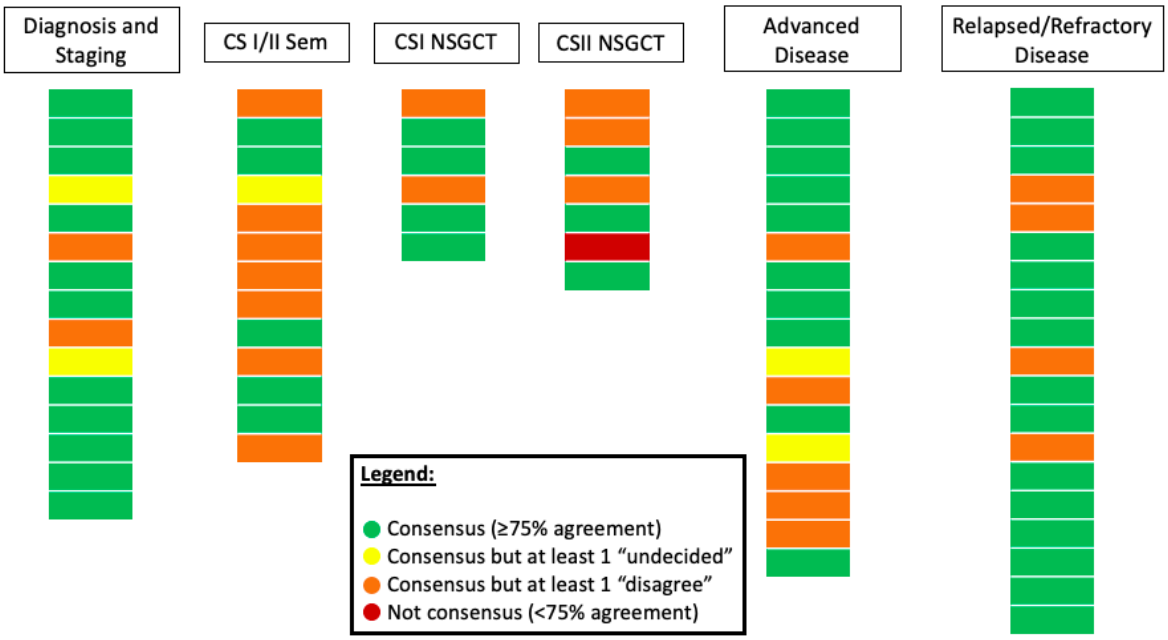
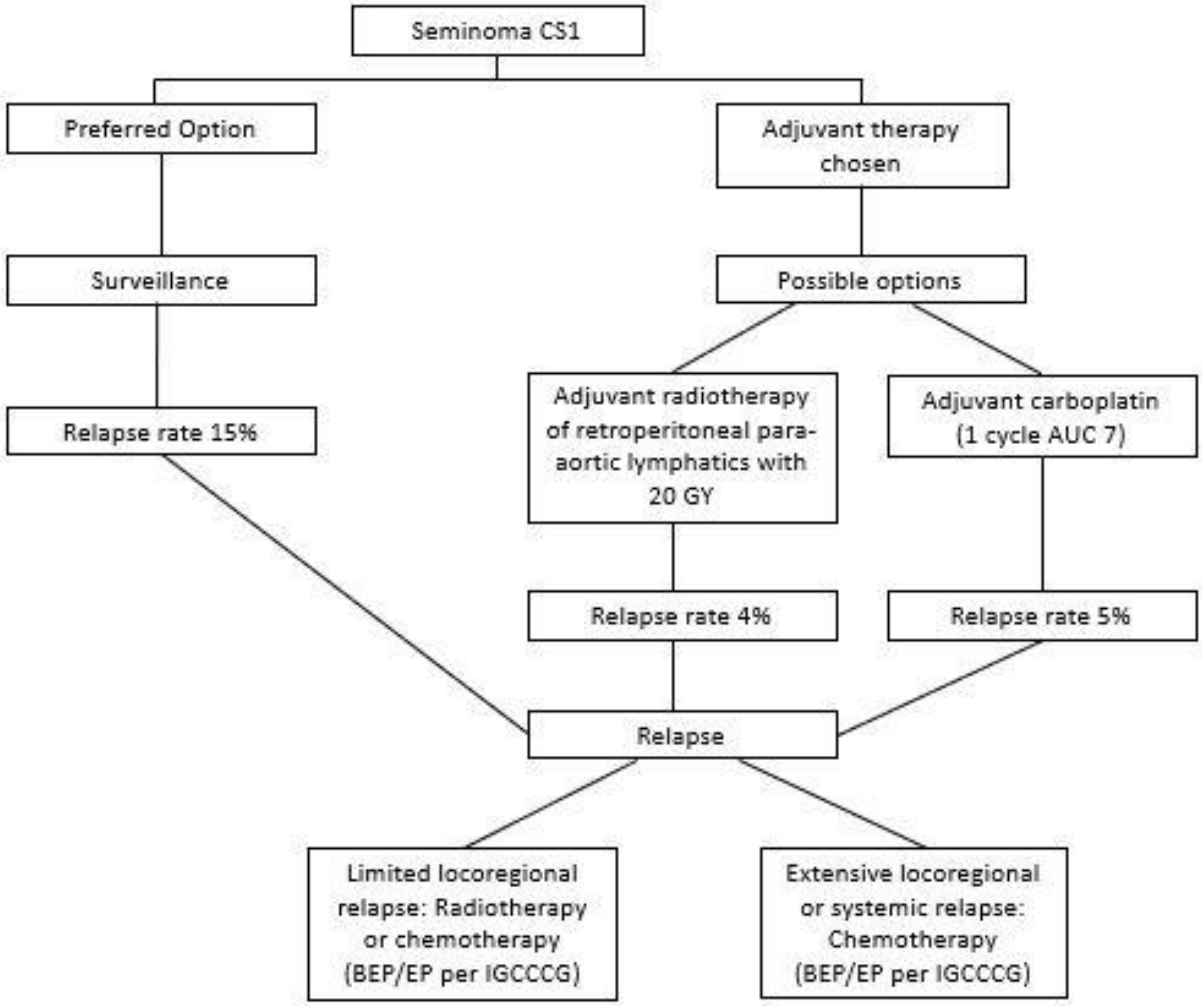
APPENDIX

