***APPENDICES***

***Appendix A. Parameter Values and Distributions***

Table A-1 details the input values used in the model and respective sources. Ranges used for one-way sensitivity analysis and distributions used for probabilistic sensitivity analysis appear in table A-2.

Table A-1. Complete Set of Parameters Used in the Model

| **Parameter Description** | **Value** | **Source** |
| --- | --- | --- |
| **Population Parameters** | | |
| Pop 6 mo–2 yr | 6,137,688 | U.S. Census Bureau (2018) [1] |
| Pop 2 yr–6 yr | 16,142,086 | U.S. Census Bureau (2018) [1] |
| Pop 6 yr–12 yr | 28,627,975 | U.S. Census Bureau (2018) [1] |
| Pop 6 mo–12 yr | 50,907,749 | U.S. Census Bureau (2018) [1] |
| Pop 3 yr–12 yr | 40,687,830 | U.S. Census Bureau (2018) [1] |
| OM Incidence 6 mo–2 yr | 50.10 | Kawai et al. (2018) [2] |
| OM Incidence 2 yr–6 yr | 19.20 | Kawai et al. (2018) [2] |
| OM Incidence 6 yr–12 yr | 6.50 | Kawai et al. (2018) [2] |
| AS incidence | 1.13 | Shapiro et al. (2011) [3] |
| GAS incidence | 4.95 | Dooling et al. (2014) [4] |
| Proportion on antibiotics, OM | 0.86 | Suaya et al. (2018) [5] |
| Proportion on antibiotics, AS | 0.82 | Shapiro et al. (2011) [3] |
| Proportion on antibiotics, GAS | 1 | Expert opinion |
| Proportion on narrow spectrum, OM, 6mo–2 yr | 0.65 | Suaya et al. (2018) [5] |
| Proportion on narrow spectrum, OM, 2 yr–6 yr | 0.65 | Suaya et al. (2018) [5] |
| Proportion on narrow spectrum, OM, 6 yr–12 yr | 0.65 | Suaya et al. (2018) [5] |
| Proportion on narrow spectrum, AS | 0.58 | Shapiro et al. (2011) [3] |
| Proportion on narrow spectrum, GAS | 0.76 | Gidengil et al. (2013) [6] |
| Exclusion of penicillin-allergic children | 0.88 | Vyles et al. (2017) [7]; Kerr et al. (1994) [8]; Lee et al. (2000) [9]; Nicklas et al. (1999) [10] |
| Gerber et al. (2017) result implementation (proportion of children with narrow-spectrum antibiotic prescription) | 1.000 | Implementation of Gerber findings [11] |
| **Gerber et al. (2017) Clinical Findings** | | |
| TF prob, narrow, OM, 6 mo–2 yr, 2 yr-6 yr, & 6 yr-12 yr | 0.035 | Weighted average of age-specific results, personal communication with Dr. Gerber |
| TF prob, narrow, AS | 0.015 | Gerber et al. (2017) [11] |
| TF prob, narrow, GAS | 0.024 | Gerber et al. (2017) [11] |
| TF prob, broad, OM, 6 mo–2 yr, 2 yr-6 yr, & 6 yr-12 yr | 0.046 | Weighted average of age-specific results, personal communication with Dr. Gerber |
| TF risk diff, broad, AS | 0.005 | Gerber et al. (2017) [11] |
| TF risk diff, broad, GAS | -0.013 | Gerber et al. (2017) [11] |
| ADR prob (retrospective), narrow, OM | 0.031 | Gerber et al. (2017) [11] |
| ADR prob (retrospective), narrow , AS | 0.018 | Gerber et al. (2017) [11] |
| ADR prob (retrospective), narrow, GAS | 0.021 | Gerber et al. (2017) [11] |
| ADR risk diff (retrospective), broad, OM | 0.018 | Gerber et al. (2017) [11] |
| ADR risk diff (retrospective), broad, AS | -0.004 | Gerber et al. (2017) [11] |
| ADR risk diff (retrospective), broad, GAS | 0.001 | Gerber et al. (2017) [11] |
| **Gerber et al. (2017) Productivity Findings** | | |
