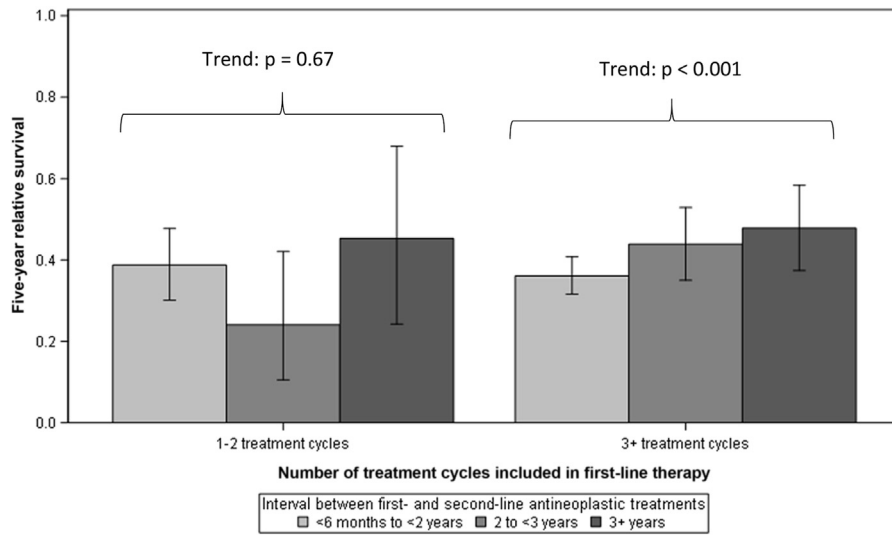
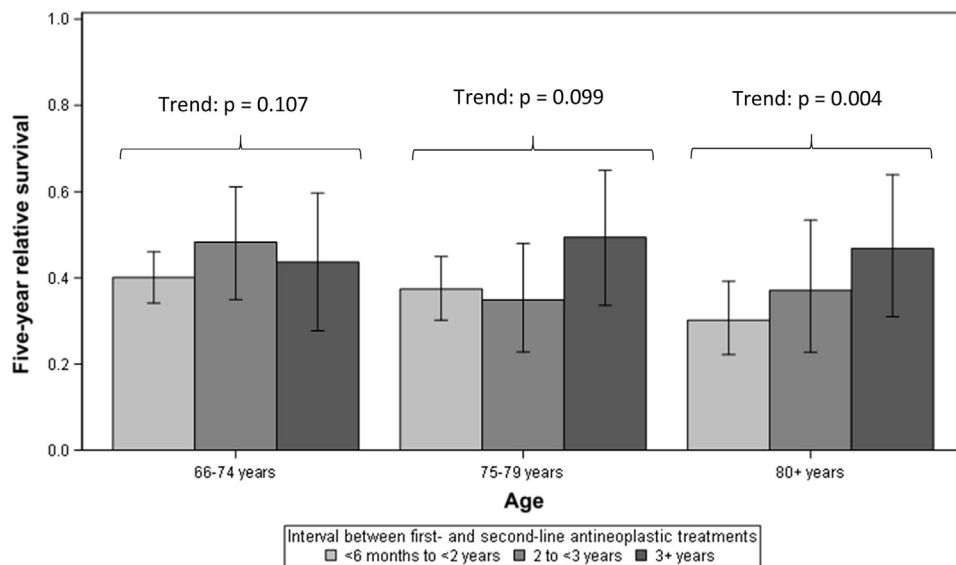


