**Appendix**

**Title**: Duration of Antibiotic Use among Adults with Uncomplicated Community-Acquired Pneumonia Requiring Hospitalization in the United States

|  |  |
| --- | --- |
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**Disclaimer**: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

**Appendix Figure 1. Method used to count outpatient length of therapy (LOT) for adults hospitalized for CAP with multiple outpatient antibiotic prescriptions.**



Abbreviations: CAP, community-acquired pneumonia; d/c, discharge; LOT, length of therapy; Rx, prescription.

**Appendix Table 1. Inpatient LOT prediction table: mean length of therapy according to length of stay among adults hospitalized for CAP.**

|  |  |  |
| --- | --- | --- |
|  | **18-64y, Private Insurance** | **≥65y, Medicare Insurance** |
|  | n=6,900 | n=19,139 |
| LOSa | Estimated LOTa,b | Estimated LOTa,c |
| Mean | 95% CI | Mean | 95% CI |
| 2 | 2.48 | 2.43 | 2.52 | 2.46 | 2.43 | 2.49 |
| 3 | 3.42 | 3.37 | 3.46 | 3.37 | 3.34 | 3.98 |
| 4 | 4.36 | 4.30 | 4.41 | 4.31 | 4.28 | 4.35 |
| 5 | 5.30 | 5.23 | 5.36 | 5.22 | 5.17 | 5.26 |
| 6 | 6.32 | 6.24 | 6.41 | 6.11 | 6.06 | 6.16 |
| 7 | 7.10 | 7.00 | 7.20 | 7.04 | 6.97 | 7.10 |
| 8 | 8.05 | 7.92 | 8.17 | 7.73 | 7.64 | 7.80 |
| 9 | 8.87 | 8.72 | 9.02 | 8.67 | 8.56 | 8.76 |
| 10 | 9.87 | 9.68 | 10.05 | 9.34 | 9.22 | 9.47 |
| Abbreviations: CAP, community-acquired pneumonia; CI, confidence interval; LOS, length of stay; LOT, length of treatment.aDaysb18-64y, Private Insurance: R-square: 0.78c≥65y, Medicare Insurance: R-square: 0.73 |

**Appendix Figure 2. Flow diagram of eligibility and inclusion of adults hospitalized for CAP: inpatient prediction cohorts.**



Abbreviations: CAP, community-acquired pneumonia; dx1, primary diagnosis; d/c discharge; HDD, Hospital Drug Database; HIV, human immunodeficiency virus; LOS, length of stay; LOT, length of therapy; PN, pneumonia; PR, Puerto Rico.
aReasons for exclusion not mutually exclusive.

bIn accordance with the CMS data use agreement and for consistency in presentation, actual number and corresponding percent of total were not displayed when cell sizes ≤10.