| Missed school prob, narrow, OM | 0.350 | Gerber et al. (2017) [11] |
| Missed school prob, narrow, AS | 0.280 | Gerber et al. (2017) [11] |
| Missed school prob, narrow, GAS | 0.600 | Gerber et al. (2017) [11] |
| Missed school risk diff, broad, OM | 0.024 | Gerber et al. (2017) [11] |
| Missed school risk diff, broad, AS | 0.039 | Gerber et al. (2017) [11] |
| Missed school risk diff, broad, GAS | 0.010 | Gerber et al. (2017) [11] |
| Missed school days | 1.522 | Adams et al. (1999) [12] |
| **Healthcare Utilization** | | |
| ED treatment prob for TF, OM | 0.051 | MEPS (2019) [13] |
| Hospital treatment prob for TF, OM | 0.003 | MEPS (2019) [13] |
| Outpatient treatment prob for TF, OM | 0.945 | MEPS (2019) [13] |
| ED treatment prob for TF, AS | 0.048 | MEPS (2019) [13] |
| Hospital treatment prob for TF, AS | 0.002 | MEPS (2019) [13] |
| Outpatient treatment prob for TF, AS | 0.950 | MEPS (2019) [13] |
| ED treatment prob for TF, GAS | 0.048 | MEPS (2019) [13] |
| Hospital treatment prob for TF, GAS | 0.002 | MEPS (2019) [13] |
| Outpatient treatment prob for TF, GAS | 0.950 | MEPS (2019) [13] |
| Length of ED visit for TF, days | 1.00 | Assumption |
| Length of hospitalization for TF, days | 2.00 | Assumption |
| Length of outpatient visit for TF, days | 1.00 | Assumption |
| ED treatment prob for ADR, OM | 0.104 | MEPS (2019) [13] |
| Hospital treatment prob for ADR, OM | 0.006 | MEPS (2019) [13] |
| Outpatient treatment prob for ADR, OM | 0.890 | MEPS (2019) [13] |
| ED treatment prob for ADR, AS | 0.092 | MEPS (2019) [13] |
| Hospital treatment prob for ADR, AS | 0.006 | MEPS (2019) [13] |
| Outpatient treatment prob for ADR, AS | 0.902 | MEPS (2019) [13] |
| ED treatment prob for ADR, GAS | 0.088 | MEPS (2019) [13] |
| Hospital treatment prob for ADR, GAS | 0.006 | MEPS (2019) [13] |
| Outpatient treatment prob for ADR, GAS | 0.906 | MEPS (2019) [13] |
| Length of ED visit for ADR, days | 1.00 | Assumption |
| Length of hospitalization for ADR, days | 2.00 | Assumption |
| Length of outpatient visit for ADR, days | 1.00 | Assumption |
| **Unit Costs (2017 USD)** | | |
| Payer cost, narrow-spectrum antibiotic course, OM | 39.13 | GoodRx (2019) [14]; Chahine, Johnson, & Costanzo (2014) [15]; Wicker & Mohundro (2010) [16]; TOP (2008) [17] |
| Payer cost, broad-spectrum antibiotic course, OM | 77.40 | GoodRx (2019) [14]; Wicker & Mohundro (2010) [16]; Chahine et al. (2014) [15]; TOP (2008) [17]; Suaya et al. (2018) [5] |
| Payer cost, narrow-spectrum antibiotic course, AS | 52.18 | GoodRx (2019) [14]; TOP (2008) [17] |
| Payer cost, broad-spectrum antibiotic course, AS | 86.31 | GoodRx (2019) [14]; Demuri & Wald (2012) [18]; Contopoulous-Ioannidis, Ioannidis,& Lau (2003) [19]; Leung & Kellner (2004) [20]; Suaya et al. (2018) [5] |
| Payer cost, narrow-spectrum antibiotic course, GAS | 31.61 | GoodRx (2019) [14]; Milatovic et al. (1993) [21]; Syrogiannopoulos et al. (2004) [22]; Tack et al. (1997) [23]; Chahine, Chamoun, & Soucher (2013) [24]; Shulman et al. (2014) [14]; Choby (2009) [25] |
