ECONOMIC ASSESSMENT OF DIAGNOSTIC REVISION IN PERIPHERAL T-CELL LYMPHOMA

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American Society of Hematology (ASH) 2020 Virtual, December 5-8, 2020, Publication Number: 1606

[Previously presented at the Academy of Managed Care Pharmacy (AMCP) Nexus 2020 Virtual, October 19–23, 2020.]

Background

- Peripheral T-cell lymphomas (PTCLs) are a collection of rare and aggressive non-Hodgkin lymphomas (NHLs) that originate from post-thymic or mature T-cells and natural killer cells.[1]
- PTCL accounts for approximately 10–15% of newly diagnosed NHL, equating to around 7,000 new cases of PTCL in the US in 2020 (among 77,240 estimated new cases of NHL[2]), with 5-year survival rates <50% for most types of PTCL.[3-5]
- Despite advances in molecular techniques, immunophenotyping, and subtype-specific approaches, diagnosis of PTCL remains challenging,[6-8] with misdiagnosis of PTCL in the form of inaccurate or delayed diagnosis potentially affecting therapeutic decisions and clinical outcomes, as well as associated healthcare resource utilization.[9,10]

- A retrospective claims analysis and parallel electronic health records (EHR) analysis estimated the rate of PTCL diagnostic revision (DR) either to or from other lymphomas at 29.3% in the claims analysis and 21.6% in the EHR analysis, with significantly higher healthcare costs for DR than non-DR patients during follow-up (**Panel 1** Appendix).[11,12]

