**Supplementary material**

**Title**

**Real world costs of Hodgkin and the main B-Cell Non-Hodgkin lymphomas in France**

**Running title**

**Cost assessment of lymphomas in France**

Michael Mounié, Ph.D 1,2,3. Nadège Costa, Ph.D 1,2. Cécile Conte, Ph.D. Student 4, Dominique Petiot, M.D 5. Didier Fabre, M.D 5. Fabien Despas Ph.D 4,6,. Maryse Lapeyre-Mestre, Ph.D., M.D 3,4,6. Guy Laurent, Pr 7. Nicolas Savy, Ph.D 3,8. Laurent Molinier, Pr 1,2,3,5.

1 : Unité d'Evaluation Médico-Economique, Centre Hospitalier Universitaire, Toulouse F-31059, France

2 : Institut National de la Santé et de la Recherche Médicale –INSERM, Unité Mixte de Recherche–UMR 1027, F-31000 Toulouse, France

3 : Université Toulouse III Paul Sabatier, Toulouse, France

4 : Laboratoire de Pharmacologie Médicale, facultés de Médecine, 37 allées Jules Guesde, Université Toulouse III Paul Sabatier 31000 Toulouse

5 : Département d’Information Médicale, Centre Hospitalier Universitaire, Toulouse F-31059, France

6 : Service de Pharmacologie Clinique, CIC 1436, CHU Toulouse, F-31000 Toulouse, France

7 : Service d'hématologie CHU Toulouse, Institut Universitaire du Cancer-Oncopôle de Toulouse, 31100 Toulouse

8 : Institut Mathématiques de Toulouse, UMR 5219, CNRS, F-31062, Toulouse, France.

**Requests for reprints and Corresponding author:**

Mr Mounié Michael

Unité d’Evaluation Médico-Economique, Département d’Information Médicale, Centre Hospitalier Universitaire, 2 Rue Viguerie, 31300 Toulouse Cedex 09, France

Tel. +33677708149

E-mail: mounie.m@chu-toulouse.fr

**Supplementary material**

**Online Resource 1. Timeline of lymphoma incident case and active treatment phase identification**

****

**Incident lymphoma case inclusion**

**Prevalent lymphoma case exclusion**

**Available data**

**Active treatment phase identification:**

**From the first lymphoma ICD-10 discriminant code to the latest ICD-10 discriminant code without ICD-10 discriminant codes during the end of treatment period**

|  |  |  |  |
| --- | --- | --- | --- |
| **Utilization** | **Code meaning** | **Code ICD 10** | **Entitled** |
| Study population and Study period | Lymphoma | C81 | Hodgkin lymphoma |
| Study population andStudy period | Lymphoma | C82 | Follicular NHL |
| Study population andStudy period | Lymphoma |  C83.3 | Diffuse B Cell NHL |
| Study population andStudy period | Management | Z511 | Chemotherapy session for tumor |
| Study population andStudy period | Management | Z512 | Others chemotherapy |
|  Study period  | Management | Z510 |  Radiotherapy session |
| Study period | Management | Z452 | Adjustment and maintenance of a vascular access device |
| Study period | Management | Z513 | Blood transfusion without diagnosis |
| Study period | Management | Z9480 | Other organ and tissue transplants |
| Study period | Management | D60-64 | Medullary aplasia and other anemias |
| Study period | Management | D70 | Agranulocytosis |
| *ICD: International Classification of Diseases, NHL : Non Hodgkin Lymphoma* |