| Payer cost, broad-spectrum antibiotic course, GAS | 71.59 | GoodRx (2019) [14]; Syrogiannopoulos et al. (2004) [22]; Chahine et al. (2013) [24]; Shulman et al. (2014) [14];  Tack et al. (1997) [23]; Milatovic et al. (1993) [21]; Choby (2009) [25]; Suaya et al. (2018) [5] |
| Payer cost, hospitalization for TF, OM | 2831.233 | MEPS (2019) [13] |
| OOP cost, hospitalization for TF, OM | 185.955 | MEPS (2019) [13] |
| Payer cost, ED visit for TF, OM | 329.485 | MEPS (2019) [13] |
| OOP cost, ED visit for TF, OM | 41.934 | MEPS (2019) [13] |
| Payer cost, outpatient visit for TF, OM | 165.543 | MEPS (2019) [13] |
| OOP cost, outpatient visit for TF, OM | 26.607 | MEPS (2019) [13] |
| Payer cost, hospitalization for TF, AS | 2531.179 | MEPS (2019) [13] |
| OOP cost, hospitalization for TF, AS | 166.248 | MEPS (2019) [13] |
| Payer cost, ED visit for TF, AS | 394.317 | MEPS (2019) [13] |
| OOP cost, ED visit for TF, AS | 33.903 | MEPS (2019) [13] |
| Payer cost, outpatient visit for TF, AS | 119.766 | MEPS (2019) [13] |
| OOP cost, outpatient visit for TF, AS | 25.844 | MEPS (2019) [13] |
| Payer cost, hospitalization for TF, GAS | 2531.179 | MEPS (2019) [13] |
| OOP cost, hospitalization for TF, GAS | 166.248 | MEPS (2019) [13] |
| Payer cost , ED visit for TF, GAS | 394.317 | MEPS (2019) [13] |
| OOP cost, ED visit for TF, GAS | 33.903 | MEPS (2019) [13] |
| Payer cost, outpatient visit for TF, GAS | 119.766 | MEPS (2019) [13] |
| OOP cost, outpatient visit for TF, GAS | 25.844 | MEPS (2019) [13] |
| Payer cost, hospitalization for ADR, OM | 5808.304 | MEPS (2019) [13] |
| OOP cost, hospitalization for ADR, OM | 381.489 | MEPS (2019) [13] |
| Payer cost, ED visit for ADR, OM | 456.962 | MEPS (2019) [13] |
| OOP cost, ED visit for ADR, OM | 43.372 | MEPS (2019) [13] |
| Payer cost, outpatient visit for ADR, OM | 198.957 | MEPS (2019) [13] |
| OOP cost, outpatient visit for ADR, OM | 32.899 | MEPS (2019) [13] |
| Payer cost, hospitalization for ADR, AS | 7747.178 | MEPS (2019) [13] |
| OOP cost, hospitalization for ADR, AS | 508.834 | MEPS (2019) [13] |
| Payer cost, ED visit for ADR, AS | 499.596 | MEPS (2019) [13] |
| OOP cost, ED visit for ADR, AS | 42.604 | MEPS (2019) [13] |
| Payer cost, outpatient visit for ADR, AS | 140.591 | MEPS (2019) [13] |
| OOP cost, outpatient visit for ADR, AS | 30.800 | MEPS (2019) [13] |
| Payer cost, hospitalization for ADR, GAS | 8122.610 | MEPS (2019) [13] |
| OOP cost, hospitalization for ADR, GAS | 533.493 | MEPS (2019) [13] |
| Payer cost, ED visit for ADR, GAS | 501.624 | MEPS (2019) [13] |
| OOP cost, ED visit for ADR, GAS | 39.508 | MEPS (2019) [13] |
| Payer cost, outpatient visit for ADR, GAS | 139.852 | MEPS (2019) [13] |
| OOP cost, outpatient visit for ADR, GAS | 33.385 | MEPS (2019) [13] |
| **Productivity Parameters** | | |
| Missed school days | 1.522 | Adams et al. (1999) [12] |
| Travel time for visit | 0.83 | Ray et al. (2015) [26] |
| Travel cost | $15.67 | Schmier et al. (2017) [27] |
| Paid work hours per day per adult with own child | 5.51 | U.S. DOL BLA (2018a) [28] |
| Average hourly wage ($) | $29.95 | U.S. DOL BLA (2018b) [29] |

