Original Article

Reimbursements and frequency of tests in privately insured testicular cancer patients in the United States: Implications to national guidelines

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Abstract

Objectives: The objective of this study was to assess the frequency of utilization and reimbursement of the common diagnostic tests and treatment modalities used in testicular cancer care.

Methods: LifeLink™ (IMS Health, Danbury, CT, USA) Claims Database was used. We identified 877 subjects with a primary diagnosis of testicular cancer (ICD 186.9) between 2007 and 2012. Median reimbursement and frequency of the diagnostic/treatment modalities used were recorded.

Results: The most common claim was a vein puncture with median reimbursement of $9.11. Tumor markers, alpha-fetoprotein and beta human chorionic gonadotropin, were ranked 6th and 7th with median reimbursement of $52.13 and $48.71, respectively. Chest X-ray and computerized tomography (CT) scan of the chest were ranked 9th and 13th with median reimbursement of $68.51 and $769, respectively. A contrast CT scan of abdomen and pelvis was the 11th most frequent claim with median reimbursement of $855.89. The three invasive treatment modalities, chemotherapy, radiation therapy, and retroperitoneal lymphadenectomy were ranked 8th, 15th, and 164th with median reimbursement of $2858.38, $3988.25, and $2009.67, respectively.

Conclusions: Testicular cancer is not an inexpensive disease. Surgery is the less utilized than radiation and chemotherapy despite lower cost. This may have implications to national guidelines and training since these treatments often carry the same grade of recommendation.

Key Words: Cancer, cost, guidelines, reimbursement, testicular

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INTRODUCTION

Testicular cancer is the second most common cancer to affect young males in the United States. It is estimated that in the year 2016, 8720 new testicular cancer patients will be diagnosed and it will claim the life of 380 Americans, mostly of the

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young age group. Testicular cancer is a highly curable cancer. If diagnosed early, the 5-year survival rate is 99.3% but drops to 73.9% in the presence of metastasis.[1]

Over the past five decades, the management of testicular cancer has undergone significant changes. With the introduction of cisplatin-based chemotherapy in the management of testicular cancer, significant improvement in survival was achieved.[2,3] In terms of potential years of life lost to genitourinary cancers, it ranks as number one.[4] Similarly, once considered a highly morbid procedure, retroperitoneal lymph node dissection (RPLND), is now done with a significant reduction in the morbidity when performed in high volume tertiary referral centers.[5] Similarly, large randomized trials showed that modern radiation therapy in Stage I seminoma with the limitation of radiation to the para-aortic area and dose reduction to 20 Gy resulted in acceptable recurrence rates and simultaneous reduction in radiation-induced toxicity.[6,7]

Testicular cancer, particularly in the early stages, can be well treated by several treatment modalities. For Stage I seminoma, patients can be treated by surveillance, radiation therapy, or 1–2 cycles of carboplatin. For Stage II seminoma, radiation therapy and/or cisplatin-based chemotherapy are viable options. For Stage I nonseminoma germ cell tumor (NSGCT), surveillance, RPLND, or chemotherapy can equally treat the tumor. For Stage II NSGCT, RPLND and/or chemotherapy are also acceptable treatments.[8,9] There is evidence derived from the Surveillance Epidemiology and End Results database that in recent years, men with testicular cancer are more likely to present with localized germ cell tumor (GCT).[10] Similarly, more men with less advanced metastatic GCT are currently treated at the Memorial Sloan Kettering Cancer Center (MSKCC).[11]

In recent years, the health system in the United States has undergone significant changes and is geared toward providing quality service in an economic fashion. In a financially conscious health system, treatment modalities with equal outcomes may be selected with the cost playing an important role in the decision making. It may also help in constructing or updating cancer guidelines.

In this report, we assess the median reimbursement and frequency of utilization of the various diagnostic tests and the reimbursement of the various treatment modalities used in treating testicular cancer using a national private insurance database, LifeLink™. We sought to explore the current practice regarding testicular cancer management with a focus on the cost of testicular cancer management. Furthermore, the frequency of tests ordered may give an idea on adherence to the current practice guidelines.