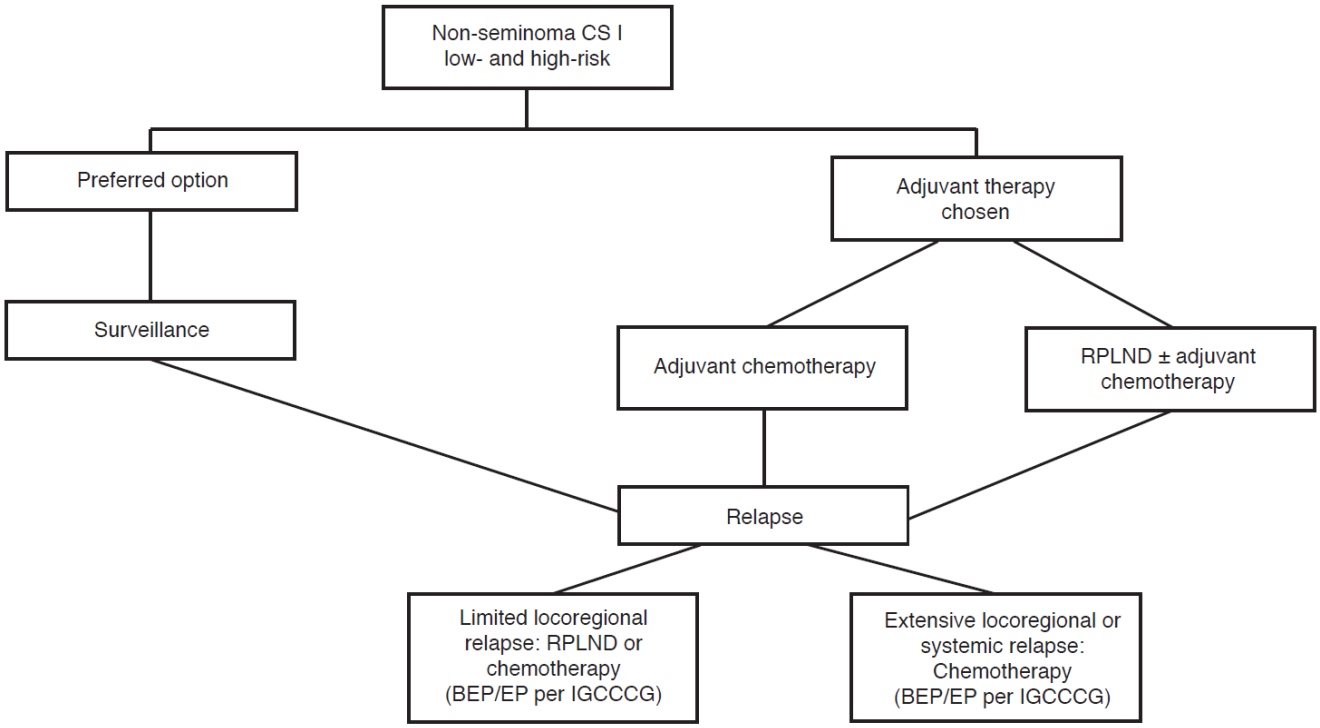
Supplementary Figure 1. Overview of initial survey results for each stage-specific topic.



