left kidney (57.53%). Most of the patients were diagnosed at an early stage (36.99%). A total of 68 (93.15%) patients underwent surgery, of which radical nephrectomy was the most common.

Bladder cancer is mostly noted among males (66.67%), with the median age at diagnosis at 62.5 years (range 30-87 years). The most common histologic subtype is urothelial cancer (68.33%), and most of the patients were diagnosed at an early stage (60.00%). A total of 17 (28.33%) patients underwent muscle-invasive therapy.

Upper urothelial cancer patients were mostly female (75.00%), with the median age at diagnosis

Table 3. Disease characteristics of patients with urologic cancers affecting both sexes.

Characteristic	Kidney	Bladder	Upper Tract Urothelial
Count	73 (30.04%)	60 (24.69%)	4 (1.65%)
Sex			
Male	51 (69.86%)	40 (66.67%)	1 (25.00%)
Female	22 (30.14%)	20 (33.33%)	3 (75.00%)
Histologic Subtype	Clear cell renal cell carcinoma – 50 (68.49%) Papillary renal cell carcinoma – 4 (5.48%) Chromophobe renal cell carcinoma – 3 (4.11%)	Urothelial cancer – 41 (68.33%) Adenocarcinoma – 8 (13.33%) Squamous cell carcinoma – 2 (3.33%)	Urothelial cancer – 4 (100.00%)
Laterality			
Left	42 (57.53%)	-	3 (75.00%)
Right	31 (42.47%)	-	1 (25.00%)
Bilateral	0 (0.00%)	-	0 (0.00%)
No data	0 (0.00%)	-	0 (0.00%)
TNM Staging Clinical			
Stage 0	-	4 (6.67%)	-
Stage I	27 (36.99%)	14 (23.33%)	1 (25.00%)
Stage II	16 (21.92%)	18 (30.00%)	1 (25.00%)
Stage III	17 (23.29%)	5 (8.33%)	2 (50.00%)
Stage IV	8 (10.96%)	8 (13.33%)	0 (0.00%)
No data	5 (6.85%)	11 (18.33%)	0 (0.00%)
TNM Staging Pathologic			
Stage 0	-	4 (6.67%)	-
Stage I	30 (41.09%)	11 (18.33%)	0 (0.00%)
Stage II	9 (12.33%)	14 (23.33%)	1 (25.00%)
Stage III	24 (32.88%)	5 (8.33%)	3 (75.00%)
Stage IV	5 (6.85%)	11 (18.33%)	0 (0.00%)
No data	5 (6.85%)	15 (25.00%)	0 (0.00%)
Treatment Received			
Surgery	71 (97.26%)	17 (28.33%)*	4 (100.00%)
Chemotherapy	5 (6.85%)	13 (21.67%)	0 (0.00%)
Radiotherapy	0 (0.00%)	2 (3.33%)	0 (0.00%)
Treatment Response			
Progressive Disease/Tumor Recurrence	2 (2.74%)	6 (10.00%)	-
No data	-	-	-
Outcome			
Alive	3 (4.11%)	8 (13.33%)	0 (0.00%)
Dead	4 (5.48%)	3 (5.00%)	0 (0.00%)
Lost to Follow-Up	66 (90.41%)	49 (81.67%)	4 (100.00%)

**Muscle-invasive therapy*

at 64 years (range 59-74 years). Most of the patients had advanced disease (75.00%), and all four patients underwent surgery, either radical nephrectomy or radical nephroureterectomy. Unfortunately, all four patients were lost to follow-up so the study was unable to elucidate their outcomes.

Discussion

Key findings show that urologic cancer incidence in the Philippines follows worldwide trends with prostate, kidney and bladder cancers as the top 3 most common types. Although other types are relatively rarer, proper attention should still be given to these types, especially testicular cancer that has the youngest median age of 33 years. On the other hand, multiple primaries (comprising of bladder and prostate cancer) have the oldest median age of 69 years. It should be noted that most patients with bladder, prostate, and kidney cancer are older adults, while testicular cancer affects much younger males.

Additionally, among urologic cancers that affect both men and women, bladder and kidney cancers are significantly more common in men, accounting for about 65–70% of cases. In contrast, upper urothelial cancer predominantly affects women, making up approximately 75% of cases.

Certain malignancies tended to be diagnosed at advanced stages. For example, around 27% of prostate cancer cases were clinically identified at stage IVB, while more than half of the upper urothelial cancer cases presented at stage III. These findings highlight the need for improved screening and surveillance strategies for these types of cancer.

