Supplementary Appendix

Supplemental Table 1. Antibiotic Agent by Oral Infection Type

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Irreversible Pulpitis (N=385,040 visits)** | **Apical Periodontitis (N=33,938 visits)** | **Acute Apical Abscess**  **(N=51,061 visits)** |
| **Visits that received >1 antibiotic, % (No.)** | **11.7% (45,240)** | **17.7% (5,992)** | **27.7% (14,121)** |
| Amoxicillin, % (No.) | 59.8% (27,039) | 59.9% (3,588) | 56.6% (7,989) |
| Amoxicillin/clavulanate, % (No.) | 6.6% (2,968) | 8.0% (479) | 10.4% (1,468) |
| Clindamycin, % (No.) | 14.3% (6,477) | 14.9% (890) | 21.0% (2,959) |
| Penicillin, % (No.) | 4.7% (2,109) | 6.6% (393) | 9.0% (1,273) |
| Cephalexin, % (No.) | 2.5% (1,137) | 1.5% (91) | 1.6% (227) |
| Azithromycin, % (No.) | 3.7% (1,662) | 3.3% (200) | 2.3% (325) |
| Doxycycline, % (No.) | 3.7% (1,695) | 2.8% (170) | 1.9% (268) |
| Other, % (No.) | 9.5% (4,278) | 7.0% (421) | 4.7% (666) |

Total percentage exceeds 100% due to some patient encounters being associated with ≥1 antibiotic

Supplemental Table 2. Parsimonious Sensitivity Analysis Excluding Immunocompromised Patients: Variables Associated with Antibiotic Prescribing by Acute Oral Infection Type

|  |  |  |
| --- | --- | --- |
| ***Irreversible Pulpitis: Parsimonious model adjusted odds ratios*** | | |
| **Variable** | **OR (95% C.L.)** | ***p* value** |
| Age ≥65 years |  |  |
| *18 to 64* | *Reference* | - |
| *65 and older* | 1.08 (1.04-1.11) | <0.0001 |
| Region |  |  |
| *Northeast* | *Reference* | - |
| *Midwest* | 1.22 (1.16-1.28) | <0.0001 |
| *South* | 1.03 (0.99-1.08) | 0.1466 |
| *West* | 0.87 (0.83-0.92) | <0.0001 |
| *Other/Missing* | 1.05 (0.92-1.2) | 0.4338 |
| Charlson Comorbidity Index |  |  |
| *Score 0* | *Reference* | - |
| *Score 1* | 1.7 (1.19-2.44) | 0.0036 |
| *Score 2+* | 1.85 (1.49-2.29) | <0.0001 |
| Prosthetic joint | 1.76 (1.7-1.83) | <0.0001 |
| ≥4 CDT procedure codes per visit | 0.93 (0.9-0.96) | <0.0001 |
| **CDT Procedure Code Present** |  |  |
| *Adjunctive procedure* | 1.22 (1.17-1.28) | <0.0001 |
| *Diagnostic procedure* | 1.53 (1.48-1.58) | <0.0001 |
| *Endodontic procedure* | 2.49 (2.35-2.63 | <0.0001 |
| *Implant procedure* | 3.34 (3.08-3.62) | <0.0001 |
| *Oral maxillofacial surgical procedure* | 5.06 (4.88-5.25) | <0.0001 |
| *Periodontic procedure* | 0.73 (0.7-0.77) | <0.0001 |
| *Preventive procedure* | 0.56 (0.53-0.59) | <0.0001 |
| *Removable prosthodontic procedure* | 0.67 (0.62-0.72) | <0.0001 |
| *Fixed prosthodontic procedure* | 0.62 (0.54-0.7) | <0.0001 |
| *Restorative procedure* | 0.59 (0.57-0.61) | <0.0001 |
| ***Apical periodontitis: Parsimonious model adjusted odds ratios*** | | |
| **Variable** | **OR (95% C.L.)** | ***p* value** |
| Region |  |  |
| *Northeast* | *Reference* |  |
| *Midwest* | 1 (0.85-1.16) | 0.9641 |
| *South* | 1.14 (1.01-1.29) | 0.0404 |
| *West* | 0.83 (0.72-0.95) | 0.0078 |
| *Other/Missing* | 1.12 (0.66-1.9) | 0.6828 |
| Prosthetic Joint | 1.54 (1.38-1.72) | <0.0001 |
| **CDT Procedure Code Present** |  |  |
| *Adjunctive procedure* | 1.4 (1.26-1.56) | <0.0001 |
| *Diagnostic procedure* | 1.7 (1.56-1.85) | <0.0001 |
| *Endodontic procedure* | 1.88 (1.67-2.12) | <0.0001 |
| *Implant procedure* | 3.65 (2.88-4.62) | <0.0001 |
| *Oral maxillofacial surgery procedure* | 3.92 (3.52-4.36) | <0.0001 |
| *Periodontic procedure* | 0.75 (0.68-0.83) | <0.0001 |
| *Fixed prosthetic procedure* | 0.7 (0.49-0.99) | 0.0447 |
| ***Acute Apical Abscess: Parsimonious model adjusted odds ratios*** | | |
| **Variable** | **OR (95% C.L.)** | ***p* value** |
| Age ≥65 years |  |  |
| *18 to 64* | *Reference* | . |
| *65 and older* | 0.83 (0.78-0.88) | <0.0001 |
| Prosthetic joint | 1.35 (1.23-1.47) | <0.0001 |
| ≥4 CDT procedure codes per visit | 0.91 (0.85-0.97) | 0.0033 |
| **CDT Procedure Code Present** |  |  |
| *Endodontic procedure* | 0.0033 | <0.0001 |
| *Implant procedure* | 1.66 (1.32-2.09) | <0.0001 |
| *Oral maxillofacial surgical procedure* | 2.95 (2.76-3.16) | <0.0001 |
| *Preventive procedure* | 0.42 (0.37-0.48) | <0.0001 |
| *Removable prosthodontic procedure* | 0.61 (0.52-0.72) | <0.0001 |
| *Fixed prosthetic procedure* | 0.52 (0.4-0.67) | <0.0001 |