**Appendix Table 2. Characteristics of adults hospitalized for CAP: inpatient prediction cohorts.**

| **Category** | **Value** | **units** | **18-64y, private insurance** | **≥65y, Medicare insurance** |
| --- | --- | --- | --- | --- |
|  |  |  | n=6,900 | n=19,139 |
|  | **No.** | **%** | **No.** | **%** |
| **Age** | 18-44 | Years | 1,934 | 28 | NA |  |
|  | 45-64 |  | 4,966 | 72 | NA |  |
|  | 65-84 |  | NA |  | 14,932 | 78 |
|  | 85+ |  | NA |  | 4,207 | 22 |
| **Sex** | Male |  | 3,137 | 45 | 9,644 | 50 |
|  | Female |  | 3,763 | 55 | 9,495 | 50 |
| **ICU status** | Any stay |  | 389 | 6 | 1,018 | 5 |
|   | No stay |  | 6,511 | 94 | 18,121 | 95 |
| **Number of hospitals** |  |  | 159 |  | 163 |  |
| **Hospital census region** | Northeast |  | 103 | 1 | 292 | 2 |
|  | South |  | 1,487 | 22 | 3,629 | 19 |
|  | Midwest |  | 4,625 | 67 | 12,500 | 65 |
|  | West |  | 685 | 10 | 2,718 | 14 |
| **Hospital size** | 1-199 | Beds | 2,106 | 31 | 5,567 | 29 |
|  | 200-299 |  | 1,173 | 17 | 3,771 | 20 |
|  | 300-499 |  | 1,906 | 28 | 5,355 | 28 |
|  | ≥500 |  | 1,715 | 25 | 4,446 | 23 |
| **LOS** | 2 | Days | 1,820 | 26 | 4,425 | 23 |
|  | 3 |  | 1,813 | 26 | 4,943 | 26 |
|  | 4 |  | 1,220 | 18 | 3,503 | 18 |
|  | 5 |  | 759 | 11 | 2,349 | 12 |
|  | 6 |  | 485 | 7 | 1,546 | 8 |
|  | 7 |  | 339 | 5 | 1,008 | 5 |
|  | 8 |  | 215 | 3 | 681 | 4 |
|  | 9 |  | 150 | 2 | 413 | 2 |
|  | 10 |  | 99 | 1 | 271 | 1 |
| **DRG** | Median (Q1-Q3) weight |  | 1.0 | 0.7 – 1.0 | 1.0 | 1.0-1.5 |
|  | 193: Simple pneumonia & pleurisy w MCC |  | 1,269 | 18 | 5,071 | 27 |
|  | 194: Simple pneumonia & pleurisy w CC |  | 2,959 | 43 | 8,699 | 45 |
|  | 195: Simple pneumonia & pleurisy w/o CC/MCC |  | 2,183 | 32 | 4,182 | 22 |
| **Admission type** | Elective |  | 492 | 7 | 1,056 | 6 |
|  | Emergency |  | 5,170 | 75 | 14,546 | 76 |
|  | Urgent |  | 1,224 | 18 | 3,502 | 18 |
|  | Other |  | 14 | <1 | 35 | <1 |
| **Discharge diagnoses**a | Heart failure |  | 446 | 6 | 4,419 | 23 |
|  | Chronic obstructive pulmonary disease and Bronchiectasis |  | 1,354 | 20 | 7,913 | 41 |
|  | Bronchiectasis |  | 97 | 1 | 545 | 3 |
|  | Empyema/lung abscess |  | 73 | 1 | 39 | <1 |
|  | Asthma |  | 1,216 | 18 | 1,961 | 10 |
|  | Diabetes |  | 1,566 | 23 | 6,174 | 32 |
|  | Chronic kidney disease |  | 450 | 7 | 4,134 | 22 |
|  | End stage renal disease |  | 105 | 2 | 675 | 4 |
|  | Stroke |  | 46 | 1 | 727 | 4 |
|  | Liver Disease, Cirrhosis and Other Liver Conditions; Viral Hepatitis |  | 309 | 4 | 460 | 2 |
|  | Cancer/malignancy |  | 984 | 14 | 5,115 | 27 |
|  | Other Human Immunodeficiency Virus and/or Acquired Immunodeficiency Syndrome (HIV/AIDS) |  | 34 | <1 | ≤10b | <1 |
| **Procedures**a | Hemodialysis |  | 39 | 1 | 272 | 1 |
|  | Mechanical ventilation |  | 35 | 1 | 50 | <1 |
| **Discharge quarter** | Jan-Mar |  | 2,222 | 32 | 6,670 | 35 |
|  | Apr-Jun |  | 1,692 | 25 | 4,707 | 25 |
|  | Jul-Sep |  | 1,399 | 20 | 3,499 | 18 |
|  | Oct-Dec |  | 1,587 | 23 | 4,263 | 22 |
| Abbreviations: CAP, community-acquired pneumonia; CC, complication or comorbidity; dx, diagnosis; DRG, diagnosis related group; HDD, hospital drug database; HIV/AIDS, Human Immunodeficiency Virus and/or Acquired Immunodeficiency Syndrome; ICU, intensive care unit; IQR, interquartile range; LOS, length of stay; MCC, major complication or comorbidity; NA, not available; Q, quartile.aConstellations of diagnosis and procedure codes for each diagnosis and procedure based on the following resources:-CCW Chronic Conditions: https://www.ccwdata.org/cs/groups/public/documents/document/ccw\_chronic\_cond\_algos.pdf-Other Chronic or Potentially Disabling Conditions: https://www.ccwdata.org/cs/groups/public/documents/document/other\_cond\_algos\_consolidated.pdf-Clinical Classifications Software (CCS) for ICD-9-CM: <https://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp>bIn accordance with the CMS data use agreement and for consistency in presentation, actual number and corresponding percent of total were not displayed when cell sizes ≤10. |