**Online Resource 2. ICD-10 codes used to identify lymphoma incident case and lymphoma active treatment period**

**Online Resource 3. Unit costs - type and sources**

|  |  |  |
| --- | --- | --- |
|  **Consumed resources** | **Unit costs types** | **Unit cost sources** |
| **Hospitalizations** |  |  |
| Inpatient stays | Disease Related Groups | Technical Agency of Hospital information1 |
| Day hospital  | Disease Related Groups | Technical Agency of Hospital information1 |
| Additional expensive drug | Common Unit of Dispensation | Ameli (French Health Insurance)2 |
| **General practitioner and specialist visits** | General Classification of Professional Acts | Ameli (French Health Insurance)3 |
| **Medcial acts** |  |  |
| Imaging | Common Classification of Medical Acts  | Ameli (French Health Insurance)4 |
| Biology | Classification of acts of Medical Biology | Ameli (French Health Insurance)5 |
| Others | Common Classification of Medical Acts | Ameli (French Health Insurance)4 |
| **Paramedical acts** | General Classification of Professional Acts | Ameli (French Health Insurance)3 |
| **Medication** | Medication Database and Tariffs Information | Ameli (French Health Insurance)6 |
| **Medical equipment** | List of Product and Service | Ameli (French Health Insurance)7 |
| **Transportation** | General Classification of Professional Acts | Ameli (French Health Insurance)3 |
| **Productivity loss** |  |  |
| Daily benefits | Per day cost | Ameli (French Health Insurance)8 |
| Disability pension  | Per day cost | Ameli (French Health Insurance)9 |
| 1: <https://www.atih.sante.fr/manuel-des-ghm-version-provisoire-2016> ; 2: <http://www.codage.ext.cnamts.fr/codif/bdm_it/index_tele_ucd.php?p_site=AMELI> ;3: <https://www.ameli.fr/sites/default/files/Documents/576134/document/ngap_version_du_01.07.2019_cnam.pdf> ;4: <https://www.ameli.fr/accueil-de-la-ccam/telechargement/index.php>;5: <http://www.codage.ext.cnamts.fr/codif/nabm/telecharge/index_tele.php?p_site=AMELI> ;6 : <http://www.codage.ext.cnamts.fr/codif/bdm_it/index_presentation.php?p_site=AMELI> ;7: <http://www.codage.ext.cnamts.fr/codif/tips//telecharge/index_tele.php?p_site=AMELI> ; 8: <https://www.ameli.fr/assure/remboursements/indemnites-journalieres/arret-maladie> ;9: <https://www.ameli.fr/assure/remboursements/pensions-allocations-rentes/invalidite> ; |

