HOSPITAL COSTS ASSOCIATED WITH NEUROLOGIC ADVERSE EVENTS IN PATIENTS WITH DIFFUSE LARGE B-CELL LYMPHOMA: A STUDY BASED ON THE UNITED STATES NATIONAL INPATIENT SAMPLE

Michael S. Broder, MD, MSHS[1]; Qiufei Ma, PhD[2]; Jessie T. Yan, PhD[1]; David Kuzan, MD[2]; Eunice Chang, PhD[1]; Jie Zhang, PhD[2]

[1] Partnership for Health Analytic Research, LLC, Beverly Hills, CA, [2] Novartis Pharmaceuticals Corporation, East Hanover, NJ

Background and Objective

Background

- Diffuse large B-cell lymphoma (DLBCL) is the most common type of non-Hodgkin lymphoma (NHL), accounting for approximately a quarter of newly diagnosed NHL cases each year.[1,2]
- Treatment options for DLBCL have been quickly expanding, including conventional immunochemotherapy and new therapies, such as chimeric antigen receptor T (CAR-T) cell therapy.[3]
- All treatments are associated with different neurologic adverse events (NEAEs), which may increase healthcare utilization and costs.[4–6]
- Few studies have reported hospital costs of NEAEs in patients with DLBCL.

Objective

- This study aimed to estimate the hospitalization costs associated with NEAEs in patients with DLBCL.

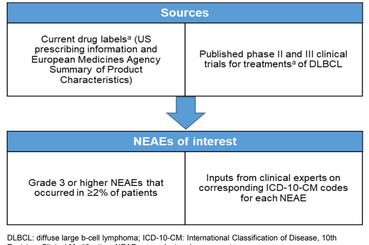
Methods

Methods

- Identification of NEAEs **(Figure 1)**
- National estimates of NEAE-related hospital length of stay (LOS) and costs
  - 2016 data from the US National Inpatient Sample (NIS)*
    - NIS represents a 20% sample of discharges from US hospitals, which is weighted to provide national estimates.
  - DLBCL hospital admissions with evidence of neurologic conditions (identified by primary and secondary discharge diagnoses) consistent with the NEAEs
    - DLBCL admissions were identified based on ICD-10-CM code C83.3x in any diagnosis position among adult patients ≥18 years.
  - Costs were estimated using hospital charges for each hospitalization and the cost-to-charge ratio for each hospital, both of which were included in the NIS.
  - Statistical analysis
    - Descriptive analysis - weighted results reported

*National Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.

Figure 1. Identification of NEAEs of interest in DLBCL



DLBCL: diffuse large b-cell lymphoma; ICD-10-CM: International Classification of Disease, 10th Revision, Clinical Modification; NEAEs: neurologic adverse events.

[a] CAR-T therapies: Kymriah and Yescarta; chemotherapies: dose-adjusted EPOCH-rituximab, dose-dense CHOP 14 +/- rituximab, bendamustine +/- rituximab, brentuximab vedotin, DHAP +/- rituximab, GDP +/- rituximab, GemOX +/- rituximab, ICE +/- rituximab, lenalidomide +/- rituximab, oxaliplatin w/ROAD, rituximab.

Results

Results

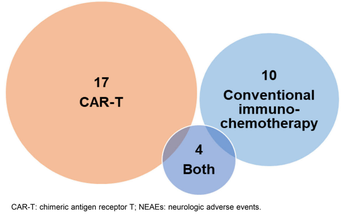
- Twenty-three NEAEs identified from drug prescribing information and clinical trials **(Figure 2)**.
  - Twenty were included in the NIS analysis based on availability of ICD-10-CM diagnosis codes and inputs from clinical experts.
- In 2016, there were 12,999 DLBCL hospitalizations in this sample representing 64,995 hospitalizations nationwide.
  - Patients were predominantly older (mean age 63.2 years), male (56.5%), and white (68.5%). Half (50.3%) had Medicare **(Table 1)**.
- Neurologic conditions of interest that occurred in ≥500 hospitalizations were: encephalopathy, followed by headache, cerebral edema, confusional state/disorientation, syncope, delirium, mental status changes/depressed level of consciousness, and aphasia **(Figure 3)**.
- Hospitalization associated with abnormal motor activity and delirium had the longest LOS, followed by encephalopathy, agitation, cerebral hemorrhage, confusional state/disorientation, diplegia, and cerebral edema **(Figure 3)**.