**Appendix Table 3. Actual and predicted values for inpatient LOT among adults hospitalized for CAP with linked inpatient and outpatient antibiotic prescribing records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Mean | 95% Confidence Interval | Median | Q1 - Q3 |
| Estimated LOT | 4.5 | 4.4 | 4.6 | 4.4 | 3.4 | 5.3 |
| Actual LOT | 4.6 | 4.4 | 4.7 | 4 | 3 | 6 |
| Difference | -0.06 | -0.11 | -0.01 | -0.5 | -0.6 | 0.4 |
| Abbreviations: CAP, community-acquired pneumonia; LOT, length of therapy; Q, quartile. |

**Appendix Figure 3. Agreement plot comparing actual and predicted lengths of antibiotic therapy in a sample of adults hospitalized for CAP with linked inpatient and outpatient prescribing records.**



Abbreviations: CCAE, commercial claims and encounters; CAP, community-acquired pneumonia; HDD, hospital drug database; LOT, length of therapy.

Agreement plot comparing predicted vs. actual lengths of therapy in a sample of adults, aged 18-64 years with private insurance, hospitalized for CAP, and whose hospitalizations were present in both CCAE and HDD data.

**Appendix Table 4. Presence of outpatient antibiotic prescriptions by LOS in adults hospitalized for CAP.**

|  |  |  |
| --- | --- | --- |
| **LOS** | **18-64y, private insurance** | **≥65y**, **Medicare insurance** |
| (days) | 0 outpatient ab fills | ≥1 outpatient ab fills | 0 outpatient ab fills | ≥1 outpatient ab fills |
|  | n=4,419 | n=17,709 | n=26,390 | n=104,356 |
|  | No. | % | No. | % | No. | % | No. | % |
| 2 | 1,114 | 17 | 5,342 | 83 | 3,935 | 13 | 27,023 | 87 |
| 3 | 939 | 16 | 4,929 | 84 | 4,992 | 15 | 28,770 | 85 |
| 4 | 727 | 19 | 3,121 | 81 | 4,566 | 19 | 19,994 | 81 |
| 5 | 472 | 21 | 1,792 | 79 | 3,594 | 23 | 12,221 | 77 |
| 6 | 354 | 25 | 1,087 | 75 | 2,993 | 29 | 7,332 | 71 |
| 7 | 311 | 32 | 649 | 68 | 2,436 | 36 | 4,365 | 64 |
| 8 | 222 | 37 | 386 | 63 | 1,758 | 41 | 2,493 | 59 |
| 9 | 159 | 38 | 265 | 63 | 1,276 | 48 | 1,366 | 52 |
| 10 | 121 | 47 | 138 | 53 | 840 | 51 | 792 | 49 |
| Abbreviations: ab, antibiotic; CAP, community-acquired pneumonia; LOS, length of stay; LOT, length of therapy.Denominator: patientNull hypothesis: length of stay is unrelated to whether or not there is an outpatient antibiotic prescription18-64y, private insurance: Chi Square=505; Degrees of Freedom=8; *P*-value <.0001≥65y, Medicare insurance: Chi Square=6785; Degrees of Freedom=8; *P*-value <.0001Reject nullNull hypothesis: patients with longer length of stay (e.g., 9 days) no more likely to have 0 days outpatient antibiotic prescription compared with patients with shorter length of stay (e.g., 3 days)18-64y, private insurance: Odds Ratio 3.1 (2.6, 3.9); *P*-value <.0001≥65y, Medicare insurance: Odds Ratio 5.4 (5.0, 5.8); *P*-value <.0001Reject null |