Supplementary Figure 2. Schema for the management of stage I seminoma (CS1). BEP: bleomycin, etoposide, cisplatin; IGCCC: International Germ Cell Cancer Collaborative Group.



Supplementary Figure 3. Schema for the management of stage I non-seminoma (CS1). IGCCC: International Germ Cell Cancer Collaborative Group; RPLND: retroperitoneal lymph node dissection.



Supplementary Table 1. Staging of testis tumors: UICC/American Joint Committee on Cancer (8th edition)[1]		
TNM staging	**Unit**	**Value**
Primary tumor (pT)	pTX	Primary tumor cannot be assessed
	pT0	No evidence of primary tumor
	pTis	Germ cell neoplasia in situ
	pT1	Tumor limited to testis (including rete testis invasion) without lymphovascular invasion
	pT1a	Tumor smaller than 3 cm in size[#]
	pT1b	Tumor 3 cm or larger in size[#]
	pT2	Tumor limited to the testis (including rete testis invasion) with lymphovascular invasion OR Tumor invading hilar soft tissue or epididymis or penetrating visceral

		mesothelial layer covering the external surface of tunica albuginea with or without lymphovascular invasion		
	pT3	Tumor directly invades spermatic cord soft tissue with or without lymphovascular invasion		
	pT4	Tumor invades scrotum with or without lymphovascular invasion		
Regional lymph nodes (pN and cN)	NX	Regional lymph node cannot be assessed		
	pN0	No regional lymph node metastasis	cN0	No regional lymph node metastasis
	pN1	Metastasis with a lymph node mass 2 cm or smaller in greatest dimension and less than or equal to five nodes positive, none larger than 2 cm in greatest dimension	cN1	Metastasis with a lymph node mass ≤2 cm in greatest dimension OR multiple lymph nodes, none >2 cm in greatest dimension
	pN2	Metastasis with a lymph node mass larger than 2 cm but not larger than 5 cm in greatest dimension; or more than five nodes positive, none larger than 5 cm; or evidence of extranodal extension of tumor	cN2	Metastasis with a lymph node mass >2 cm but ≤5 cm in greatest dimension OR multiple lymph nodes, any one mass >2 cm but ≤5 cm in greatest dimension
	pN3	Metastasis with a lymph node mass larger than 5 cm in greatest dimension	cN3	Metastasis with a lymph node mass >5 cm in greatest dimension
Distant metastasis (M)	M1	Distant metastasis		
	M1a	Non-retroperitoneal nodal or pulmonary metastases		
	M1b	Non-pulmonary visceral metastases		
Serum tumor markers (S)	SX	Serum marker studies not available or performed		
	S0	Marker study levels within normal limits		
	S1	LDH <1.5 × normal and HCG (IU/L) <5000 and AFP (ug/L) <1000		

	S2	LDH 1.5–10 × normal or HCG (IU/L) 5000–50 000 or AFP (ug/L) 1000–10 000		
	S3	LDH >10 × normal or HCG (IU/L) >50 000 or AFP (ug/L) >10 000		
Stage grouping				
Stage	**Tumor**	**Node**	**Metastasis**	**Serum factor**
0	pTis	N0	M0	S0
I	pT1-4	N0	M0	SX
IA	pT1	N0	M0	S0
IB	pT2	N0	M0	S0
	pT3		M0	S0
	pT4		M0	S0
IS	Any T	N0	M0	S1-3
II	Any T	N1-3	M0	SX
IIA	Any T	N1	M0	S0
	Any T	N1	M0	S1
IIB	Any T	N2	M0	S0
	Any T	N2	M0	S1
IIC	Any T	N3	M0	S0
	Any T	N3	M0	S1
III	Any T	Any N	M1	SX
IIIA	Any T	Any N	M1a	S0
	Any T	Any N	M1a	S1
IIIB	Any T	N1-3	M0	S2
	Any T	Any N	M1a	S2
IIIC	Any T	N1-3	M0	S3
	Any T	Any N	M1a	S3
	Any T	Any N	M1b	Any S

[#]Subclassification of pT1 applies only to pure seminoma. AFP: alpha-fetoprotein; HCG: human chorionic gonadotrophin; LDH: lactate dehydrogenase.