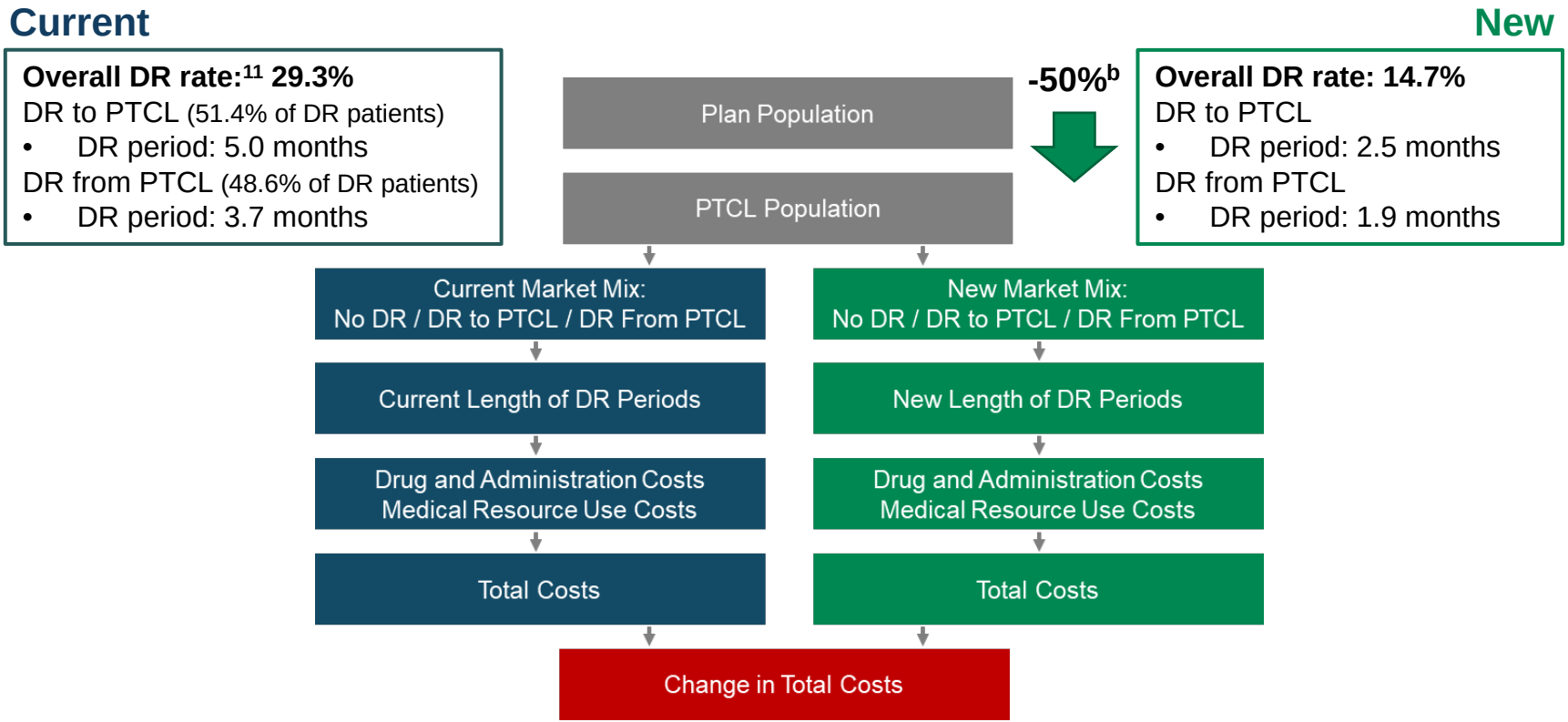
Objective & Methods

To estimate the cost of DR in PTCL to US health plans and quantify the potential impact of reducing the percentage of patients with DR, and the average DR period length, on healthcare costs in the US PTCL population.

- **Data source**: IBM MarketScan® Commercial and Medicare Supplemental Databases.
- **Study design and population:** A cost calculator model was developed using pharmacy and medical costs for adult patients with a PTCL diagnosis from January 2010 to June 2017, with or without DR.
- The calculator was constructed to estimate the economic impact of reducing PTCL DR to a health plan by calculating costs for the current scenario compared with a new scenario with a lower proportion of patients with DR and shorter DR period.

- **DR definition:** ≥1 medical claim for a non-PTCL lymphoma (eg, Hodgkin lymphoma) in the year prior to or after the index PTCL diagnosis.

Figure 1. Model Schematic and Scenarios



[a]Over a 1-year time horizon.
[b]Assumption for both the rate of DR and the DR period. DR, diagnostic revision; PTCL, peripheral T-cell lymphoma.

Model Inputs: Population Estimates and Costs

Table 1. Frontline PTCL plan member distribution and annual incidence rates stratified by age

Age, years	20–44	45–54	55–64	≥65
NHL incidence rate (per 100,000 persons)[13]	5.5	21	40.4	91.5
Commercial plan member distribution[14]	37.3%	12.5%	12.1%	14.0%
Medicare plan member distribution[15]	3.4%	4.4%	8.2%	84.1%

Table 2. PPPM costs during the DR and follow-up periods

		DR period monthly costs		Follow-up period monthly costs	
	Non-DR[12]	DR to PTCL[12]	DR from PTCL[12]	DR to PTCL[12]	DR from PTCL[12]
Inpatient	$4,263	$3,715	$12,508	$4,834	$6,616
Emergency room	$94	$113	$133	$67	$91
OP office	$253	$293	$388	$289	$317
Laboratory tests	$656	$952	$1,621	$671	$830
Radiology	$997	$1,310	$1,972	$1,349	$1,412
Other OP services[a]	$4,278	$6,988	$9,154	$4,948	$6,134
OP prescription	$956	$1,679	$1,218	$1,259	$723
Total HCRU PPPM	$11,497	$15,050	$26,994	$13,417	$16,123

[a]Other OP services includes any other services in an OP setting not listed in other categories. DR, diagnostic revision; HCRU, healthcare resource utilization; NHL, non-Hodgkin lymphoma; OP, outpatient; PPPM, per patient per month; PTCL, peripheral T-cell lymphoma.