**Appendix Table 5. Codes used to indicate healthcare utilization.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Indicator | CMS tables | CCAE tables | Code type | Search terms |
| IV antimicrobial therapy | bcarrier, DME, HHA, hospice, outpatient, SNF | Outpatient | HCPCS codes | hcpcs\_cd in('J0456' 'J0540' 'J0560' 'J0561' 'J1956' 'J0697' 'J0744' 'J3490' 'J3370' 'J2020' 'J0696' 'J2543' 'J3490' 'J2185' 'J0692' 'J1335' 'J0743' 'J0278' 'J2280' 'J0290' 'J0295' 'J2510' 'J2540' 'J2543' 'J2700' 'G8709' 'G8710' 'G8711' 'G9314' 'G9315' 'S9494' 'S9497' 'S9500' 'S9501' 'S9502' 'S9503' 'S9504') |
| IV chemotherapy | bcarrier, DME, HHA, hospice, outpatient, SNF | Outpatient | HCPCS codes | substr(hcpcs\_cd,1,2)=’J9’ or hcpcs\_cd in(‘96416’ ‘96425’) |
| Hemodialysis | Outpatient | Outpatient | Revenue center | rev\_cntr in:('082') |
| Abbreviations: bcarrier, Physician/Supplier Part B claims; CMS, Centers for Medicare & Medicaid Services; CCAE, commercial claims and encounters; CAP, community-acquired pneumonia; DME, durable medical equipment; HCPCS, Healthcare Common Procedure Coding System; HHA, home health agency; IV, intravenous; SNF, skilled nursing facility.Notes: HCPCS codes s9494 thru s9504 are antimicrobial (not just antibacterial); 'G9559' and 'G9560' are documented reason for no beta lactamSource: CMS 2015 Table of Drugs, https://www.cms.gov/Medicare/Coding/HCPCSReleaseCodeSets/Downloads/2015-Table-of-Drugs-.pdf; accessed February 3, 2017. |

**Appendix Table 6. Comparison of characteristics of adults hospitalized for CAP with 0 vs. ≥1 outpatient antibiotic fills.**

| Category |  | 18-64y, private insurance | ≥65y, Medicare insurance |
| --- | --- | --- | --- |
|  |  | 0 outpatient ab fills | ≥1 outpatient ab fills | 0 outpatient ab fills | ≥1 outpatient ab fills |
|  |  | n=4,198 | n=17,085 | n=26,390 | n=104,356 |
|  |  | No. | % | No. | % | No. | % | No. | % |
| Baseline (30 days before index admit) |  |  |  |  |  |  |  |  |  |
| SNF claims |  | ≤10a | 0 | ≤10a | 0 | 459 | 2 | 675 | 1 |
| Outpatient claimsb |  | 1,988 | 45 | 6,967 | 39 | 11,374 | 43 | 42,773 | 41 |
| Hospice claims |  | ≤10a | 0 | 19 | 0 | 63 | 0 | 125 | 0 |
| Hemodialysis |  | 107 | 2 | 206 | 1 | 1,705 | 6 | 3,217 | 3 |
| Antimicrobial therapyc |  | 377 | 9 | 1,232 | 7 | 1,640 | 6 | 5,674 | 5 |
| IV chemotherapy |  | 155 | 4 | 599 | 3 | 869 | 3 | 3,697 | 4 |
| Index hospitalization |  |  |  |  |  |  |  |  |  |
| Take home amount>$0 |  | NA |  | NA |  | ≤10a | 0.01 | 20 | 0.02 |
| Follow up (-1 to 3 days after index discharge) |  |  |  |  |  |  |  |  |  |
| SNF claims |  | ≤10a | 0 | ≤10a | 0 | 61 | 0 | ≤10a | 0 |
| Outpatient claimsb |  | 356 | 8 | 1,166 | 7 | 1,017 | 4 | 3,687 | 4 |
| Hospice claims |  | ≤10a | 0 | ≤10a | 0 | 29 | 0 | 20 | 0 |
| Hemodialysis |  | 84 | 2 | 174 | 1 | 736 | 3 | 1,320 | 1 |
| Antimicrobial therapyc,d |  | 133 | 3 | 120 | 1 | 448 | 2 | 706 | 1 |
| IV chemotherapy |  | 11 | 0 | 43 | 0 | 45 | 0 | 223 | 0 |
| Deathse |  | NA |  | NA |  | 167 | 1 | 91 | 0 |
| Abbreviations: ab, antibiotic; CAP, community-acquired pneumonia; IV, intravenous; NA, not available; SNF, skilled nursing facility; y, year.Notes: Denominator: patientaIn accordance with the CMS data use agreement and for consistency in presentation, actual number and corresponding percent of total were not displayed when cell sizes ≤10bHospital-affiliated outpatient claimscAntibiotic/antimicrobial therapy (products, supplies, or services)dLikelihood of receiving antimicrobial-related products: 18-64 year private insurance – OR: 4.4, 95% CI: 3.4-5.6, *P*-value<.0001; ≥65 year Medicare insurance – OR: 2.5, 95% CI: 2.3-2.9, *P*-value<.0001e≥65y, Medicare insurance: Odds Ratio of no outpt ab fill among pts who died post-d/c vs. those who survived): 7.3 (5.7-9.4), *P*<.0001 |