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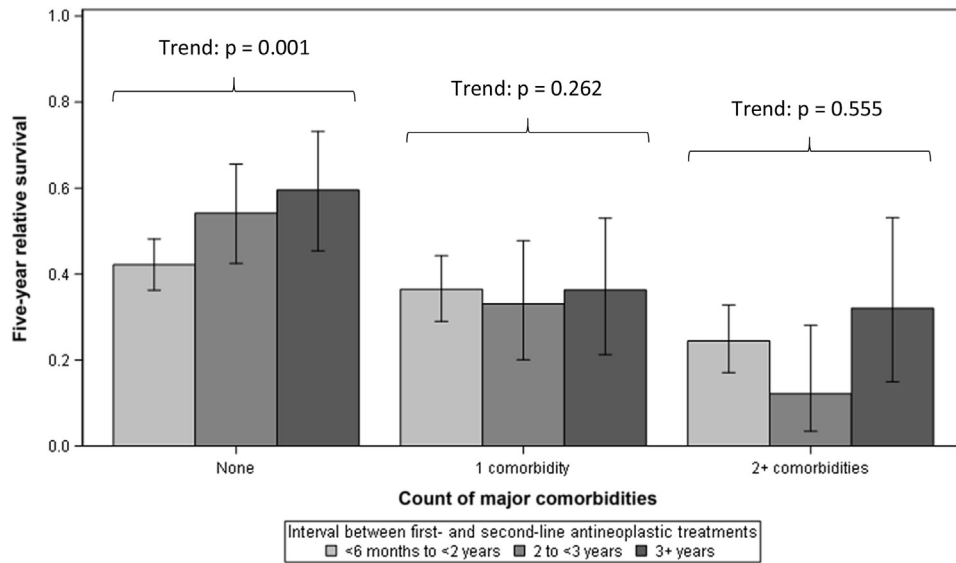
Supplemental Figure 1 Surveillance, Epidemiology, and End Results—Medicare Cohort: Estimated 5-year Relative Survival From the Initiation of Second-line Treatment, Stratified by Number of Treatment Cycles Received During First-line Treatment and the Time Interval Between First- and Second-line Treatments



Supplemental Figure 2 Surveillance, Epidemiology, and End Results—Medicare Cohort: Estimated 5-year Relative Survival From the Initiation of Second-line Treatment, Stratified by Patient Age and Time Interval Between First- and Second-line Treatments



Supplemental Figure 3 Surveillance, Epidemiology, and End Results—Medicare Cohort: Estimated 5-year Relative Survival From the Initiation of Second-line Treatment, Stratified by Major Comorbidity Count and Time Interval Between First- and Second-line Treatments



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Supplemental Table 1 Administrative Diagnosis and Procedure Codes Used to Identify Receipt of Chemotherapy and Immunotherapy