METHODS

Data source

LifeLink™ (IMS Health, Danbury, CT, USA) Health Plan Claims Database is the largest and most comprehensive database of integrated medical claims in the United States. It is paid claims data, which by definition is information collected by the medical plans from medical service providers to facilitate the adjudication and payment of health insurance benefits on behalf of the plan's enrolled members. It has over 61 million unique patients' claims, both medical and pharmaceutical, from over 98 health plans across the US (approximately 16 million covered lives per year). Records in the LifeLink™ Health Plan Claims Database are generally representative of the national, commercially insured population in terms of age and gender.[12]

To assess the median reimbursement of treating testicular cancer as the well as the median frequency of each diagnostic test used in testicular cancer patients, we identified subjects with a primary diagnosis of testicular cancer (ICD 186.9). Subjects needed to have continuous medical insurance for a continuous 6 months before and 12 months after index diagnosis of testicular cancer. We identified a total of 877 patients with index diagnosis of testicular cancer included in the database between the years 2007 and 2012. We added all the financial claims for these subjects and then restratified them per enrollee claim observation with a primary diagnosis of testicular cancer (ICD-9, 186.9). We identified the median pay/claim with the minimum and maximum pay during the same period. Unpaid claims were not included in the reimbursement analysis. The LifeLink™ database has claim information on both the allowed and the actual paid amount of money by insurers. We included the actual paid amount in our analysis. A list of the most frequent 200 claims was generated. The median reimbursements of inpatient, outpatient were assessed as well. These were divided to ancillary (nonphysician/nonfacility charges) and nonancillary. Nonancillary included the following claims record types: Facility (F), Facility claim cost adjustments (J), Management (M), Pharmaceutical (P), and Surgical (S) in the LifeLink™ database. Nonancillary charges comprised mainly supplies costs. Retail pharmacy costs were included as well. There are no ancillary charges for retail pharmacy costs.

This retrospective study was conducted after granting an exemption from review by the Institutional Review Board of our university since no patient, physician, or hospital identifiers were examined in the study. This study was supported by the Translational Research Institute, grant UL1TR000039 through the NIH National Center for Research Resources and National Center for Advancing Translational Sciences.

RESULTS

Frequency data

Frequency of tests

The frequency of valid claims for the various diagnostic tests is summarized in Table 1.

Frequency of treatment

Of the 3 common invasive treatments postorchiectomy (chemotherapy/radiation/RPLND), only chemotherapy (1 h infusion CPT 96413) was in the top 10 most common procedures performed for testicular cancer (ranked 8th). Radiation treatment delivery (CPT 77414) was ranked 15th. Performing an RPLND (CPT 38780) was not from the top 50 tests/procedures frequently claimed in testicular cancer patients (ranked 164th).

Chemotherapy

The frequency of the common procedures codes used during chemotherapy treatment which were in the top 50 claimed codes in testicular cancer patients was: Chemotherapy infusion for 1 h (ranked 8th/procedure frequency 1598), chemotherapy infusion each added hour-sequential (ranked 11th/procedure frequency 1125), administration of nonchemotherapy drug during chemotherapy (as intravenous antibiotics, ondansetron, vaccines, B12 injections) (ranked 16th/procedure frequency 724), chemotherapy infusion each added hour-nonsequential (ranked 19th with procedure frequency 629), and intravenous hydration (ranked 25th/procedure frequency 480).

Radiation therapy

The frequency of the common procedures codes used during radiation therapy treatment was: radiation treatment delivery (11–19 Gy) (ranked 15th/procedure frequency 781), radiation treatment management-5 treatments (office visits every 5 radiation treatments) (ranked 36th/procedure frequency 390), and radiation treatment delivery (6–10 Gy) (ranked 46th/procedure frequency 322).

Retroperitoneal lymph node dissection

RPLND was not found in the top 50 claimed procedure codes and was ranked 165th with procedure frequency of 31. We could not find related codes to RPLND in the top 50 claimed codes as well.