Supplementary Table 2. Summary of surveillance studies in stage I seminoma						
Author	**Year**	**Median followup (months)**	**No. patients**	**No. patients relapse**	**Relapse %**	**Cause-specific survival %**
Ramakrishnan[2]	1992	44	72	13	18	100
Von der Maase[3]	1993	48	261	49	18.8	98.9
Warde[4]	2005	98	421	64	15.2	99.7
Tyldesley[5]	2006	33	93	16	17.2	97.8
Tandstad[6]	2011	62	512	65	12.7	99.8
Mortensen[7]	2014	181	1954	369	18.9	99.3
Aparicio[8]	2014	80	744	63	11.1	100
Chung[9]	2014	46	685	88	12.8	99
Kollmannsberge[10]	2015	52	1344	173	13	99.9

Supplementary Table 3. Adjuvant radiation therapy studies in stage I seminoma				
Author	**Years of study**	**No. patients**	**Relapse %**	**Cause-specific survival %**
Fosså[11]	1989–1993	478	3.8	100
Jones[12]	1995–1998	625	3.5	99.6
Santoni[13]	1970–1999	487	4.3	99.4
Oliver[14]	1996–2001	904	4.0	99.9
Tandstad[6]	2000–2006	481	0.8	99
Soper[15]	1990–2010	329	2.8	99.3
Hosni[16]	1981–2011	294	5.0	100

Supplementary Table 4. Summary of surveillance studies in stage I non-seminoma						
Author (publication year) ***Site***	**Years of study**	**No. patients**	**Median followup (months)**	**Relapses n (%)**	**Deaths n (%)**	**DSS %**
Divrik (2006)[17] *Turkey*	1993–2005	211	75	66 (31)	5 (2)	98
Daugaard (2003)[18] *Denmark*	1984–2001	301	60	86 (29)	0 (0)	99
Roeleveld (2001)[19] *Netherlands*	1982–1994	90	97	23 (26)	1 (1)	99
Alexandre (2001)[20] *France*	1984–1996	88	52	24 (27)	1 (1)	98
Francis (2000)[21] *United Kingdom*	1979–1996	183	70	52 (28)	2 (1)	99
Sogani (1998)[22] *Memorial Sloan-Kettering Cancer Center, NY*	1979–1987	105	136	27 (26)	3 (3)	97
Colls (1999)[23] *New Zealand*	1980–1997	248	53	70 (28)	4 (2)	98
Hao (1998)[24] *Tom Baker Cancer Centre, Calgary*	1980–1994	76	49	28 (37)	2 (3)	97
Boyer (1997)[25] *Australia*	1982–1995	77	58	27 (35)	2 (3)	97
Nicolai (1995)[26] *Milan*	1981–1984	85	132	25 (29)	3 (4)	96
Gels (1995)[27] *Groningen*	1982-1992	154	84	42 (27)	2 (1)	99
Ondrus (1994)[28] *Slovak Republic*	1984–1993	80	83	29 (36)	4 (5)	95
Read (1992)[29] *United Kingdom*	1984–1987	373	60	100 (27)	5 (1)	98
Freedman (1987)[30] *United Kingdom multicentre*	1979–1983	259	30	70 (27)	3 (1)	98
Maroto* (2005)[31] *Spanish Germ Cell Group*	1994–2004	358	40	71 (20)	5 (1.4)	95

Amato* (2004)[32] *MD Anderson Cancer Center, Houston*	1993–1999	23	38	3 (13)	0 (0)	100
Ondrus* (1998)[33] *Slovak Republic*	1992–1997	49	37	7 (14.3%)	0 (0)	100
Pont* (1990)[34] *Vienna*	1985–1989	22	30	1 (4.5)	0 (0)	100
Mortensen (2016)[35] *Danish Testicular Cancer Study Group*	1984-2007	1366	180	424 (31%)	15 (1.1%)	98.2
Lago-Hernandez (2015)[36] *Dana-Farber Cancer Institute*	1997–2013	135	48	50 (37%)	2 (1.5%)	NR
Kollmannsberger (2014)[10] *Multinational cohort*	1998–2010	1139	62	221 (19%)	5 (0.4%)	99.4
Kobayashi (2013)[37] *Japan*	1989–2008	36	99	9 (25%)	0 (0%)	100
Tandstad (2009)[38] Sweden-Norway *(Swedish-Norwegian Testicular Cancer Project)*	1988–2005	350	56.4	44 (12.6%)	0 (0%)	99.9%
Sturgeon (2011)[39] *Princess Margaret*	1993–2005	371	75.6	104 (28%)	3 (0.8%)	99.1
Pooled data	1979–2013	6179	30–180	1603 (25.9%)	67 (1.1%)	95–100%