Definition	Code Type	Code	Valid Interval Start Date	Valid Interval End Date
Alemtuzumab	CPT/HCPCS	J9010	01/01/2003	—
Bendamustine	CPT/HCPCS	J9033	01/01/2009	—
Chemotherapy	DRG	410	—	—
Chemotherapy	CITD-9 DIAGNOSIS	V5811	—	—
Immunotherapy	CITD-9 DIAGNOSIS	V5812	—	—
Chemotherapy	CITD-9 PROCEDURE	9925	—	—
Chemotherapy ^a	CPT/HCPCS	964xx	—	—
Chemotherapy	CPT/HCPCS	9650x	—	—
Chemotherapy	CPT/HCPCS	9651x	—	—
Chemotherapy	CPT/HCPCS	9652x	—	—
Chemotherapy	CPT/HCPCS	9653x	—	—
Chemotherapy	CPT/HCPCS	9654x	—	—
Chemotherapy	CPT/HCPCS	G0355	01/01/2005	12/31/2005
Chemotherapy	CPT/HCPCS	G0356	01/01/2005	12/31/2005
Chemotherapy	CPT/HCPCS	G0357	01/01/2005	12/31/2005
Chemotherapy	CPT/HCPCS	G0358	01/01/2005	12/31/2005
Chemotherapy	CPT/HCPCS	G0359	01/01/2005	12/31/2005
Chemotherapy	CPT/HCPCS	G0360	01/01/2005	12/31/2005
Chemotherapy	CPT/HCPCS	G0361	01/01/2005	12/31/2005
Chemotherapy	CPT/HCPCS	G0362	01/01/2005	12/31/2005
Chemotherapy ^a	CPT/HCPCS	J9xxx	—	—
Chemotherapy	CPT/HCPCS	Q0083	—	—
Chemotherapy	CPT/HCPCS	Q0084	—	—
Chemotherapy	CPT/HCPCS	Q0085	—	—
Chemotherapy	Revenue	0331	—	—
Chemotherapy	Revenue	0332	—	—
Chemotherapy	Revenue	0335	—	—
Chlorambucil	CPT/HCPCS	S0172	01/01/2002	—
Cladribine	CPT/HCPCS	J9065	01/01/1995	—
Cyclophosphamide	CPT/HCPCS	J8530	01/01/1995	—
Cyclophosphamide	CPT/HCPCS	J9070	01/01/1984	—
Cyclophosphamide	CPT/HCPCS	J9080	01/01/1994	12/31/2010
Cyclophosphamide	CPT/HCPCS	J9090	01/01/1994	12/31/2010
Cyclophosphamide	CPT/HCPCS	J9091	01/01/1994	12/31/2010
Cyclophosphamide	CPT/HCPCS	J9092	01/01/1994	12/31/2010
Cyclophosphamide	CPT/HCPCS	J9093	01/01/1988	12/31/2010
Cyclophosphamide	CPT/HCPCS	J9094	01/01/1994	12/31/2010
Cyclophosphamide	CPT/HCPCS	J9095	01/01/1994	12/31/2010
Cyclophosphamide	CPT/HCPCS	J9096	01/01/1994	12/31/2010
Cyclophosphamide	CPT/HCPCS	J9097	01/01/1994	12/31/2010
Doxorubicin	CPT/HCPCS	J9000	01/01/1984	—
Doxorubicin	CPT/HCPCS	J9001	01/01/2000	12/31/2012
Doxorubicin	CPT/HCPCS	J9002	01/01/2013	12/31/2013
Doxorubicin	CPT/HCPCS	Q2048	07/01/2012	12/31/2012
Doxorubicin	CPT/HCPCS	Q2049	07/01/2012	—
Doxorubicin	CPT/HCPCS	Q2050	07/01/2013	—
Fludarabine	CPT/HCPCS	C9262	04/01/2010	06/30/2010
Fludarabine	CPT/HCPCS	J8562	01/01/2011	—
Fludarabine	CPT/HCPCS	J9185	01/01/1994	—
Fludarabine	CPT/HCPCS	Q2025	07/01/2010	12/31/2010
Mitoxantrone	CPT/HCPCS	J9293	01/01/1990	—
Obinutuzumab	CPT/HCPCS	J9301	—	—

Supplemental Table 1 Continued

Definition	Code Type	Code	Valid Interval Start Date	Valid Interval End Date
Ofatumumab	CPT/HCPCS	C9260	04/01/2010	12/31/2010
Ofatumumab	CPT/HCPCS	J9302	01/01/2011	—
Pentostatin	CPT/HCPCS	J9268	01/01/1994	—
Rituximab	CPT/HCPCS	J9310	01/01/1999	—
Vincristine	CPT/HCPCS	J9370	01/01/1986	—
Vincristine	CPT/HCPCS	J9371	01/01/2014	—
Vincristine	CPT/HCPCS	J9375	01/01/1988	12/31/2010
Vincristine	CPT/HCPCS	J9380	01/01/1994	12/31/2010

In addition to the procedure and diagnosis codes listed above, National Drug Codes (NDCs) obtained from the 2015 Cerner Multum Lexicon were used to define receipt of the following drugs: alemtuzumab, bendamustine, chlorambucil, cladribine, cyclophosphamide, doxorubicin, fludarabine, ibritinib, idelalisib, lenalidomide, mitoxantrone, obinutuzumab, ofatumumab, pentostatin, rituximab, vincristine.

Abbreviations: CPT = Current Procedural Terminology; HCPCS = Healthcare Common Procedure Coding System.

^aA subset of codes in the CPT/HCPCS ranges 964xx and J9xxx were excluded as being unlikely to represent antineoplastic therapy for chronic lymphocytic leukemia/small lymphocytic lymphoma. These codes are listed in [Supplemental Table 2](#) (in the online version).