Table 3. Plan Savings: (A) Commercial and (B) Medicare

- In a hypothetical 1 million member commercial plan, based on an estimated **23 adult PTCL patients**[a] and assuming a 50% reduction in both the rate of DR and the DR period, the estimated total plan savings annually in the new scenario would be **$250,951.**

(A) Commercial

	Plan total	PPPY	PPPM	PMPM
Inpatient	$106,635	$4,847	$404	$0.11
Emergency room	$453	$21	$2	$0.00
OP office	$2,665	$121	$10	$0.00
Laboratory tests	$14,483	$658	$55	$0.01
Radiology	$18,974	$862	$72	$0.02
Other OP services[b]	$100,919	$4,587	$382	$0.10
OP prescription	$6,823	$310	$26	$0.01
Total HCRU	**$250,951**	**$11,407**	**$951**	**$0.25**

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[a]Estimate assumes 10% of NHL patients are diagnosed with PTCL.
[b]Other OP services includes any other services in an OP setting not listed in other categories. HCRU, healthcare resource utilization; NHL, non-Hodgkin lymphoma; OP, outpatient; PMPM, per member per month; PPPM, per patient per month; PPPY, per patient per year

Table 3. Plan Savings: (A) Commercial and (B) Medicare

- In a hypothetical 1 million member Medicare plan, based on an estimated **81 adult PTCL patients**[a] and assuming a 50% reduction in both the rate of DR and the DR period, the estimated total plan savings annually in the new scenario would be **$906,801.**