Reference values used above were values for when variable was not present unless otherwise noted.

Model: Include variable if p<0.05 in full model.

Supplemental Table 3. Parsimonious Sensitivity Analysis Excluding Patients with Antibiotic Days Supply Less than Three: Variables Associated with Antibiotic Prescribing by Acute Oral Infection Type

|  |  |  |
| --- | --- | --- |
| ***Irreversible Pulpitis: Parsimonious model adjusted odds ratios*** | | |
| **Variable** | **OR (95% C.L.)** | ***p* value** |
| Region |  |  |
| *Northeast* | *Reference* | - |
| *Midwest* | 1.09 (1.04-1.14) | 0.0003 |
| *South* | 1.02 (0.99-1.07) | 0.2203 |
| *West* | 0.9 (0.86-0.94) | <0.0001 |
| *Other/Missing* | 0.94 (0.84-1.04) | 0.2378 |
| Charlson Comorbidity Index |  |  |
| *Score 0* | *Reference* | - |
| *Score 1* | 1.46 (1.06-2) | 0.0198 |
| *Score 2+* | 1.52 (1.27-1.81) | <0.0001 |
| Cardiac condition | 1.38 (1.33-1.43) | <0.0001 |
| Prosthetic joint | 1.5 (1.45-1.55) | <0.0001 |
| ≥4 CDT procedure codes per visit | 0.92 (0.89-0.95) | <0.0001 |
| **CDT Procedure Code Present** |  |  |
| *Adjunctive procedure* | 1.22 (1.17-1.27) | <0.0001 |
| *Diagnostic procedure* | 1.59 (1.54-1.63) | <0.0001 |
| *Endodontic procedure* | 2.6 (2.48-2.72) | <0.0001 |
| *Implant procedure* | 3.3 (3.08-3.53) | <0.0001 |
| *Oral maxillofacial surgical procedure* | 5.42 (5.25-5.6) | <0.0001 |
| *Periodontic procedure* | 0.73 (0.7-0.76) | <0.0001 |
| *Preventive procedure* | 0.53 (0.51-0.56) | <0.0001 |
| *Removable prosthodontic procedure* | 0.69 (0.65-0.73) | <0.0001 |
| *Fixed prosthodontic procedure* | 0.63 (0.57-0.71) | <0.0001 |
| *Restorative procedure* | 0.6 (0.58-0.61) | <0.0001 |
| ***Apical periodontitis: Parsimonious model adjusted odds ratios*** | | |
| **Variable** | **OR (95% C.L.)** | ***p* value** |
| Region |  |  |
| *Northeast* | *Reference* | . |
| *Midwest* | 0.85 (0.74-0.98) | 0.0211 |
| *South* | 1.09 (0.98-1.23) | 0.1244 |
| *West* | 0.83 (0.73-0.94) | 0.0035 |
| *Other/Missing* | 1.17 (0.82-1.69) | 0.3896 |
| Infective endocarditis history | 1.3 (1.17-1.44) | <0.0001 |
| Prosthetic joint | 1.31 (1.19-1.44) | <0.0001 |
| ≥4 CDT procedure codes per visit | 0.88 (0.82-0.94) | 0.0001 |
| **CDT Procedure Code Present** | - | - |
| *Adjunctive procedure* | 1.71 (1.58-1.84) | <0.0001 |
| *Diagnostic procedure* | 1.91 (1.72-2.12) | <0.0001 |
| *Endodontic procedure* | 3.78 (3.08-4.63) | <0.0001 |
| *Oral maxillofacial surgical procedure* | 4.18 (3.81-4.59) | <0.0001 |
| *Periodontic procedure* | 0.72 (0.66-0.79) | <0.0001 |
| *Preventive procedure* | 0.47 (0.4-0.55) | <0.0001 |
| *Removable prosthodontic procedure* | 0.6 (0.49-0.75) | <0.0001 |
| *Restorative procedure* | 0.48 (0.44-0.53) | <0.0001 |
| ***Acute Apical Abscess: Parsimonious model adjusted odds ratios*** | | |
| **Variable** | **OR (95% C.L.)** | ***p* value** |
| Age ≥65 years |  |  |
| *18 to 64* | *Reference* | . |
| *65 and older* | 0.78 (0.74-0.83) | <0.0001 |
| Race |  |  |
| *White* | *Reference* | . |
| *Black* | 1.04 (0.97-1.1) | 0.2805 |
| *Other* | 0.92 (0.8-1.05) | 0.1979 |
| *Missing* | 0.88 (0.78-0.99) | 0.0314 |
| Prosthetic joint | 1.24 (1.15-1.33) | <0.0001 |
| ≥4 CDT procedure codes per visit | 0.9 (0.85-0.95) | 0.0002 |
| **CDT Procedure Code Present** |  |  |
| *Adjunctive procedure* | 1.15 (1.07-1.23) | 0.0002 |
| *Diagnostic procedure* | 2.1 (1.98-2.22) | <0.0001 |
| *Endodontic procedure* | 1.75 (1.63-1.88) | <0.0001 |
| *Implant procedure* | 1.5 (1.25-1.82) | <0.0001 |
| *Oral maxillofacial surgical procedure* | 3.09 (2.91-3.27) | <0.0001 |
| *Preventive procedure* | 0.41 (0.37-0.46) | <0.0001 |