**Appendix Table 7. Total length of antibiotic therapy distribution in adults hospitalized for CAP**.

|  |  |
| --- | --- |
| **LOS (days)** | **18-64y, Private insurance** |
| **n**a | **Min**b,c | **5th pctl** | **Q1** | **Median** | **Mode** | **Mean** | **Q3** | **95th pctl** | **Max** |
| 2 | 6,456 | 2.5 | 2.5 | 6.5 | 9.5 | 9.5 | 8.3 | 9.5 | 12.5 | 30.5 |
| 3 | 5,868 | 3.4 | 3.4 | 7.4 | 10.4 | 10.4 | 9.3 | 10.4 | 13.4 | 31.4 |
| 4 | 3,848 | 4.4 | 4.4 | 7.4 | 10.4 | 11.4 | 10.1 | 11.4 | 14.4 | 32.4 |
| 5 | 2,264 | 5.3 | 5.3 | 8.3 | 10.3 | 12.3 | 10.8 | 12.3 | 15.3 | 33.3 |
| 6 | 1,441 | 6.3 | 6.3 | 7.3 | 11.3 | 6.3 | 11.7 | 13.3 | 20.3 | 34.3 |
| 7 | 960 | 7.1 | 7.1 | 7.1 | 12.1 | 7.1 | 11.9 | 14.1 | 19.1 | 35.1 |
| 8 | 608 | 8.1 | 8.1 | 8.1 | 13.1 | 8.1 | 12.4 | 15.1 | 20.1 | 36.1 |
| 9 | 424 | 8.9 | 8.9 | 8.9 | 13.9 | 8.9 | 13.7 | 15.9 | 22.9 | 36.9 |
| 10 | 259 | 9.9 | 9.9 | 9.9 | 12.9 | 9.9 | 14.1 | 16.9 | 23.9 | 33.9 |
| Overall | 22,128 | 2.5 | 2.5 | 7.4 | 9.5 | 9.5 | 9.8 | 12.3 | 16.3 | 36.9 |

|  |  |
| --- | --- |
| **LOS (days)** | **≥65y, Medicare insurance** |
| **n**a | **Min**b,c | **5th pctl** | **Q1** | **Median** | **Mode** | **Mean** | **Q3** | **95th pctl** | **Max** |
| 2 | 30,958 | 2.5 | 2.5 | 6.5 | 8.5 | 9.5 | 8.4 | 9.5 | 12.5 | 30.5 |
| 3 | 33,762 | 3.4 | 3.4 | 7.4 | 9.4 | 10.4 | 9.0 | 10.4 | 13.4 | 31.4 |
| 4 | 24,560 | 4.3 | 4.3 | 7.3 | 9.3 | 11.3 | 9.5 | 11.3 | 14.3 | 32.3 |
| 5 | 15,815 | 5.2 | 5.2 | 7.2 | 10.2 | 5.2 | 10.1 | 12.2 | 15.2 | 33.2 |
| 6 | 10,325 | 6.1 | 6.1 | 6.1 | 11.1 | 6.1 | 10.6 | 13.1 | 16.1 | 34.1 |
| 7 | 6,801 | 7.0 | 7.0 | 7.0 | 11.0 | 7.0 | 11.2 | 14.0 | 17.0 | 35.0 |
| 8 | 4,251 | 7.7 | 7.7 | 7.7 | 11.7 | 7.7 | 11.6 | 14.7 | 17.7 | 35.7 |
| 9 | 2,642 | 8.7 | 8.7 | 8.7 | 10.7 | 8.7 | 12.2 | 15.7 | 18.7 | 36.7 |
| 10 | 1,632 | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 | 12.7 | 16.3 | 19.3 | 37.3 |
| Overall | 130,746 | 2.5 | 3.4 | 7.4 | 9.5 | 10.4 | 9.5 | 11.4 | 15.3 | 37.3 |