Reimbursement data

Reimbursement for tests

The median reimbursement for the common diagnostic tests and treatments used in testicular cancer is illustrated in Table 1. The median reimbursement for a computerized tomography (CT) chest was significantly higher compared to a chest X-ray (CXR) $769.76 versus $68.51. The median reimbursement for ordering combined CT abdomen and pelvis with contrast was less than ordering a CT abdomen with contrast alone ($855.89 vs. $862.81), respectively.

Reimbursement for treatments

Of the three common treatment modalities used for testicular cancer, the median reimbursement was highest for radiation therapy followed chemotherapy and with the least reimbursement was for RPLND.

Chemotherapy

There were several reimbursed codes related to chemotherapy administration in the top 50 most claimed codes. These included chemotherapy infusion 1 h, chemotherapy infusion each added hour-sequential, administration of nonchemotherapy drug during chemotherapy, chemotherapy infusion each added

Table 1: Frequency of tests/treatments claimed and reimbursement

Procedure code CPT4	Procedure code frequency	Median	Min	Max
(A) Top 10 most common claims				
1-36415 - Venpnctr FNGR/HEEL/EAR stick routne	3401	$9.11	$0.00	$3,295.51
2-99213 - Office/outpatient visit EST MOD	2838	$133.00	$0.00	$3,153.22
3-85025 - Automated hemogram (CBC)	2762	$32.54	$0.00	$2,046.72
4-99214 - Office/outpatient visit EST MOD	2384	$200.78	$0.00	$4,559.90
5-80053 - Metabolic panel comprehensive	2016	$31.90	$0.00	$3,682.93
6-82105 - Alpha-fetoprotein serum	1730	$52.13	$0.00	$1,341.00
7-84702 - Chorionic gonadotropin test	1671	$48.71	$0.00	$1,259.59
8-96413 - Chemo IV infuse 1 HR	1598	$2,858.38	$0.00	$13,721.98
9-71020 - Chest X-ray two views	1361	$68.51	$0.00	$2,054.34
10-83615 - UV-Assay blood LDH enzyme	1323	$21.12	$0.00	$938.14
(B) Other claims				
1-72193-Contrast CT scan of the pelvis	1014	$781.20	$0.00	$6,784.00
†2-71260 - Contrast cat scan of chest	998	$769.76	$0.00	$7,488.18
3-74160 Contrast CT scan of the abdomen	916	$862.81	$0.00	$7,002.00
¶4-77414 - Radiation treatment delivery	781	$3,988.25	$0.00	$12,660.84
5-74177 - CT abdomen and pelvis W/Contrast	410	$855.89	$0.00	$10,140.69
6-76870 - Ultrasound scrotum and contents	297	$120.00	$0.00	$940.12
*7-38780 - Retroperitonea lymphadenectomy	31	$2,009.67	$187.44	$10,378.57

†Ranked 13th, ¶Ranked 15th, *Ranked 164th in order of frequency for claimed CPT code

hour-nonsequential, and intravenous hydration. The median reimbursements for these codes were $2858.38, $1368.08, $415.26, $489.47, and $416.28, respectively. Collectively, if all these codes were used for the same patient, the median reimbursement is $5547.47.

Radiation therapy

The median reimbursement for the radiation therapy-related codes that made it to the top 50 claimed codes were radiation treatment delivery (11–19 Gy), radiation treatment management-5 treatments, and radiation treatment delivery (6–10 Gy) was $3988.25, $816.24, and 4186.61, respectively.

Retroperitoneal lymph node dissection

The median reimbursement for an RPLND was $2009.67. We did not find more reimbursable codes that could be related to RPLND in the top 50 most claimed codes. With further examination of the LifeLink™ Database, interestingly, we found that reimbursement for an inguinal (radical) orchiectomy was close to RPLND with a median of $1569.20.