Notes: ADR = adverse drug reaction; AS = acute sinusitis; ED = emergency department; GAS = Group A streptococcal pharyngitis; mo = month(s); OM = otitis media; OOP = out of pocket; pop = population; prob = probability; risk diff = risk difference; TF = treatment failure; yr = year(s)

Negative risk difference means broad spectrum is associated with lower risk of ADR or TF.

Table A-2. Ranges Used for One-Way Sensitivity Analysis and Distributions Used for Probabilistic Sensitivity Analysis

| **Study Population Parameters** | **Default** | **< Range >** | | **SE** | **alpha** | **beta** | **Distribution** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Annual Incidence of Acute Respiratory Tract Infection, per 100 Children** | | | | | | | |
| OM infections in children 6 mo to < 2 yr | 50.10 | 41.40 | 58.90 | 4.46 |  |  | Normal |
| OM infections in children 2 yr to < 6 yr | 19.20 | 15.80 | 22.60 | 1.73 |  |  | Normal |
| OM infections in children 6 yr–12 yr | 6.50 | 5.50 | 7.60 | 0.54 |  |  | Normal |
| AS in children 6 mo to 12 yr | 1.13 | 0.79 | 1.43 | 0.16 |  |  | Normal |
| GAS in children > 2 yr | 4.95 | 4.54 | 5.34 | 0.20 |  |  | Normal |
| **Proportion Taking Antibiotics After ARTI Visit** | | | | | | | |
| Current practice, OM in children 6 mo to < 2 yr | 0.86 | 0.647 | 1.000 | 0.090 | 12 | 2 | Beta |
| Current practice, AS in children 6 mo to 12 yr | 0.82 | 0.786 | 0.851 |  | 441.160 | 96.840 | Beta |
| Current practice, GAS in children 3 yr–12 yr | 1 |  |  |  |  |  |  |
| **Proportion Taking Narrow-Spectrum Versus Broad-Spectrum Antibiotics** | | | | | | | |
| Current practice, OM in children 6 mo to < 2 yr | 0.65 | 0.488 | 0.813 | 0.083 | 21 | 11 | Beta |
| Current practice, OM in children 2 yr to < 6 yr | 0.65 | 0.488 | 0.813 | 0.083 | 21 | 11 | Beta |
| Current practice, OM in children 6 yr–12 yr | 0.65 | 0.488 | 0.813 | 0.083 | 21 | 11 | Beta |
| Current practice, AS in children 6 mo–12 yr | 0.58 | 0.534 | 0.626 |  | 255.78 | 185.220 | Beta |
| Current practice, GAS in children 3 yr–12 yr | 0.76 | 0.752 | 0.772 |  | 5017 | 1568 | Beta |
| **Gerber et al. (2017) Clinical Findings** | | | | | | | |
| ***Treatment Failure*** | | | | | | | |
| Probability of TF for AOM given narrow-spectrum antibiotic, 6 mo to < 2 yr | 0.035 | 0.034 | 0.032 |  | 575 | 15823 | Beta |
| Probability of TF for AOM given narrow-spectrum antibiotic, 2 yr–6 yr | 0.035 | 0.034 | 0.032 |  | 575 | 15823 | Beta |
| Probability of TF for AOM given narrow-spectrum antibiotic 6 yr–12 yr | 0.035 | 0.034 | 0.032 |  | 575 | 15823 | Beta |
| Probability of TF for AS given narrow-spectrum antibiotic | 0.015 | 0.011 | 0.019 |  | 51 | 3349 | Beta |
| Probability of TF for GAS given narrow-spectrum antibiotic | 0.024 | 0.020 | 0.028 |  | 144 | 5819 | Beta |
| Probability of TF for AOM given broad-spectrum antibiotic, 6 mo to < 2 yr | 0.046 | 0.039 | 0.054 |  | 124 | 2564 | Beta |
| Probability of TF for AOM given broad-spectrum antibiotic, 2 yr–6 yr | 0.046 | 0.039 | 0.054 |  | 124 | 2564 | Beta |
| Probability of TF for AOM given broad-spectrum antibiotic 6 yr–12 yr | 0.046 | 0.039 | 0.054 |  | 124 | 2564 | Beta |
| Risk difference for treatment failure for AS at 14 days given broad- versus narrow-spectrum antibiotic | 0.005 | -0.006 | 0.016 | 0.01 |  |  | Normal |
| Risk difference for treatment failure for GAS at 14 days given broad- versus narrow-spectrum antibiotic | -0.013 | -0.022 | -0.003 | 0.00 |  |  | Normal |
| ***Adverse Drug Reaction*** | | | | | | | |
| Probability of adverse drug reactions for OM at 14 days given narrow-spectrum antibiotic | 0.031 | 0.028 | 0.034 |  | 507 | 15930 | Beta |
| Probability of adverse drug reactions for AS at 14 days given narrow-spectrum antibiotic | 0.018 | 0.014 | 0.023 |  | 61 | 3339 | Beta |
| Probability of adverse drug reactions for GAS at 14 days given narrow-spectrum antibiotic | 0.021 | 0.018 | 0.025 |  | 127 | 5826 | Beta |
| Risk difference for adverse drug reactions for OM at 14 days given broad- versus narrow-spectrum antibiotic | 0.018 | 0.008 | 0.027 | 0.00 |  |  | Normal |