|  |
| --- |
| Abbreviations: CAP, community-acquired pneumonia; LOS, length of stay; max, maximum; min, minimum; pctl, percentile; Q1, quartile 1; Q3, quartile 3.an: number of patient hospitalizations.bnumber of days prescribed ≥1 antibiotic.cMethod for handling multiple prescriptions: earliest start date and latest end date. |

**Appendix Table 8. Rank of antibiotic class selections among adults hospitalized for CAP.**

1. **Inpatient 18-64y, Private Insurance**

|  |  |  |  |
| --- | --- | --- | --- |
| **Antibiotic class** | **Overall** | **ICU** | **non-ICU** |
| n=51,568 | n=4,112 | n=47,456 |
| **n** | **%**a | **n** | **%** | **n** | **%** |
| 3rd, 4th Generation Cephalosporins | 13,559 | 26 | 952 | 23 | 12,607 | 27 |
| 8:12.18 Quinolones | 12,704 | 25 | 979 | 24 | 11,725 | 25 |
| 8:12.12.92 Other Macrolides | 11,497 | 22 | 770 | 19 | 10,727 | 23 |
| Beta-lactam and enzyme inhibitorb | 4,610 | 9 | 470 | 11 | 4,140 | 9 |
| 8:12.28.16 Glycopeptides | 4,167 | 8 | 505 | 12 | 3,662 | 8 |
| 8:12.24 Tetracyclines | 959 | 2 | 73 | 2 | 886 | 2 |
| 8:12.07.08 Carbapenems | 820 | 2 | 71 | 2 | 749 | 2 |
| 8:12.28.24 Oxazolidinones | 663 | 1 | 82 | 2 | 581 | 1 |
| 8:12.28.20 Lincomycins | 443 | 1 | 63 | 2 | 380 | 1 |
| J01XD Imidazole derivatives | 411 | 1 | 33 | 1 | 378 | 1 |
| 1st, 2nd Generation Cephalosporins | 369 | 1 | 24 | 1 | 345 | 1 |
| 8:12.20 Sulfonamides | 336 | 1 | 22 | 1 | 314 | 1 |
| 8:12.02 Aminoglycosides | 255 | 0 | 29 | 1 | 226 | 0 |
| 8:12.07.16 Monobactams | 235 | 0 | 18 | 0 | 217 | 0 |
| 8:12.06.20 Fifth Generation Cephalosporins | 177 | 0 | ≤10c | 0 | 174 | 0 |
| 8:12.12.04 Erythromycins | 129 | 0 | ≤10c | 0 | 120 | 0 |
| 8:12.16.08 Aminopenicillins | 42 | 0 | ≤10c | 0 | 39 | 0 |
| 8:12.16.04 Natural Penicillins | 38 | 0 | ≤10c | 0 | 38 | 0 |
| 8:16.04 Antituberculosis Agents | 31 | 0 | ≤10c | 0 | 27 | 0 |
| 8:12.28.12 Cyclic Lipopeptides | 30 | 0 | ≤10c | 0 | 29 | 0 |
| 8:16.92 Miscellaneous Antimycobacterials | 28 | 0 | ≤10c | 0 | 28 | 0 |
| 8:12.24.12 Glycylcyclines | 25 | 0 | ≤10c | 0 | 25 | 0 |
| 8:36 Urinary Anti-infectives | 15 | 0 | ≤10c | 0 | 15 | 0 |
| 8:12.28.28 Polymyxins | 14 | 0 | ≤10c | 0 | 14 | 0 |
| 8:12.16.12 Penicillinase-resistant Penicillins | 11 | 0 | ≤10c | 0 | ≤10c | 0 |