**Online Resource 4. Baseline comorbidities according to lymphoma subgroups**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Comorbidities (n, (%))** | HL | FL |  | DLBCL |  |
| Cases | Controls | P | Cases | Controls | P | Cases | Controls | P |
| Myocardial Infarction | 1 (1.8) | 3 (1.3) | 1 | 2 (3.1) | 3 (1.2) | 0.262 | 1 (1) | 6 (1.5) | 1 |
| Congestive Heart Failure | 2 (3.5) | 0 (0) | 0.039 | 0 (0) | 4 (1.6) | 0.587 | 4 (3.9) | 7 (1.7) | 0.243 |
| Periphral Vascular Disease | 0 (0) | 1 (0.4) | 1 | 2 (3.1) | 7 (2.7) | 1 | 2 (1.9) | 12 (2.9) | 0.746 |
| Cerebrovascular Disease | 1 (1.8) | 3 (1.3) | 1 | 1 (1.6) | 2 (0.8) | 0.489 | 3 (2.9) | 7 (1.7) | 0.427 |
| Dementia | 0 (0) | 2 (0.9) | 1 | 1 (1.6) | 2 (0.8) | 0.489 | 0 (0) | 10 (2.4) | 0.224 |
| Chronic Pulmonary Disease | 1 (1.8) | 8 (3.5) | 0.693 | 1 (1.6) | 15 (5.9) | 0.21 | 4 (3.9) | 28 (6.8) | 0.363 |
| Connective Tissue Disease | 2 (3.5) | 1 (0.4) | 0.103 | 0 (0) | 1 (0.4) | 1 | 3 (2.9) | 3 (0.7) | 0.098 |
| Ulcer Disease | 0 (0) | 0 (0) | 1 | 1 (1.6) | 0 (0) | 0.2 | 0 (0) | 0 (0) | 1 |
| Mild Liver Disease | 1 (1.8) | 2 (0.9) | 0.489 | 1 (1.6) | 2 (0.8) | 0.489 | 2 (1.9) | 1 (0.2) | 0.103 |
| Diabetes | 1 (1.8) | 14 (6.1) | 0.318 | 3 (4.7) | 24 (9.4) | 0.316 | 0 (0) | 42 (10.2) | <0.001 |
| Hemiplegia | 0 (0) | 1 (0.4) | 1 | 0 (0) | 1 (0.4) | 1 | 1 (1) | 1 (0.2) | 0.36 |
| Moderate Or Severe Renal Disease | 0 (0) | 1 (0.4) | 1 | 1 (1.6) | 0 (0) | 0.2 | 1 (1) | 5 (1.2) | 1 |
| Diabete With End Organ Damage | 0 (0) | 1 (0.4) | 1 | 0 (0) | 1 (0.4) | 1 | 0 (0) | 3 (0.7) | 1 |
| Any Tumor (except lymphoma) | 5 (8.8) | 12 (5.3) | 0.347 | 16 (25) | 28 (10.9) | 0.007 | 18 (17.5) | 31 (7.5) | 0.004 |
| Moderate Or Severe Liver Disease | 1 (1.8) | 0 (0) | 0.2 | 0 (0) | 1 (0.4) | 1 | 0 (0) | 0 (0) | 1 |
| Metastatic Solid Tumor | 2 (3.5) | 1 (0.4) | 0.103 | 2 (3.1) | 0 (0) | 0.039 | 3 (2.9) | 1 (0.2) | 0.027 |
| HIV.AIDS*HL : Hodgkin Lymphoma, FL: Follicular Lymphoma, DLBCL: Diffuse Large B Cell Lymphoma, P: P-value* | 1 (1.8) | 0 (0) | 0.2 | 1 (1.6) | 0 (0) | 0.2 | 1 (1) | 0 (0) | 0.2 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | HL | FL | DLBCL |
| Cases (n=57) | Controls (n=228) | ∆Cost | Cases (n=64) | Controls (n=256) | ∆Cost | Cases (n=103) | Controls (n=412) | ∆Cost |
| **Inpatient stays** | 3075 [2325; 4580] | 95 [38; 284] | 2980 | 3188 [2733; 3716] | 73 [46; 122] | 3115 | 5999 [5400; 6849] | 68 [43; 113] | 5931 |
|  **Additional medicine:** | 494 [132; 2231] | 64 [14; 249] | 430 | 1701 [1351; 2180] | - | 1701 | 2291 [2005; 2758] | 7 [0; 21] | 2284 |
|  Rituximab | 45 [3; 147] | - | 45 | 1511 [1185; 1933] | - | 1511 | 2061 [1771; 2541] | - | 2061 |
|  Other medicines\* | 449 [87; 1929] | 64 [14; 250] | 385 | 191 [102; 529] | - | 191 | 230 [137; 377] | 7 [0; 21] | 223 |
|  **DRG tarifs :** | 2273 [1813; 3098] | 25 [15; 41] | 2248 | 1379 [1105; 1820] | 54 [32; 96] | 1325 | 3387 [2868; 3987] | 46 [32; 74] | 3341 |
| Diagnosis | 879 [522; 1859] | - | 879 | 364 [239; 572] | - | 364 | 618 [451; 872] | - | 618 |
| Treatment | 1124 [934; 1367] | - | 1124 | 800 [591; 1204] | - | 800 | 2167 [1831; 2651] | - | 2167 |
| Adverse event  | 87 [26; 244] | - | 87 | 27 [8; 69] | - | 27 | 159 [92; 312] | - | 159 |
| Other hospitalizations | 184 [105; 301] | 25 [16; 41] | 159 | 188 [105; 376] | 54 [33; 101] | 134 | 443 [255; 856] | 46 [31; 76] | 397 |