*Single-arm (surveillance) of risk-adapted study. DSS: disease-specific survival.

Supplementary Table 5. Adjuvant chemotherapy for stage I non-seminoma germ cell tumor (selected studies)					
Author (publication year)	**No. patients**	**Risk factors**	**Regimen**	**Median followup (months)**	**Relapses n (%)**
Adjuvant chemotherapy with 2 cycles of cisplatin-based combination chemotherapy					
Cullen (1996)[40]	114	EC, LVI, no yolk sac tumor	$BE_{360}P \times 2$	48	2 (1.7)
Pont (1996)[41]	29	LVI	BEP × 2	79	2 (6.9)
Chevreau (2004)[42]	40	LVI, EC	BEP × 2	113	0 (0)
Adjuvant chemotherapy with 1 cycle of cisplatin-based combination chemotherapy					
Tandstad (2009)[38]	157	LVI	BEP × 1	58	5(3.2)
Tandstad (2014)[43]	258	LVI	BEP × 1	95	8 (3.2)
Cullen (2020)[44]	246	LVI	BEP X 1	49	7 (3.1)

Supplementary Table 6. Adjuvant RPLND in the management of stage I non-seminoma								
Author (publication year) ***Site***	**Years of study**	**Patients CS I**	**PS I (%)**	**PS II (%)**	**Relapse PS I %**	**Relapse PS II %**	**Adjuvant chemotherapy %**	**No. patients dead of testis cancer (%)**
Donohue (1993)[45] *Indiana*	1979–1989	378	266 (70)	112 (30)	12	34	13	3 (0.8)
Sweeney (2000)[46] *Indiana*	1990–1995	292	226 (77)	66 (22)	10	22	12	1 (0.3)
Nicolai (2004)[47] *Milan*	1985–1995	322	262 (80)	60 (20)	NR	27	NR	4 (1.2)
Stephenson (2005)[48]	1989–2002	297	214 (72)	83 (28)	6	19	15	1 (0.3)

MSKCC, NYC								
Spermon (2002)[49] *Nijmegen*	1982–1994	101	70 (69)	31 (31)	10	0	31	1 (1.0)
Weissbach (1990)[50] *TTSG Bonn*	1982–1987	(CS1 NR)	229	NR	17	NR	NR	2
Klepp* (1997)[51] *SWENOTECA*	1990–1994	99	85 (86)	14 (14)	18	0	14	0 (0)
Albers** (2008)[52] *German Testicular Cancer Study Group*	1996–2005	173	141 (82)	32 (18)	9	0	18	0 (0)
Poulakis (2006)[53] *Germany*	2001–2004	50	39 (78%)	11 (22%)	2	0	22	0 (0)
Lv (2013)[54] *China*	1997–2011	34	19 (66%)	15 (44%)	11.8		35	1 (2.9)
Dong (2013)[55] *China*	1997–2009	30	27 (90%)	3 (10%)	0	0	10	0 (0)
Hermans (2000)[56] *Indiana*	1990–1995	292	226 (77.4%)	66 (22.6%)	10.2	10.6	8.6	N/A
Pooled data	1979–2011	2068	77%	33%	9.6%	11.3%	17.9	0.65%