Reference values used above were values for when variable was not present unless otherwise noted.

If Days Supply = 1 or 2 for a given antibiotic, then changed that antibiotic from Yes to No.

Supplemental Table 4. Parsimonious Sensitivity Analysis Excluding Patients with History of High-risk Cardiac Conditions: Variables Associated with Antibiotic Prescribing by Acute Oral Infection Type

|  |  |  |
| --- | --- | --- |
| ***Irreversible Pulpitis: Parsimonious model adjusted odds ratios*** | | |
| **Variable** | **OR (95% C.L.)** | ***p* value** |
| Age ≥65 years |  |  |
| *18 to 64* | *Reference* | . |
| *65 and older* | 1.04 (1.02-1.07) | 0.0013 |
| Region |  |  |
| *Northeast* | *Reference* | . |
| *Midwest* | 1.2 (1.15-1.26) | <0.0001 |
| *South* | 1.04 (1-1.09) | 0.0412 |
| *West* | 0.86 (0.82-0.9) | <0.0001 |
| *Other/Missing* | 1.04 (0.93-1.16) | 0.4995 |
| Charlson Comorbidity Index |  |  |
| *Score 0* | *Reference* | . |
| *Score 1* | 1.32 (0.83-2.11) | 0.2469 |
| *Score 2+* | 1.81 (1.46-2.24) | <0.0001 |
| Prosthetic joint | 1.76 (1.7-1.82) | <0.0001 |
| ≥4 CDT procedure codes per visit | 0.92 (0.89-0.94) | <0.0001 |
| **CDT Procedure Code Present** |  |  |
| *Adjunctive procedure* | 1.24 (1.19-1.29) | <0.0001 |
| *Diagnostic procedure* | 1.56 (1.51-1.6) | <0.0001 |
| *Endodontic procedure* | 2.49 (2.36-2.61) | <0.0001 |
| *Implant procedure* | 3.29 (3.05-3.53) | <0.0001 |
| *Oral maxillofacial surgical procedure* | 5.22 (5.05-5.4) | <0.0001 |
| *Periodontic procedure* | 0.76 (0.73-0.8) | <0.0001 |
| *Preventive procedure* | 0.57 (0.54-0.59) | <0.0001 |
| *Removable prosthodontic procedure* | 0.69 (0.65-0.74) | <0.0001 |
| *Fixed prosthodontic procedure* | 0.68 (0.61-0.76) | <0.0001 |
| *Restorative procedure* | 0.6 (0.58-0.62) | <0.0001 |
| ***Apical periodontitis: Parsimonious model adjusted odds ratios*** | | |
| **Variable** | **OR (95% C.L.)** | ***p* value** |
| Region |  |  |
| *Northeast* | Reference | . |
| *Midwest* | 0.93 (0.8-1.08) | 0.3132 |
| *South* | 1.11 (0.98-1.26) | 0.0961 |
| *West* | 0.79 (0.69-0.91) | 0.0011 |
| *Other/Missing* | 1.13 (0.77-1.67) | 0.5273 |
| Prosthetic joint | 1.54 (1.38-1.7) | <0.0001 |
| **CDT Procedure Code Present** |  |  |
| *Adjunctive procedure* | 1.4 (1.27-1.55) | <0.0001 |
| *Diagnostic procedure* | 1.69 (1.56-1.83) | <0.0001 |
| *Endodontic procedure* | 1.88 (1.68-2.1) | <0.0001 |