| Risk difference for adverse drug reactions for AS at 14 days given broad- versus narrow-spectrum antibiotic | -0.004 | -0.013 | 0.005 | 0.00 |  |  | Normal |
| Risk difference for adverse drug reactions for GAS at 14 days given broad- versus narrow-spectrum antibiotic | 0.001 | -0.011 | 0.013 | 0.01 |  |  | Normal |
| **Gerber et al. (2017) Productivity Findings** | | | | | | | |
| Probability of missing school or daycare because of infection for OM, narrow spectrum | 0.350 | 0.307 | 0.394 |  | 161 | 299 | Beta |
| Probability of missing school or daycare because of infection for AS, narrow spectrum | 0.280 | 0.231 | 0.329 |  | 89 | 230 | Beta |
| Probability of missing school or daycare because of infection for GAS, narrow spectrum | 0.600 | 0.550 | 0.644 |  | 251 | 169 | Beta |
| Risk difference for missing school or daycare because of infection for OM, broad versus narrow spectrum | 0.024 | -0.061 | 0.109 | 0.04 |  |  | Normal |
| Risk difference for missing school or daycare because of infection for AS, broad versus narrow spectrum | 0.039 | -0.061 | 0.140 | 0.05 |  |  | Normal |
| Risk difference for missing school or daycare because of infection for GAS, broad versus narrow spectrum | 0.010 | -0.092 | 0.112 | 0.05 |  |  | Normal |
| Missed school/daycare, mean days | 1.522 | 1.142 | 1.903 | 0.194 |  |  | Normal |
| **Healthcare Utilization** | | | | | | | |
| ***Treatment Failure*** | | | | | | | |
| Probability of ED treatment after treatment failure for OM | 0.051 |  |  |  | 510.145 | 9925 | Multinomial |
| Probability of hospitalization after treatment failure for OM | 0.003 |  |  |  | 32.753 | 9925 | Multinomial |
| Probability of outpatient treatment after treatment failure for OM | 0.945 |  |  |  | 9383.095 | 9925 | Multinomial |
| Probability of ED treatment after treatment failure for AS | 0.048 |  |  |  | 128.440 | 2704 | Multinomial |
| Probability of hospitalization after treatment failure for AS | 0.002 |  |  |  | 6.219 | 2704 | Multinomial |
| Probability of outpatient treatment after treatment failure for AS | 0.950 |  |  |  | 2569.070 | 2704 | Multinomial |
| Probability of emergency department treatment after treatment failure for GAS | 0.048 |  |  |  | 128.440 | 2704 | Multinomial |
| Probability of hospitalization after treatment failure for GAS | 0.002 |  |  |  | 6.219 | 2704 | Multinomial |
| Probability of outpatient treatment after treatment failure for GAS | 0.950 |  |  |  | 2569.070 | 2704 | Multinomial |
| Length of ED visit, mean days | 1.000 | 0.750 | 1.250 | 0.128 |  |  | Normal |
| Length of hospitalization, mean days | 2.000 | 1.500 | 2.500 | 0.255 |  |  | Normal |
| Length of outpatient visit, mean hours | 1.000 | 0.750 | 1.250 | 0.128 |  |  | Normal |
| ***Adverse Drug Reaction*** | | | | | | | |
| Probability of ED treatment after adverse drug reaction for OM | 0.104 |  |  |  | 421.636 | 4062 | Multinomial |
| Probability of hospitalization after adverse drug reaction for OM | 0.006 |  |  |  | 25.997 | 4062 | Multinomial |
| Probability of outpatient treatment after adverse drug reaction for OM | 0.890 |  |  |  | 3614.368 | 4062 | Multinomial |
| Probability of ED treatment after adverse drug reaction for AS | 0.092 |  |  |  | 211.966 | 2309 | Multinomial |
| Probability of hospitalization after adverse drug reaction for AS | 0.006 |  |  |  | 13.392 | 2309 | Multinomial |
| Probability of outpatient treatment after adverse drug reaction for AS | 0.902 |  |  |  | 2083.642 | 2309 | Multinomial |
| Probability of ED treatment after adverse drug reaction for GAS | 0.088 |  |  |  | 168.416 | 1916 | Multinomial |
| Probability of hospitalization after adverse drug reaction for GAS | 0.006 |  |  |  | 12.262 | 1916 | Multinomial |
| Probability of outpatient treatment after adverse drug reaction for GAS | 0.906 |  |  |  | 1735.321 | 1916 | Multinomial |
| Length of ED visit, mean days | 1.000 | 0.750 | 1.250 | 0.128 |  |  | Normal |
| Length of hospitalization, mean days | 2.000 | 1.500 | 2.500 | 0.255 |  |  | Normal |
| Length of outpatient visit, mean days | 1.000 | 1.183 | 1.417 | 0.060 |  |  | Normal |
| **Study Population Parameters** | | | | | | | |
| ***Treatment Failure*** | | | | | | | |