1. **Inpatient ≥65y, Medicare Insurance**

|  |  |  |  |
| --- | --- | --- | --- |
| **Antibiotic class** | **Overall** | **ICU** | **non-ICU** |
| n=138,833 | n=9,466 | n=129,367 |
| **n** | **%**a | **n** | **%** | **n** | **%** |
| 3rd, 4th Generation Cephalosporins | 37,827 | 27 | 2,194 | 23 | 35,633 | 28 |
| 8:12.18 Quinolones | 34,469 | 25 | 2,282 | 24 | 32,187 | 25 |
| 8:12.12.92 Other Macrolides | 31,589 | 23 | 1,693 | 18 | 29,896 | 23 |
| Beta-lactam and enzyme inhibitorb | 12,446 | 9 | 1,167 | 12 | 11,279 | 9 |
| 8:12.28.16 Glycopeptides | 9,109 | 7 | 1,019 | 11 | 8,090 | 6 |
| 8:12.24 Tetracyclines | 2,476 | 2 | 134 | 1 | 2,342 | 2 |
| 8:12.07.08 Carbapenems | 2,213 | 2 | 292 | 3 | 1,921 | 1 |
| 8:12.28.24 Oxazolidinones | 1,419 | 1 | 166 | 2 | 1,253 | 1 |
| J01XD Imidazole derivatives | 1,327 | 1 | 113 | 1 | 1,214 | 1 |
| 1st, 2nd Generation Cephalosporins | 1,232 | 1 | 99 | 1 | 1,133 | 1 |
| 8:12.07.16 Monobactams | 1,137 | 1 | 83 | 1 | 1,054 | 1 |
| 8:12.28.20 Lincomycins | 1,032 | 1 | 84 | 1 | 948 | 1 |
| 8:12.02 Aminoglycosides | 694 | 0 | 30 | 0 | 664 | 1 |
| 8:12.20 Sulfonamides | 503 | 0 | 42 | 0 | 461 | 0 |
| 8:12.12.04 Erythromycins | 341 | 0 | ≤10c | 0 | 339 | 0 |
| 8:12.06.20 Fifth Generation Cephalosporins | 246 | 0 | 17 | 0 | 229 | 0 |
| 8:36 Urinary Anti-infectives | 190 | 0 | ≤10c | 0 | 185 | 0 |
| 8:12.16.08 Aminopenicillins | 159 | 0 | ≤10c | 0 | 150 | 0 |
| 8:12.24.12 Glycylcyclines | 110 | 0 | ≤10c | 0 | 106 | 0 |
| 8:16.04 Antituberculosis Agents | 87 | 0 | ≤10c | 0 | 78 | 0 |
| 8:12.16.16 Extended-spectrum Penicillins | 64 | 0 | ≤10c | 0 | 64 | 0 |
| 8:12.16.04 Natural Penicillins | 61 | 0 | 11 | 0 | 50 | 0 |
| 8:12.28.12 Cyclic Lipopeptides | 50 | 0 | 11 | 0 | 39 | 0 |
| 8:16.92 Miscellaneous Antimycobacterials | 24 | 0 | ≤10c | 0 | 24 | 0 |
| 8:12.07.12 Cephamycins | 12 | 0 | ≤10c | 0 | 12 | 0 |
| 8:12.16.12 Penicillinase-resistant Penicillins | ≤10b | 0 | ≤10c | 0 | ≤10c | 0 |
| 8:12.28.28 Polymyxins | ≤10b | 0 | ≤10c | 0 | ≤10c | 0 |