Ancillary/Nonancillary and retail pharmacy charges

Details of these charges are illustrated in Table 2. As described in the methods section, nonancillary charges will mainly summon the facility charges for example charges related to supplies in the clinics, operating rooms, and chemotherapy infusion centers. Ancillary-related charges will include charges that are nonfacility and nonphysician providers related, for example, charges incurred using ambulance services. Retail pharmacy charges will only be "nonancillary."

DISCUSSION

Financial costs of cancer are high for the individual and the society as a whole. The American Cancer Society estimated 88.7 billion$ in direct medical costs related to cancer treatment in 2011.[13]

A recent Internet-based survey showed that 19% and 4% of cancer patients paid annual out of pocket expenses of $10,000 and $50,000, respectively, for treating their cancers. Further 25% of the low-income patients (<40,000$) declined to receive the recommended treatment due to being expensive.[14] Testicular cancer is a disease mainly affecting young males, many of whom are uninsured.[15] This points to the importance of adopting a cost consciousness strategy in managing these patients.

Table 2: Median pay for inpatient/outpatient and retail pharmacy claims

Paid amount		Median	Min	Max
Claims data type	Record type			
Inpatient medical	Ancillary	$9,511.05	$0.00	$262,768.04
	Non-ancillary	$8,911.02	$442.00	$313,673.16
Outpatient medical	Ancillary	$4,131.10	$0.00	$170,310.98
	Non-ancillary	$1,273.54	$0.00	$463,855.57
Retail pharmacy	Non-ancillary	$268.79	$0.00	$42,987.11

There are several cancer management guidelines that incorporate cost consideration in decision-making. The American Society of Clinical Oncology (ASCO) recently issued the "ASCO value framework" that proposes a methodology to compare the relative clinical benefits, side effects, and costs of the different treatment regimens. Combining these data results in "Net Health Benefit" (NHB). The NHB represents the added benefits patients would expect from different treatments that are compared in head to head trials.[16] Both the NCCN and the MSKCC are creating similar tools.[17,18]

The results of the frequency of tests used for imaging patients with testicular cancers are sobering. We noted that the frequency of ordering CT chest is close to CXR (the procedure frequency was 998 vs. 1361). The median reimbursement for a CXR was only $68.51 compared to $769.76 for a CT chest. We reviewed the current NCCN guidelines, and CXR is the preferred chest imaging in patients with suspicious testicular mass and with CT chest indicated for patients with positive abdominal CT or abnormal CXR. Similarly, CXR is the preferred follow-up investigation unless the patient has thoracic symptoms.[8] Along the same line of thought, patients with early stage testicular cancer are properly staged at the time of diagnosis, pelvic CT scan may be eliminated during follow-up with further reduction in the cost of treating testicular cancer.[8,9] Furthermore, a group of experts proposed a total of 5 CT scans over 3–5 years in patients with Stage I testicular cancer with the potential of eliminating chest and pelvic imaging and the use of less expensive modalities as abdominal ultrasound.[19]

Our frequency results for valid claims for testicular cancer tumor markers (alpha-fetoprotein/beta human chorionic gonadotropin/lactate dehydrogenase) showed that the frequency of these tests is less than expected. Usually, patients are followed up with tumor markers at a frequency ranging from twice up to 6 times/year, in most guidelines depending on type, stage, and treatment administered.[8,9] A possible explanation to these findings is that currently in the US, Stage I testicular cancer represents 75% of newly diagnosed patients, especially with seminoma as the most common diagnosed testicular cancer.[20]

Our reimbursement data results showed that of the three treatment modalities radiation, chemotherapy, and surgery, the highest reimbursement was for radiation therapy ($3988.25 vs. $2858.38 and $2009.67, respectively). Radiation therapy is an appropriate treatment for Stage I and non-Bulky Stage II seminoma.[19] However, we must consider these data

with these findings may be impacted by the change in practice patterns with more prevalence of active surveillance for Stage I seminoma.[21] The oncological outcome of active surveillance and single agent carboplatin for Stage I seminoma is found to be comparable to radiation therapy. Similarly, relapses that occurred during active surveillance were successfully managed by radiation therapy/chemotherapy and without compromise in overall patient survival.[22] Furthermore, in addition to cost consciousness when making a treatment decision, the potential late toxicity, most notably the possible induction of secondary nongerm cell cancer related to radiation.[23]