| *Average cost of a hospitalization OM* |  |  |  |  |  |  |  |
| Payer costs | 2831.233 | 1502.356 | 4574.153 | 788.924 | 12.9 | 219.8 | Gamma |
| Out-of-pocket costs | 185.955 | 98.675 | 300.430 | 51.817 | 12.9 | 14.4 | Gamma |
| *Average cost of ED visit OM* |  |  |  |  |  |  |  |
| Payer costs | 329.485 | 284.089 | 378.196 | 24.019 | 188.2 | 1.8 | Gamma |
| Out-of-pocket costs | 41.934 | 28.953 | 57.280 | 7.245 | 33.5 | 1.3 | Gamma |
| *Average cost of outpatient visit OM* |  |  |  |  |  |  |  |
| Payer costs | 165.543 | 151.451 | 180.254 | 7.349 | 507.4 | 0.3 | Gamma |
| Out-of-pocket costs | 26.607 | 23.756 | 29.616 | 1.495 | 316.6 | 0.1 | Gamma |
| *Average cost of a hospitalization AS* |  |  |  |  |  |  |  |
| Payer costs | 2531.179 | 503.170 | 6165.305 | 1485.834 | 2.9 | 872.2 | Gamma |
| Out-of-pocket costs | 166.248 | 33.048 | 404.937 | 97.590 | 2.9 | 57.3 | Gamma |
| *Average cost of ED visit AS* |  |  |  |  |  |  |  |
| Payer costs | 394.317 | 312.135 | 485.958 | 44.393 | 78.9 | 5.0 | Gamma |
| Out-of-pocket costs | 33.903 | 20.949 | 49.926 | 7.423 | 20.9 | 1.6 | Gamma |
| *Average cost of outpatient visit AS* |  |  |  |  |  |  |  |
| Payer costs | 119.766 | 101.164 | 139.914 | 9.891 | 146.6 | 0.8 | Gamma |
| Out-of-pocket costs | 25.844 | 23.536 | 28.259 | 1.205 | 459.9 | 0.1 | Gamma |
| *Average cost of a hospitalization GAS* |  |  |  |  |  |  |  |
| Payer costs | 2531.179 | 503.170 | 6165.305 | 1485.834 | 2.9 | 872.2 | Gamma |
| Out-of-pocket costs | 166.248 | 33.048 | 404.937 | 97.590 | 2.9 | 57.3 | Gamma |
| *Average cost of ED visit GAS* |  |  |  |  |  |  |  |
| Payer costs | 394.317 | 312.135 | 485.958 | 44.393 | 78.9 | 5.0 | Gamma |
| Out-of-pocket costs | 33.903 | 20.949 | 49.926 | 7.423 | 20.9 | 1.6 | Gamma |
| *Average cost of outpatient visit GAS* |  |  |  |  |  |  |  |
| Payer costs | 119.766 | 101.164 | 139.914 | 9.891 | 146.6 | 0.8 | Gamma |
| Out-of-pocket costs | 25.844 | 23.536 | 28.259 | 1.205 | 459.9 | 0.1 | Gamma |
| ***Adverse Drug Reaction Costs*** | | | | | | | |
| Average cost of a hospitalization OM |  |  |  |  |  |  |  |
| Payer costs | 5808.304 | 2554.008 | 10376.611 | 2016.378 | 8.3 | 700.0 | Gamma |
| Out-of-pocket costs | 381.489 | 167.747 | 681.536 | 132.436 | 8.3 | 46.0 | Gamma |
| Average cost of ED visit OM |  |  |  |  |  |  |  |
| Payer costs | 456.962 | 384.197 | 535.945 | 38.736 | 139.2 | 3.3 | Gamma |
| Out-of-pocket costs | 43.372 | 30.147 | 58.964 | 7.370 | 34.6 | 1.3 | Gamma |
| Average cost of outpatient visit OM |  |  |  |  |  |  |  |
| Payer costs | 198.957 | 106.157 | 320.420 | 55.024 | 13.1 | 15.2 | Gamma |
| Out-of-pocket costs | 32.899 | 17.463 | 53.141 | 9.163 | 12.9 | 2.6 | Gamma |
| Average cost of a hospitalization AS |  |  |  |  |  |  |  |
| Payer costs | 7747.178 | 3218.628 | 14230.262 | 2841.732 | 7.4 | 1042.4 | Gamma |
| Out-of-pocket costs | 508.834 | 211.399 | 934.643 | 186.645 | 7.4 | 68.5 | Gamma |
| Average cost of ED visit AS |  |  |  |  |  |  |  |
| Payer costs | 499.596 | 400.837 | 609.067 | 53.174 | 88.3 | 5.7 | Gamma |
| Out-of-pocket costs | 42.604 | 23.369 | 67.520 | 11.332 | 14.1 | 3.0 | Gamma |
| Average cost of outpatient visit AS |  |  |  |  |  |  |  |
| Payer costs | 140.591 | 109.054 | 176.074 | 17.120 | 67.4 | 2.1 | Gamma |
| Out-of-pocket costs | 30.800 | 12.829 | 56.503 | 11.270 | 7.5 | 4.1 | Gamma |
| Average cost of a hospitalization GAS |  |  |  |  |  |  |  |
| Payer costs | 8122.610 | 3317.148 | 15042.580 | 3027.034 | 7.2 | 1128.1 | Gamma |
| Out-of-pocket costs | 533.493 | 217.870 | 987.996 | 198.816 | 7.2 | 74.1 | Gamma |
| Average cost of ED visit GAS |  |  |  |  |  |  |  |
| Private payer costs | 501.624 | 397.707 | 617.421 | 56.112 | 79.9 | 6.3 | Gamma |
| Out-of-pocket costs | 39.508 | 20.289 | 65.026 | 11.497 | 11.8 | 3.3 | Gamma |
| Average cost of outpatient visit GAS |  |  |  |  |  |  |  |
| Payer costs | 139.852 | 103.042 | 182.197 | 20.230 | 47.8 | 2.9 | Gamma |
| Out-of-pocket costs | 33.385 | 12.427 | 64.517 | 13.475 | 6.1 | 5.4 | Gamma |
| **Other Productivity Parameters** | | | | | | | |
| Travel time for hospitalization, ED, outpatient, or office visit (hours) | 0.83 | 0.75 | 0.92 | 0.04 |  |  | Normal |