A significant limitation of the study is the high rate of patients lost to follow-up across all groups, exceeding 75% of the population. This greatly hinders the ability to assess outcomes and plan for long-term care. Among the cases with available data, bladder and penile cancers had the highest proportion of surviving patients, while testicular cancer showed the highest recorded mortality rate. This could reflect late presentation, aggressive disease or data limitations. Prostate and kidney cancers had relatively low death rates (less than 10% each) and moderate survival, though interpretation remains limited by incomplete follow-up. Notably, all patients with upper urothelial cancer were lost to follow-up, preventing any assessment of outcomes for this group. These findings emphasize the need for improved patient tracking to enable more accurate survival analysis.

Despite this, the available data suggest low rates of disease progression or recurrence overall. Bladder cancer showed the highest recurrence rate at 10%, while prostate, kidney and penile cancers had relatively low recurrence rates of approximately 2–3%.

Benefits of Patient Registries

Registries are essential tools in epidemiologic research. In fact, the number of registry-based publications has grown significantly in the last five years. This rise is likely due to both the growing number of registries and an improved understanding of their value, as evidenced by their increasing presence in major publications.[14] Registry data provide important insights into real-world health issues by offering information on incidence, prevalence, outcomes, prognostic factors, confounding variables and other clinically relevant factors. As such, registry data can help streamline focus of clinical guidelines and health policies.

One of the greatest advantages of registries is their ability to include and track large numbers of patients, making them especially effective for observational research. This stands in contrast to randomized controlled trials (RCTs), which often struggle with small sample sizes and require years of multi-center recruitment to gather enough participants. Another key benefit of registries is their cost-effectiveness. Registry-based data collection is significantly less expensive than conducting clinical trials, particularly in the case of rare cancers, where multiple sites are needed to recruit only a few patients at each location to achieve an adequate sample size.

Registries are valuable tools for quality improvement, offering feedback and benchmarking to clinicians, hospitals and healthcare organizations. This urologic cancer registry can play a key role in identifying gaps in patient care, guiding public health priorities, and serving as a rich resource for further research. Ultimately, it offers long-term value by contributing to improved care and

outcomes for patients with urologic cancers. Patient registries have been particularly successful in managing urologic cancers like prostate cancer and are capable of monitoring outcomes across large patient populations.[15]

Limitations

By the end of the study period, a total of 243 patients were enrolled, which is notably lower than the 1,108 cases of prostate and other urogenital cancers reported by the 27 contributing hospitals of the Cancer CARE Registry and Research Philippines Hospital-Based Cancer Registry (CARE PH HBCR) in its 2023 Annual Report.[17] It's important to consider that the COVID-19 pandemic was still ongoing during this time, which may have affected patients' health-seeking behaviors and contributed to the lower enrollment numbers. There was also a high rate of patients lost to follow-up which limited the understanding of outcomes.

The quality of a registry depends heavily on the accuracy and consistency of the data entered. Ideally, data should be collected by specially-trained professionals, as variation in the experience or background of data collectors can introduce bias into the dataset. Incomplete data is a widespread challenge regardless of the collection method, and poor follow-up or documentation can result in missing key events or outcomes—such as adverse events—which are then excluded from analysis. Additionally, data in registries are often collected opportunistically during healthcare interactions, not on a pre-determined schedule like in a randomized controlled trial (RCT). Crucial data on important outcomes may be missed or not recorded.

Future Directions

To maximize the impact of this disease registry, several key enhancements are necessary. Foremost is the improvement of follow-up tracking systems as the high rates of patients lost to follow-up poses a major barrier to accurate survival analysis and effective long-term care planning. Standardization of documentation is also critical as this ensures consistent recording of staging and treatment details, especially in prostate cancer, where nearly 50% of cases lacked risk stratification data. Developing integrated care pathways is essential to support coordinated management strategies, including surgical and chemotherapeutic interventions particularly for prostate and bladder cancers. Additionally, implementing robust protocols for tracking recurrence is vital.

Taken together, these improvements will enhance the registry's effectiveness and contribute to more informed care strategies and improved outcomes for patients with urologic cancers.

Conclusion

This urologic cancer registry represents the first multi-center, investigator-initiated epidemiologic study of its kind in the Philippines. As a proof-of-concept (POC) project, it demonstrates the feasibility of establishing a national database capturing baseline data on the country's most common urologic malignancies.

Building and maintaining a disease-specific registry remains a significant challenge for healthcare professionals and researchers. This current study's team faced similar obstacles in launching this pioneering effort. The study revealed critical gaps in patient care, particularly in the documentation of staging, treatment and follow-up—a reflection of the real-world limitations in current clinical practice.

Moving forward, the next phase involves leveraging advances in information technology to integrate cancer registries with hospital electronic medical records (EMRs). This sets the stage for applying data science and artificial intelligence (AI) to enhance early and accurate diagnosis, improve survival rates, and elevate the quality of life for patients with these cancers.

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