Supplemental Table 2 Specific Chemotherapy, Immunotherapy and Related Billing Codes Excluded as Unlikely to Represent Treatment for Chronic Lymphocytic Leukemia/Small Lymphocytic Lymphoma

Definition	Code Type	Code	Percentage of all Chemo-related Codes Observed in Cohort
Aldesleukin injection	CPT/HCPCS	J9015	0.00
Arsenic trioxide injection	CPT/HCPCS	J9017	0.02
Asparaginase, nos	CPT/HCPCS	J9020	0.00
Azacitidine injection	CPT/HCPCS	J9025	0.21
Bcg live intravesical vac	CPT/HCPCS	J9031	0.10
Bevacizumab injection	CPT/HCPCS	J9035	0.32
Bleomycin sulfate injection	CPT/HCPCS	J9040	0.06
Carmustine injection	CPT/HCPCS	J9050	0.00
Cetuximab injection	CPT/HCPCS	J9055	0.04
CHEMO HORMON ANTINEOPL SQ/IM	CPT/HCPCS	96402	0.19
Chemotherapy (in SEER-Medicare chemo range but definition unavailable)	CPT/HCPCS	J9240	0.00
Chemotherapy (in SEER-Medicare chemo range but definition unavailable)	CPT/HCPCS	J9295	0.00
Chemotherapy (in SEER-Medicare chemo range but definition unavailable)	CPT/HCPCS	J9376	0.00
Chemotherapy (in SEER-Medicare chemo range but definition unavailable)	CPT/HCPCS	J9381	0.00
CHEMOTHERAPY INTO CNS	CPT/HCPCS	96450	0.04
Clofarabine injection	CPT/HCPCS	J9027	0.00
DACARBAZINE 100 MG	CPT/HCPCS	J9130	0.03
Dacarbazine 200 mg inj	CPT/HCPCS	J9140	0.02
Dactinomycin injection	CPT/HCPCS	J9120	0.00
Daunorubicin injection	CPT/HCPCS	J9150	0.00
Degarelix injection	CPT/HCPCS	J9155	0.00
Denileukin diftitox inj	CPT/HCPCS	J9160	0.00
Diethylstilbestrol injection	CPT/HCPCS	J9165	0.00
Docetaxel injection	CPT/HCPCS	J9171	0.03
Docetaxel injection	CPT/HCPCS	J9170	0.05
Elliotts b solution per mL	CPT/HCPCS	J9175	0.00
Epirubicin hydrochloride, 50 mg	CPT/HCPCS	J9180	0.00

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Supplemental Table 2 Continued

Definition	Code Type	Code	Percentage of all Chemo-related Codes Observed in Cohort
Floxuridine injection	CPT/HCPCS	J9200	0.00
Fluorouracil injection	CPT/HCPCS	J9190	0.23
Gemcitabine hcl injection	CPT/HCPCS	J9201	0.19
Gemtuzumab ozogamicin inj	CPT/HCPCS	J9300	0.00
Goserelin acetate implant	CPT/HCPCS	J9202	0.10
HISTRELIN IMPLANT VANTAS 50 MG	CPT/HCPCS	J9225	0.00
Inj melphalan hcl 50 mg	CPT/HCPCS	J9245	0.00
INJ PEGASPARGASE SINGLE DOSE V	CPT/HCPCS	J9266	0.00
Inj, epirubicin hcl, 2 mg	CPT/HCPCS	J9178	0.00
INJECTION IDARUBICITIN HCL 5 MG	CPT/HCPCS	J9211	0.00
INJECTION IRINOTECAN 20 MG	CPT/HCPCS	J9206	0.03
INJECTION MESNA 200 MG	CPT/HCPCS	J9209	0.04
INJECTION MITOMYCIN 5 MG	CPT/HCPCS	J9280	0.02
INJECTION OXALIPLATIN 0.5 MG	CPT/HCPCS	J9263	0.05
INJECTION PACLITAXEL 30 MG	CPT/HCPCS	J9265	0.19
INJECTION TOPOTECAN 4 MG	CPT/HCPCS	J9350	0.01
INJECTION VINBLASTINE SULFATE	CPT/HCPCS	J9360	0.07
Injection, fulvestrant	CPT/HCPCS	J9395	0.00
Interferon alfa-2a inj	CPT/HCPCS	J9213	0.05
Interferon alfa-2b inj	CPT/HCPCS	J9214	0.17
Interferon alfacon-1 inj	CPT/HCPCS	J9212	0.02
Ipilimumab injection	CPT/HCPCS	J9228	0.00
IRRIG DRUG DELIVERY DEVCITE	CPT/HCPCS	96,523	1.29
LEUPROLIDE ACETATE 7.5 MG	CPT/HCPCS	J9217	0.21
Leuprolide acetate implant	CPT/HCPCS	J9219	0.00
Leuprolide acetate injection	CPT/HCPCS	J9218	0.00
Mechlorethamine hcl inj	CPT/HCPCS	J9230	0.00
MITOMYCIN 20 MG	CPT/HCPCS	J9290	0.00
Mitomycin 40 mg inj	CPT/HCPCS	J9291	0.01
Paclitaxel protein bound	CPT/HCPCS	J9264	0.02
Panitumumab injection	CPT/HCPCS	J9303	0.00
Pemetrexed injection	CPT/HCPCS	J9305	0.03
Plicamycin (mithramycin) inj	CPT/HCPCS	J9270	0.00
REFILL/MAINT PORTABLE PUMP	CPT/HCPCS	96,521	0.07
REFILL/MAINT PUMP/RESVR SYST	CPT/HCPCS	96,522	0.07
Romidepsin injection	CPT/HCPCS	J9315	0.00
Streptozocin injection	CPT/HCPCS	J9320	0.00
Temsirolimus injection	CPT/HCPCS	J9330	0.01
Thiotepa injection	CPT/HCPCS	J9340	0.00
Topotecan injection	CPT/HCPCS	J9351	0.00
Trastuzumab injection	CPT/HCPCS	J9355	0.03
Valrubicin injection	CPT/HCPCS	J9357	0.00
Vinorelbine tartrate inj	CPT/HCPCS	J9390	0.02