| *Implant procedure* | 3.75 (2.99-4.7) | <0.0001 |
| *Oral maxillofacial surgical procedure* | 4.22 (3.82-4.66) | <0.0001 |
| *Periodontic procedure* | 0.76 (0.69-0.84) | <0.0001 |
| *Preventive procedure* | 0.49 (0.41-0.59) | <0.0001 |
| *Removable prosthodontic procedure* | 0.55 (0.43-0.69) | <0.0001 |
| *Fixed prosthodontic procedure* |  |  |
| *Restorative procedure* | 0.51 (0.46-0.56) | <0.0001 |
| **Acute Apical Abscess: Parsimonious model adjusted odds ratios** | | |
| **Variable** | **OR (95% C.L.)** | ***p* value** |
| Age ≥65 years |  |  |
| *18 to 64* | *Reference* | . |
| *65 and older* | 0.81 (0.77-0.86) | <0.0001 |
| Region |  |  |
| *Northeast* | Reference | . |
| *Midwest* | 1.14 (1.03-1.26) | 0.013 |
| *South* | 1.19 (1.09-1.3) | <0.0001 |
| *West* | 0.96 (0.87-1.06) | 0.418 |
| *Other/Missing* | 1.1 (0.89-1.36) | 0.3625 |
| Prosthetic joint | 1.35 (1.25-1.46) | <0.0001 |
| ≥4 CDT procedure codes per visit | 0.9 (0.85-0.95) | 0.0004 |
| **CDT Procedure Code Present** |  |  |
| *Adjunctive procedure* | 1.14 (1.06-1.23) | 0.0008 |
| *Diagnostic procedure* | 2.13 (2-2.26) | <0.0001 |
| *Endodontic procedure* | 1.68 (1.56-1.81) | <0.0001 |
| *Implant procedure* | 1.55 (1.28-1.89) | <0.0001 |
| *Oral maxillofacial surgical procedure* | 3.09 (2.9-3.29) | <0.0001 |
| *Periodontic procedure* | 0.73 (0.66-0.8) | <0.0001 |
| *Preventive procedure* | 0.43 (0.38-0.49) | <0.0001 |

Reference values used above were values for when variable was not present unless otherwise noted.

Keep all Days Supply, including 1 or 2 days.

Exclude if cardiac condition.

Supplemental Table 5: ICD Codes Associated with Acute Oral Infections by Type

|  |  |
| --- | --- |
| Irreversible pulpitis codes | K02.63 - Dental caries on smooth surface penetrating into pulp  K02.7 - Dental root caries |
| Apical periodontitis codes: | K04.4 - Acute apical periodontitis of pulpal origin  K05.20 - Aggressive periodontitis, unspecified  K05.211 Aggressive periodontitis, localized, slight  K05.212 Aggressive periodontitis, localized, moderate  K05.213 Aggressive periodontitis, localized, severe  K05.219 -Aggressive periodontitis, localized, unspecified severity  K05.221 - Aggressive periodontitis, generalized, slight  K05.222 – Aggressive periodonitits, generalized, moderate |
| Acute apical abscess code: | K04.6 - Periapical abscess with sinus |