Notes: ADR = adverse drug reaction; AS = acute sinusitis; ED = emergency department; GAS = Group A streptococcal pharyngitis; OM = otitis media; TF = treatment failure

References

1. U.S. Census Bureau. 2017 National Population Projections Datasets: Projections for the United States, 2017 to 2060 (2018) <https://www.census.gov/data/datasets/2017/demo/popproj/2017-popproj.html>

2. Kawai K, Adil EA, Barrett D, Manganella J, Kenna MA. Ambulatory visits for otitis media before and after the introduction of pneumococcal conjugate vaccination. J. Pediatr. 201, 122–127.e1 (2018).

3. Shapiro DJ, Gonzales R, Cabana MD, Hersh AL. National trends in visit rates and antibiotic prescribing for children with acute sinusitis. Pediatrics 127(1), 28–34 (2011).

4. Dooling KL, Shapiro DJ, Van Beneden C, Hersh AL, Hicks LA. Overprescribing and inappropriate antibiotic selection for children with pharyngitis in the United States, 1997–2010. JAMA Pediatr. 168(11), 1073–1074 (2014).

5. Suaya JA, Gessner BD, Fung S et al. Acute otitis media, antimicrobial prescriptions, and medical expenses among children in the United States during 2011–2016. Vaccine 36(49), 7479–7486 (2018).

6. Gidengil CA, Kruskal BA, Lee GM. Initial antibiotic choice in the treatment of group A streptococcal pharyngitis and return visit rates. J. Pediatric Infect. Dis. Soc. 2(4), 361–367 (2013).