1. **Outpatient**

|  |  |  |
| --- | --- | --- |
| **Antibiotic class** | **18-64 years****Private Insurance** | **≥65 years****Medicare Insurance** |
| n=22,134 | n=124,454 |
| **n** | **%**a | **n** | **%** |
| 8:12.18 Quinolones | 10,756 | 49 | 57,979 | 47 |
| 8:12.12.92 Other Macrolides | 4,013 | 18 | 22,370 | 18 |
| 1st, 2nd Generation Cephalosporins | 2,001 | 9 | 13,861 | 11 |
| Beta-lactam and enzyme inhibitorb | 1,760 | 8 | 9,491 | 8 |
| 3rd, 4th Generation Cephalosporins | 1,693 | 8 | 10,525 | 8 |
| 8:12.24 Tetracyclines | 859 | 4 | 4,900 | 4 |
| 8:12.20 Sulfonamides | 260 | 1 | 1,313 | 1 |
| 8:12.28.20 Lincomycins | 227 | 1 | 1,001 | 1 |
| J01XD Imidazole derivatives | 204 | 1 | 1,126 | 1 |
| 8:12.28.24 Oxazolidinones | 172 | 1 | 393 | 0 |
| 8:12.16.08 Aminopenicillins | 101 | 0 | 824 | 1 |
| 8:12.28.16 Glycopeptides | 24 | 0 | 179 | 0 |
| 8:36 Urinary Anti-infectives | 16 | 0 | 221 | 0 |
| 8:12.02 Aminoglycosides | ≤10c | 0 | 40 | 0 |
| 8:12.16.04 Natural Penicillins | 11 | 0 | 41 | 0 |
| 8:12.12.04 Erythromycins | 11 | 0 | 56 | 0 |
| 8:16.04 Antituberculosis Agents | ≤10c | 0 | 46 | 0 |
| 8:12.16.12 Penicillinase-resistant Penicillins | ≤10c | 0 | 29 | 0 |
| 8:12.07.16 Monobactams | ≤10c | 0 | ≤10c | 0 |
| 8:12.28.28 Polymyxins | ≤10c | 0 | ≤10c | 0 |
| 8:16.92 Miscellaneous Antimycobacterials | ≤10c | 0 | ≤10c | 0 |
| 8:12.07.08 Carbapenems | ≤10c | 0 | 38 | 0 |
| 8:12.06.20 Fifth Generation Cephalosporins | ≤10c | 0 | ≤10c | 0 |
| 8:12.24.12 Glycylcyclines | ≤10c | 0 | ≤10c | 0 |
| 8:12.28.12 Cyclic Lipopeptides | ≤10c | 0 | ≤10c | 0 |
| 8:12.28.30 Rifamycins | ≤10c | 0 | ≤10c | 0 |

|  |
| --- |
| Abbreviations: CAP, community-acquired pneumonia; HDD, hospital drug database; ICU, intensive care unit; LOS, length of stay; LOT, length of therapy.aInpatient antibiotic class selection data was ranked by days of therapy.Outpatient antibiotic class selection was ranked at the prescription level.Percent selection for a given antibiotic class was calculated as follows:-Inpatient setting: # days of therapy for given antibiotic class/total # days of therapy.-Outpatient setting: # prescriptions for a given antibiotic class/total # prescriptions.bβ-lactam combinations refers only to β-lactam/ β-lactamase combinations.cIn accordance with the CMS data use agreement and for consistency in presentation, actual number and corresponding percent of total were not displayed when cell sizes ≤10. |

**Appendix Figure 4. Routes of administration among adults hospitalized for CAP: inpatient prediction cohorts.**



Abbreviations: CAP, community-acquired pneumonia; DOTs, days of therapy.

Denominator: all inpatient days of therapy

**Appendix Table 9. Routes of administration for outpatient antibiotic prescriptions among adults hospitalized for CAP.**

|  |  |  |
| --- | --- | --- |
| **Route** | **18-64y, private insurance** | **≥65y**, **Medicare insurance** |
|  | n=22,134 | n=124,454 |
|  | No. | % | No. | % |
| Inhalation | ≤10a | 0 | ≤10a | 0 |
| Intramuscular | ≤10a | 0 | ≤10a | 0 |
| Intravenousb | 25 | 0.1 | 495 | 0.4 |
| Oral | 22,109 | 99.9 | 123,957 | 99.6 |
| Abbreviation: CAP, community-acquired pneumonia.aIn accordance with the CMS data use agreement and for consistency in presentation, actual number and corresponding percent of total were not displayed when cell sizes ≤10.bIncludes routes listed as intravenous or injection. |