Table 1. Patient demographics

	All DLBCL Admissions N = 64,995[a]
Age in years at admission, mean [median]	63.2 [65.0]
Gender, n (%)	
Female	28,215 (43.4)
Male	36,690 (56.5)
Missing	90 (0.1)
Race, n (%)	
White	44,550 (68.5)
Black	5,880 (9.0)
Hispanic	5,715 (8.8)
Other	5,310 (8.2)
Missing	3,540 (5.4)
Median household income based on ZIP Code, n (%)	
$1-$38,999	14,425 (22.2)
$39,000-$47,999	15,020 (23.1)
$48,000-$62,999	16,600 (25.5)
$63,000 or more	17,325 (26.7)
Missing	1,625 (2.5)
Primary payer, n (%)	
Medicare	32,720 (50.3)
Medicaid	6,760 (10.4)
Private (including HMO)	22,055 (33.9)
Other	3,415 (5.3)
Missing	45 (0.1)

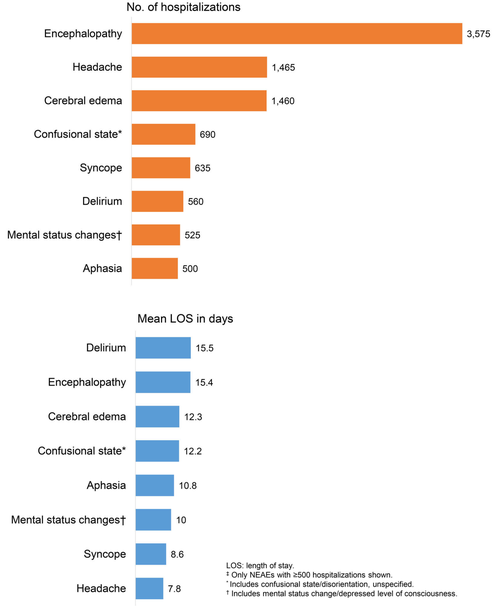
DLBCL: diffuse large b-cell lymphoma; HMO: health maintenance organization.
[a] Weighted based on 12,999 hospitalizations.

Figure 2. NEAEs of interest per therapy type



CAR-T: chimeric antigen receptor T; NEAEs: neurologic adverse events.

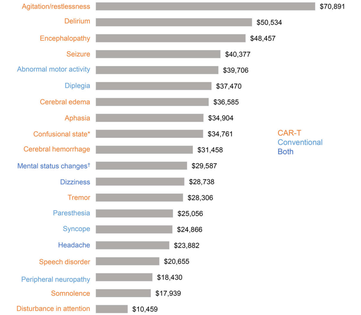
Figure 3. Encephalopathy hospitalizations occurred the most and delirium had the longest average LOS‡



LOS: length of stay.
‡ Only NEAEs with ≥500 hospitalizations shown.
* Includes confusional state/disorientation, unspecified.
† Includes mental status change/depressed level of consciousness.

- The highest inpatient cost was for agitation/restlessness (mean $70,891, median $18,155), followed by delirium (mean $50,534, median $30,726) and encephalopathy (mean $48,457, median $26,437) **(means presented in Figure 4)**.
  - Seizure, abnormal motor activity, diplegia, cerebral edema, aphasia, peripheral neuropathy, somnolence, and disturbance in attention were associated with mean costs of $10,459 to $40,377 (median $10,168 to $17,367).

Figure 4. Among the NEAEs, agitation/restlessness had the highest mean inpatient costs



* Includes confusional state/disorientation, unspecified.
† Includes mental status change/depressed level of consciousness.

Conclusions

Conclusions

- Hospitalization costs associated with neurologic conditions vary and may be substantial.
- Studies using patient-level databases are warranted to confirm the study results.

Limitations

- The NIS does not contain treatment information. Therefore, the relationship between treatments and NEAEs could not be confirmed.

References

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Acknowledgements

Funded by Novartis Pharmaceuticals Corporation.

Disclosures

Poster presented at AMCP Nexus, National Harbor, MD, October 31-November 1, 2019.

This study was sponsored by Novartis Pharmaceuticals Corporation.