7. Vyles D, Chiu A, Simpson P, Nimmer M, Adams J, Brousseau DC. Parent-reported penicillin allergy symptoms in the Pediatric Emergency Department. Acad. Pediatr. 17(3), 251–255 (2017).

8. Kerr J. Penicillin allergy: a study of incidence as reported by patients. Br. J. Clin. Pract. 48(1), 5–7 (1994).

9. Lee CE, Zembower TR, Fotis MA et al. The incidence of antimicrobial allergies in hospitalized patients: implications regarding prescribing patterns and emerging bacterial resistance. Arch. Intern. Med. 160(18), 2819–2822 (2000).

10. Nicklas R, Bernstein I, Li J. β-Lactam antibiotics: the diagnosis and management of anaphylaxis. J. Allergy Clin. Immunol. 101(Suppl.), S498–S501 (1999).

11. Gerber JS, Ross RK, Bryan M et al. Association of broad- vs narrow-spectrum antibiotics with treatment failure, adverse events, and quality of life in children with acute respiratory tract infections. J. Am. Med. Assoc. 318(23), 2325–2336 (2017).

12. Adams PF, Hendershot GE, Marano MA. Centers for Disease Control and Prevention/National Center for Health Statistics. Current estimates from the National Health Interview Survey, 1996. Vital Health Stat 10. 1999 Oct;(200):1-203.

13. AHRQ (Agency for Healthcare Hesearch and Quality). MEPS: Medical Expenditure Panel Survey 2006–2015 data (2019) [https://meps.ahrq.gov/data stats/download data files.jsp](https://meps.ahrq.gov/data%20stats/download%20data%20files.jsp)

14. GoodRx. (2019) <https://www.goodrx.com>

15. Chahine EB, Johnson AN, Costanzo A. Update on the management of pediatric acute otitis media. US Pharm. 39(7), 27–30 (2014).

16. McMahon Wicker A, Labruzzo Mohundro B. Management of pediatric otitis media. US Pharm. 35(3), 44–49 (2010).

17. TOP (Toward Optimized Practice). Diagnosis and treatment of AOM in children: summary of the Alberta clinical practice guideline for acute otitis media (2008 Update).

18. DeMuri GP, Wald ER. Acute bacterial sinusitis in children. N. Engl. J. Med. 367(12), 1128–1134 (2012).

19. Contopoulos-Ioannidis DG, Ioannidis JPA, Lau J. Acute sinusitis in children: current treatment strategies. Pediatr. Drugs 5(2), 71–80 (2003).

20. Leung AKC, Kellner JD. Acute sinusitis in children: diagnosis and management. J. Pediatr. Heal. Care 18(2), 72–76 (2004).

21. Milatovic D, Adam D, Hamilton H, Materman E. Cefprozil versus penicillin V in treatment of streptococcal tonsillopharyngitis. Antimicrob. Agents Chemother. 37(8), 1620–1623 (1993).

22. Syrogiannopoulos GA, Bozdogan B, Grivea IN et al. Two dosages of clarithromycin for five days, amoxicillin/clavulanate for five days or penicillin V for ten days in acute group A streptococcal tonsillopharyngitis. Pediatr. Infect. Dis. J. 23(9), 857–865 (2004).

23. Tack KJ, Henry DC, Manford Gooch W et al. Five-day cefdinir treatment for streptococcal pharyngitis. Antimicrob. Agents Chemother. 42(5), 1073–1075 (1998).

24. Chahine EB, Chamoun J, Sucher AJ. Management of streptococcal pharyngitis. US Pharm. 38(7), 51–56 (2013).

25. Choby BA. Diagnosis and treatment of streptococcal pharyngitis. Am. Fam. Physician 79(5), 383–390 (2009).

26. Ray KN, Chari AV, Engberg J, Bertolet M, Mehrotra A. Opportunity costs of ambulatory medical care in the United States. Am. J. Manag. Care 21(8), 567–574 (2015).

27. Schmier J, Ogden K, Nickman N et al. Costs of providing infusion therapy for rheumatoid arthritis in a hospital-based infusion center setting. Clin. Ther. 39(8), 1600–1617 (2017).

28. U.S. Department of Labor Bureau of Labor Statistics. Civilian labor force participation rate, seasonally adjusted total for all months in 2018. News release chart (2018a).

29. US Department of Labor Bureau of Labor Statistics. Current Population Survey: Unadjusted median usual weekly earnings, Employed full time, Wage and salary workers. BLS Data Viewer Series LEU0252881500 (2018b).