| **Productivity loss** | 499 [337; 671] | 35 [22; 61] | 464 | 200 [114; 318] | 64 [36; 124] | 136 | 261 [176; 374] | 32 [18; 58] | 229 |
|  Daily allowance | 419 [285; 573] | 19 [10; 37] | 400 | 187 [107; 312] | 9 [3; 24] | 178 | 220 [139; 330] | 8 [3; 21] | 212 |
| **Medical acts** | 188 [140; 280] | 16 [12; 31] | 172 | 118 [96; 148] | 24 [20; 31] | 94 | 181 [152; 238] | 20 [18; 24] | 161 |
|  Laboratory tests | 68 [57; 85] | 4 [3; 6] | 64 | 53 [43; 69] | 7 [6; 10] | 46 | 76 [67; 85] | 6 [5; 7] | 70 |
|  Imaging Acts | 23 [17; 33] | 3 [2; 4] | 20 | 21 [16; 28] | 7 [5; 9] | 14 | 27 [21; 34] | 6 [5; 8] | 21 |
|  Technical Flate rates | 91 [54; 197] | 1 [0; 2] | 90 | 39 [26; 62] | 2 [1; 3] | 37 | 55 [40; 75] | 2 [1; 3] | 53 |
| **Transportation** | 255 [192; 337] | 7 [2; 21] | 248 | 92 [66; 129] | 3 [2; 9] | 89 | 244 [200; 304] | 5 [3; 8] | 239 |
|  Ambulance | 22 [10; 44] | 3 [0; 18] | 19 | 14 [7; 27] | 0 [0; 1] | 14 | 81 [57; 118] | 2 [1; 4] | 79 |
|  Taxi | 111 [73; 173] | 1 [0; 8] | 110 | 42 [25; 72] | 1 [0; 2] | 41 | 97 [72; 130] | 1 [0; 1] | 96 |
|  VSL | 98 [54; 175] | 1 [0; 2] | 97 | 31 [18; 53] | 2 [0; 8] | 29 | 56 [39; 81] | 2 [1; 5] | 54 |
| **Medications (\*\*)** | 592 [449; 812] | 32 [22; 63] | 560 | 427 [302; 613] | 62 [48; 88] | 365 | 908 [803; 1027] | 50 [43; 64] | 858 |
| anti-infectious for systemic use (J) | 45 [25; 131] | 1 [1; 2] | 44 | 39 [20; 109] | 1 [1; 3] | 38 | 42 [29; 72] | 1 [1; 2] | 41 |
| **Antineoplastics and immuno-modulators (L)**  | 351 [251; 477] | 3 [0; 9] | 348 | 227 [153; 343] | 11 [2; 33] | 216 | 533 [460; 614] | 6 [2; 21] | 527 |
|  **Growth Factors (L03AA)** | 335 [242; 462] | - | 335 | 215 [138; 320] | - | 215 | 524 [446; 603] | - | 524 |
| Filgrastim | 66 [34; 131] | - | 66 | 29 [13; 57] | - | 29 | 83 [59; 115] | - | 83 |
| Lenograstim | 207 [137; 307] | - | 207 | 53 [27; 100] | - | 53 | 216 [166; 272] | - | 216 |
| Pegfilgrastim | 62 [25; 133] | - | 62 | 133 [67; 249] | - | 133 | 225 [159; 316] | - | 225 |
| **Blood and hematopoietic organs (B)** | 77 [41; 166] | 2 [1; 6] | 75 | 83 [47; 145] | 3 [2; 6] | 80 | 222 [168; 337] | 2 [2; 4] | 220 |
| Antithrombotic (B01) | 9 [3; 22] | 2 [1; 5] | 7 | 17 [9; 36] | 3 [2; 6] | 14 | 45 [30; 69] | 2 [2; 3] | 43 |
| Antianemic preparations (B03) | 65 [32; 161] | - | 65 | 64 [29; 114] | 0 [0; 1] | 64 | 159 [110; 263] | - | 159 |
| Blood substitutes and infusion solutions (B05) | 4 [1; 17] | - | 4 | 2 [1; 8] | - | 2 | 18 [7; 49] | - | 18 |
|  **Nervous system** | 14 [10; 20] | 5 [3; 10] | 9 | 21 [10; 45] | 9 [6; 13] | 12 | 17 [13; 24] | 8 [6; 13] | 9 |
| **Digestive tracks and metabolism (A)** | 74 [57; 97] | 4 [3; 6] | 70 | 27 [20; 36] | 8 [6; 11] | 19 | 41 [35; 48] | 8 [6; 10] | 33 |
| **Total***All cost differences presented are significant (p<0.01). HL: Hodgkin Lymphoma, FL: Follicular Lymphoma, DLBCL: Diffuse Large B Cells Lymphoma, Other expensive drugs \*: All medication not taken into account in DRG as expensive drugs except Rituximab, (\*\*) : related ATC code, - : No consumption found* | 4690 [3845; 5981] | 212 [142; 432] | 4478 | 4101 [3591; 4731] | 281 [212; 395] | 3820 | 7745 [7071; 8518] | 219 [180; 273] | 7526 |

**Online Resource 5. Monthly costs per patient (€, 2018) according to cost drivers and lymphoma subgroups**