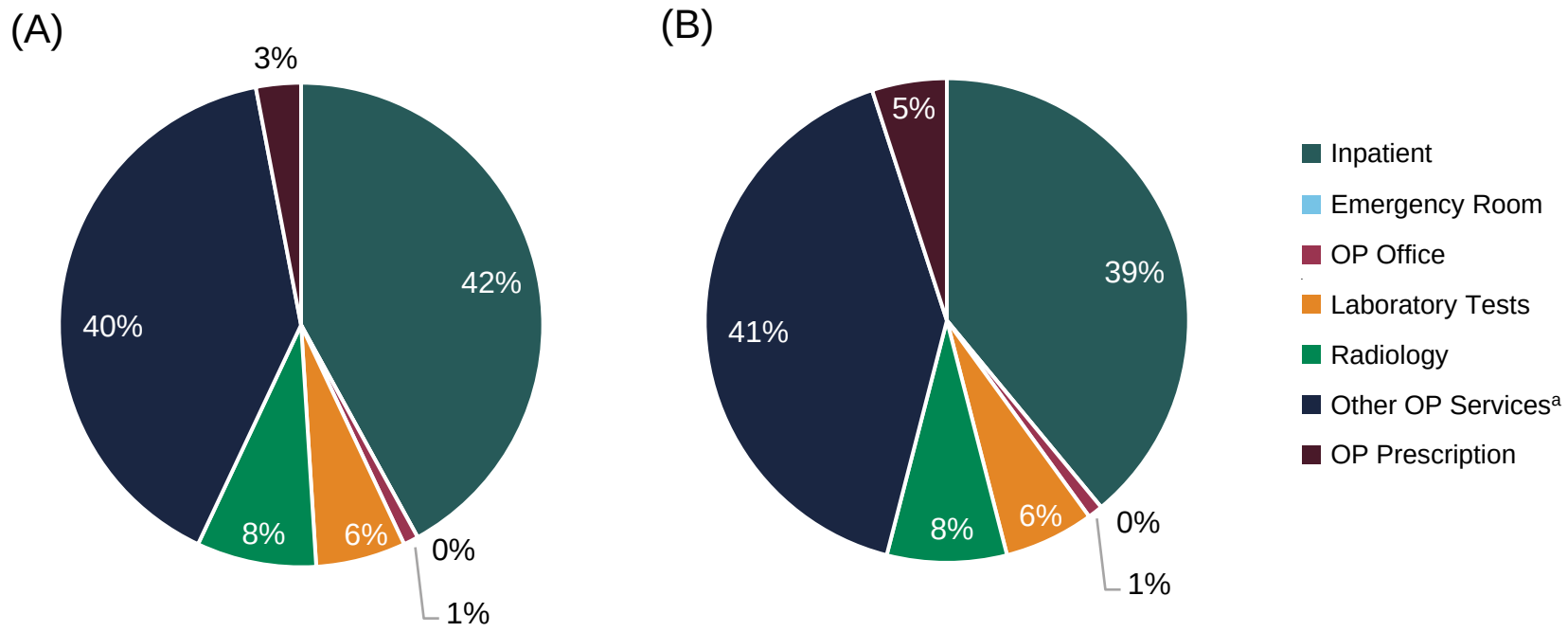
(B) Medicare

	Plan total	PPPY	PPPM	PMPM
Inpatient	$356,377	$4,400	$367	$0.36
Emergency room	$1,309	$16	$1	$0.00
OP office	$9,744	$120	$10	$0.01
Laboratory tests	$52,593	$649	$54	$0.05
Radiology	$72,117	$890	$74	$0.07
Other OP services[b]	$374,238	$4,620	$385	$0.37
OP prescription	$40,424	$499	$42	$0.04
Total HCRU	**$906,801**	**$11,195**	**$933**	**$0.91**

[a]Estimate assumes 10% of NHL patients are diagnosed with PTCL.
[b]Other OP services includes any other services in an OP setting not listed in other categories. HCRU, healthcare resource utilization; NHL, non-Hodgkin lymphoma; OP, outpatient; PMPM, per member per month; PPPM, per patient per month; PPPY, per patient per year

Figure 2. Distribution of Savings: (A) Commercial and (B) Medicare

- Savings in both the commercial and Medicare settings were largely derived from reduced costs associated with other outpatient services and inpatient services in the new scenario.



[a]Other OP services includes any other services in an OP setting not listed in other categories. OP, outpatient.

Conclusions and Limitations

- *Limitations:* For the purpose of the cost calculator model, it was assumed costs are similar across PTCL subtypes and for commercial vs Medicare patients; these will likely vary, but can be evaluated with sensitivity analyses performed with the calculator.

- This analysis reiterates the need for appropriate diagnostic criteria and expertise when diagnosing PTCL and its subtypes, as accurate and timely diagnosis of PTCL is essential to enable appropriate treatment.
- Due to the rarity of PTCL, suspected T-cell diagnoses may benefit from a second opinion at an academic center, with research suggesting academic centers provide a more comprehensive diagnostic workup than other clinical settings.
- Assessment of biomarkers (eg, CD30) may also help to improve diagnostic accuracy for PTCL and subsequent treatment strategies.
- Interventions that reduce the proportion of patients with DR and the length of the DR period are likely to result in significant savings to payers and help achieve the triple aim of healthcare (improve the individual experience of care, improve the health of populations, reduce the per capita costs of care).

References and Disclosures

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DISCLOSURES: This study was funded by Seagen, Inc. NL, JL, KY-I, DS: employees of Seagen and own stock at Seagen. DC: employee of Xcenda, and a paid consultant to Seagen in connection with this study. WS: employee of Xcenda, a paid consultant to Seagen in connection with this study, and owns stock at AmerisourceBergen (parent company of Xcenda).

ACKNOWLEDGMENTS: Medical writing support was provided by Elizabeth Harvey of Curo, a division of Envision Pharma Group, and funded by Seagen.