**Single-arm of randomized trial.

Supplementary Table 7. Summary of randomized studies in advanced germ cell tumors					
Author	**Year**		**No. patients**	**Treatment and cycles**	**Results:**
Good-risk patients					
Bosl[57] *United States*	1988		164	EP × 4 VAB-6 × 3	No difference EP less toxic
Einhorn[58] *Indiana*	1989		184	BEP × 3 BEP × 4	No difference BEP × 3 less toxic
de Wit[59] *EORTC/MRC*	2001		812	BEP × 3 BEP × 3, EP X1	No difference BEP × 3 less toxic
Toner[60] *Australia/New Zealand*	2001		166	BE500P X 3 BE360PX4	BE500P superior OS
Role of bleomycin					
Levi[61] *Australia*	1993		218	PVB X 2-6 PV X 2-7	PVB:less cancer deaths but more toxicity deaths
Loehrer[62] *ECOG*	1995		171	BEP × 3 EP × 3	BEP × 3 superior
de Wit[63] *EORTC*	1997		395	$BE_{360}P$ × 4 $E_{360}P$ × 4	BE360P: RR higher
Culine[64] *GETUG*	2007		270	BEP × 3 EP × 4	RR similar BEP X 3: EFS and OS underpowered but nonsignificant trend
Role of carboplatin (good risk)					
Bajorin[65] *United States*	1993		265	EP × 4 E Carbo × 4	EP × 4 superior
Bokemeyer[66] *Germany*	1996		54 NSGCT	BE500P X 3 BE360Carbo X 4	BEP superior with lower relapses
Horwich[67] *MRC/EORTC*	1997		598 NSGCT	BE360P × 4 BE360Carbo × 4	$BE_{360}P$ × 4 superior
Horwich[68] *MRC*	2000		130 SEMINOMA	EP X 4 Carbo X 4	Closed early. EP still standard
Intermediate- and poor-risk					
Williams[69] *Indiana*	1987		261	BEP X 4 PVB X 4	BEP is superior
Nichols[70]	1991		159	BEP X 4 BEP200 X 4	No difference BEP less toxic

SWOG/Southeastern Cancer Study Group					
De Wit[71] *EORTC*	1995		234	BEP X 4 PVB/BEP X4	No difference BEP less toxic
Nichols[72] *ECOG/SWOG/CALGB*	1998		286	BEP × 4 VIP × 4	No difference BEP less toxic
de Wit[73] *EORTC*	1998		84	BEP × 4 VIP × 4	No difference BEP less toxic (closed early)
Kaye[74] *MRC/EORTC*	1998		371	BEP X 4 + EP X2 BOP X 3+ VIPB X 3	No difference BEP X 4 + EP X 2 less toxic
Droz[75] *GETUG*	2007		115	BEPVin × 4 BEPVin + HDCT	No difference BEPVin less toxic
Motzer[76] *MSKCC/ECOG/SWOG/CALGB*	2007		219	BEP × 4 BEP + HDCT	No difference BEP less toxic
Daugaard[77] *EORTC/Germany/Spain*	2011		131	BEP X 4 VIPX 1 + HDCT X 3	No difference RR and OS HDCT: nonsignificant trend in FFS
de Wit[78] *EORTC/MRC/Germany/Spain*	2012		337	BEP x 4 T-BEP x4	No difference (closed early)
Fizazi[79] *GETUG/MDAnderson*	2014		263 (203 randomized)	BEP x 4 BEP X 1 + Dose Dense chemo X 4	Dose dense superior in PFS (primary endpoint), not OS

[#]Dose-dense: BEP + paclitaxel+oxaliplatin X 2 cycles and then cisplatin+ ifosfamide+bleomycin X 2 cycles with G-CSF support. AGCTG: Australasian Germ Cell Trial Group; BECarbo: bleomycin, etoposide, and carboplatin; BEP: bleomycin, etoposide, cisplatin; BEPVin: bleomycin + etoposide + cisplatin + vinblastine; BOP: bleomycin,vincristine, cisplatin; cisplatin+VIP: cisplatin + ifosfamide + etoposide; dose-dense chemo: T-BEP+ Oxaliplatin X 2 then cisplatin, bleomycin ifosfamide X 2; ECarbo: etoposide and carboplatin; EORTC: European Organization for Research and Treatment of Cancer; EP: etoposide and cisplatin; EPVin: etoposide + cisplatin + vinblastine; FFS: failure-free survival; HDCT: high-dose chemotherapy; IGCCCG: International Germ Cell Consensus Classification; MRC: Medical Research Council; GTCG: German Testicular Cancer Group; MSKCC: Memorial Sloan-Kettering Cancer Center; OS: overall survival; PFS: progression-free survival; PVB: cisplatin , vinblastine, bleomycin; PV: vinblastine + cisplatin; RR: response rate; T-BEP: paclitaxel+cisplatin+etoposide+bleomycin; VAB-6: vinblastine + bleomycin + cisplatin + cyclophosphamide + dactinomycin; VIP: etoposide ifosfamide cisplatin.

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