Chemotherapy was the second highest reimbursed of the three active treatment modalities used to treat testicular cancer and was associated with several reimbursement codes ($2858.38). There is no doubt that cisplatin-based chemotherapy has changed testicular cancer management to the better forever. It is the preferred treatment for patients with NSGCT with bulky retroperitoneal adenopathy, metastatic disease and has proven effective in early stages of both seminoma and NSGCT.[8] However, chemotherapy will not treat retroperitoneal teratoma, needs long-term follow-up CT scans and potential late toxicities as cardiovascular and secondary late malignancy among others.[24] Another consideration with chemotherapy is the young age of the affected patients and the desire to preserve fertility. In one study, 30% of testicular cancer patients elected for sperm banking before initiation of chemotherapy.[25] The estimated cost for sperm banking in the United States is variable but in the range of $1000 initial fee and with yearly storage fees of $300–500.[26]

The least reimbursed of the three examined treatment modalities was retroperitoneal lymph node dissection ($2009.67). It was also the least frequently used treatment modality with a procedure frequency of 31. RPLND continues to be a challenging surgical procedure, especially in the postchemotherapy setting. The complication rate for primary RPLND is reported to be 8% compared to 18% in the postchemotherapy setting.[27,28] There is evidence of reduced exposure of urology residents to that particular type of surgery.[29] Furthermore, there is widespread use of surveillance or chemotherapy for Stage I NSGCT.[19] We also noticed that the median reimbursement for this technically challenging surgery, always an inpatient surgery, was close to less technically demanding procedure, usually an outpatient procedure, radical orchiectomy (median reimbursement $2009.67 vs. $1569.20, respectively). Similarly, there were no reimbursable codes related to RPLND in the top 50 claimed codes, likely cause is the 90 days postoperative global period where most submitted codes are not reimbursed by insurers. All these factors may have contributed to the lower frequency of performing RPLND in testicular cancer patients with the urologist performing the radical orchiectomy then referring the patient to medical or radiation oncology. Nevertheless, in high volume centers, bilateral template nerve sparing RPLND is associated with lower perioperative complications and better antegrade ejaculation rates.[30] Furthermore, RPLND is associated with <2% recurrence in the retroperitoneum and less intense follow-up protocols compared to surveillance, radiation, and chemotherapy.[8] This results in less expensive but adequate follow-up for testicular cancer patients.

We acknowledge a limitation to our research is that we were unable to assess the potential reimbursements for urologists treating their patients with active surveillance. Partially mitigating this limitation is that adjuvant treatments in the form of radiation therapy/chemotherapy and surgery are very popular. The frequency and reimbursement costs for the various laboratory/imaging tests and ancillary/nonancillary charges provided in our report may serve as a guide of the costs involved in managing a testicular cancer patient on active surveillance.

CONCLUSION

Testicular cancer is not an inexpensive cancer to treat. There is variation in practice patterns than what would be expected if national guidelines in treating testicular cancer were followed. Furthermore, there is a significant difference in costs of radiation, chemotherapy, and surgery for testicular cancer though all may carry the same grade of recommendation within the same stage of the disease. These findings combined with the initiative of the ASCO of the "NHB" we believe should be considered when deciding a treatment option for testicular cancer. Furthermore, referring testicular cancer patients who need RPLND to high volume centers performing this procedure may help reduce the cost. A focus on graduating urologists, specifically trained in performing RPLND, is useful. A proposal for better reimbursement to a technically demanding procedure as RPLND by private insurers should be considered given the current low reimbursement, effectiveness of the procedure in cancer control, and the less costly follow-up it is associated with.

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Conflicts of interest
There are no conflicts of interest.

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