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APPENDIX

Panel 1. Retrospective Analysis of Rate of DR Among PTCL Patients[11,12]

Study design and databases: a retrospective analysis was conducted to describe the rate of DR among patients with PTCL using data from 2 large, real-world US databases from January 2009-June 2017:

1. IBM MarketScan® Commercial and Medicare Supplemental, administrative claims database
2. IBM Explorys Research, EHR database

Study population: adults with a new diagnosis of PTCL and at least 12 months of pre-index and 10 months of post-index continuous claims or HER activity; follow up was until the earliest of inpatient death, end of continuous enrollment, or end of the study period

Primary endpoint: prevalence of DR defined as the diagnosis of a non-PTCL diagnosis before or after the PTCL diagnosis

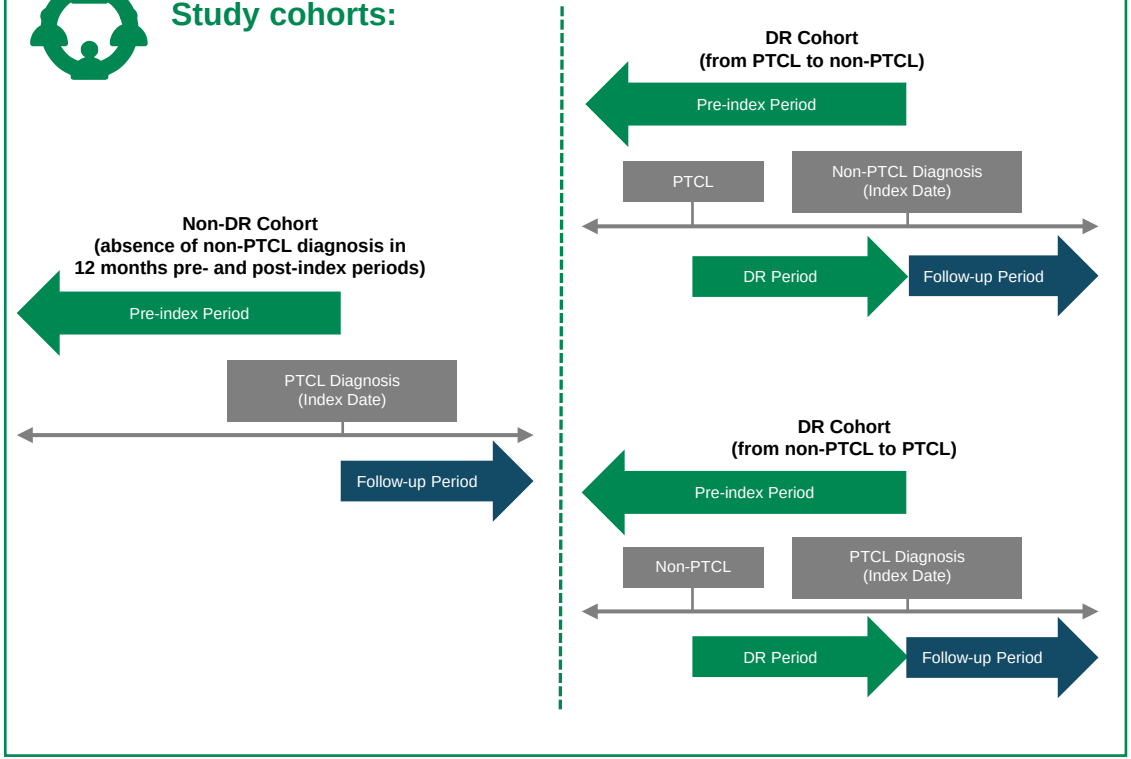
Diagnostic revision:

- Rate of DR was 29.3% in the claims analysis and 21.6% in the EHR analysis
- 51.4% had DR to PTCL and 48.6% DR from PTCL in the claims analysis, while 56.0% had DR to PTCL and 44.0% from PTCL in the EHR analysis
- Average duration of DR period was 5.0 months for patients with DR to PTCL and 3.7 months from PTCL

12-month healthcare costs by service type and cohort:
Multivariate-adjusted total healthcare costs were higher in the DR cohort relative to the non-DR cohort in the 12-month follow-up period (n=1,589):

- $225,944 in the DR cohort
- $174,851 in the non-DR cohort
- Difference $51,094

Study cohorts:



DR, diagnostic revision; EHR, electronic health records; PTCL, peripheral T-cell lymphoma.