Abbreviations: bcg = Bacillus Calmette-Guérin; CNS = central nervous system; CPT = Current Procedural Terminology; hcl = hydrochloride; HCPCS = Healthcare Common Procedure Coding System; inj = injection/injectable; MAINT PUMP/RESVR SYST = maintenance pump/reservoir system; SEER = Surveillance, Epidemiology, and End Results; vac = vaccine.

Supplemental Table 3 Categorization of Patients' First-Line Treatment Regimens

Type of Antineoplastic Treatment Regimen	Specific Regimen as Determined From Drug-specific HCPCS and NDC Codes	Frequency	Percent
Chemo-immunotherapy (n = 693)	Fludarabine, cyclophosphamide and immunotherapy	179	9.07
	Fludarabine and immunotherapy	254	12.87
	(Pentostatin or cladribine) and immunotherapy	21	1.06
	Bendamustine and immunotherapy	50	2.53
	Cyclophosphamide, vincristine, doxorubicin and immunotherapy	48	2.43
	Cyclophosphamide, vincristine and immunotherapy	102	5.17
	None of the above. Immunotherapy and at least 1 of the following: chlorambucil, cyclophosphamide, vincristine, doxorubicin or mitoxantrone	39	1.97
Chemotherapy alone (n = 824)	Fludarabine and cyclophosphamide	64	3.24
	Fludarabine, pentostatin or cladribine ^a	427	21.64
	Bendamustine	16	0.81
	Cyclophosphamide, vincristine, and doxorubicin	37	1.87
	Cyclophosphamide and vincristine	137	6.94
	None of the above. At least 1 of the following: chlorambucil, cyclophosphamide, vincristine, doxorubicin, or mitoxantrone	143	7.25
Immunotherapy alone (n = 457)	Rituximab, ofatumumab, or alemtuzumab ^a	457	23.15

Abbreviations: HCPCS = Healthcare Common Procedure Coding System; NDC = National Drug Code.

^aCells with fewer than 11 patients combined due to Surveillance, Epidemiology, and End Results—Medicare reporting requirements. Of the 427 patients who received fludarabine, pentostatin, or cladribine, fewer than 11 received pentostatin or cladribine. Of the 457 patients who received rituximab, ofatumumab or alemtuzumab, fewer than 11 patients received ofatumumab or alemtuzumab.