Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.
**eTable 1.** ICD-9-CM and ICD-10-CM Codes Used to Identify Cases of Appendicitis

| ICD Version | Diagnosis Code | Long Description                                      |
|-------------|----------------|--------------------------------------------------------|
| 9           | 540.0          | Acute appendicitis with generalized peritonitis        |
| 9           | 540.1          | Acute appendicitis with peritoneal abscess             |
| 9           | 540.9          | Acute appendicitis without mention of peritonitis      |
| 9           | 541            | Appendicitis, unqualified                             |
| 9           | 542            | Other appendicitis                                    |
| 10          | K35.2          | Acute appendicitis with generalized peritonitis        |
| 10          | K35.3          | Acute appendicitis with localized peritonitis          |
| 10          | K35.80         | Unspecified acute appendicitis                         |
| 10          | K35.89         | Other acute appendicitis                              |
| 10          | K37            | Unspecified appendicitis                              |
| 10          | K36            | Other appendicitis                                    |
**eTable 2. Description of Cases and Cohort at Risk by Age and Sex**

| Age   | Female Enrollees | Male Enrollees |          |          |          |          |          |          |          |          |          |          |          |          |
|-------|------------------|----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|       | Cases            | Person-Years at Risk in 100,000s | Annualized Incidence Per 100,000 | Cases | Person-Years at Risk in 100,000s | Annualized Incidence Per 100,000 |
| 0-5   | 3,365            | 130.5          | 25.8     | 4,306    | 136.9    | 31.4     |
| 6-10  | 15,110           | 137.3          | 110.1    | 22,156   | 143.3    | 154.6    |
| 11-15 | 27,137           | 152.1          | 178.4    | 38,968   | 158.5    | 245.8    |
| 16-20 | 36,918           | 159.8          | 231.0    | 42,472   | 165.2    | 257.0    |
| 21-30 | 59,764           | 293.1          | 203.9    | 60,093   | 270.1    | 222.5    |
| 31-40 | 58,002           | 333.0          | 174.2    | 55,515   | 297.9    | 186.4    |
| 41-50 | 56,699           | 390.1          | 145.4    | 50,374   | 349.0    | 144.3    |
| 51-60 | 51,523           | 397.2          | 129.7    | 42,110   | 350.2    | 120.3    |
| 61-70 | 22,424           | 205.3          | 10.92    | 20,583   | 184.6    | 111.5    |
| 71-80 | 7,349            | 84.9           | 86.6     | 7,376    | 69.9     | 105.5    |
| 81+   | 4,153            | 60.5           | 68.7     | 3,520    | 37.7     | 93.3     |

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eFigure 1. Model fit for each metropolitan statistical area (MSA)

Panel A shows the $R^2$ of temperature prediction model for each of the MSAs in the IBM Marketscan data universe. Each point is one MSA in the IBM Marketscan data universe. Model fits were highest quality in the Northeast and Midwest states where seasonal patterns far exceed normal temperature variance and smallest in coastal cities where the normal variance is temperature is large relative to the seasonal pattern. Panel B shows a histogram of the model estimated $R^2$ values.
eFigure 2. Temperature deviations for each metropolitan statistical area (MSA)

The distribution of deviations was relatively similar across the different MSAs. Each line is the estimated density for the temperature deviations for one MSA. The majority of the MSAs clearly cluster together with a standard deviation of approximately 2.78°C.
**eTable 3. Full Model Estimates for Deviations Model—Binned Deviations**

|                          | Incidence Rate Ratio | 95% CI (robust SE by clustered by MSA) |
|--------------------------|----------------------|----------------------------------------|
|                          |                      | Lower Bound                            | Upper Bound                 |
| Female Sex               | 0.918                | 0.911                                  | 0.925                       |
| Age                      |                      |                                        |                            |
| 0-5                      | Reference            |                                        |                            |
| 6-10                     | 4.630                | 4.469                                  | 4.796                       |
| 11-15                    | 7.426                | 7.082                                  | 7.786                       |
| 16-20                    | 8.525                | 8.049                                  | 9.029                       |
| 21-30                    | 7.441                | 7.019                                  | 7.888                       |
| 31-40                    | 6.323                | 5.974                                  | 6.691                       |
| 41-50                    | 5.091                | 4.820                                  | 5.377                       |
| 51-60                    | 4.394                | 4.153                                  | 4.650                       |
| 61-70                    | 3.870                | 3.665                                  | 4.086                       |
| 71-80                    | 3.372                | 3.194                                  | 3.560                       |
| 81+                      | 2.776                | 2.632                                  | 2.929                       |
| Day of Week              |                      |                                        |                            |
| Sunday                   | Reference            |                                        |                            |
| Monday                   | 1.477                | 1.458                                  | 1.497                       |
| Tuesday                  | 1.473                | 1.456                                  | 1.491                       |
| Wednesday                | 1.422                | 1.404                                  | 1.440                       |
| Thursday                 | 1.384                | 1.366                                  | 1.403                       |
| Friday                   | 1.347                | 1.331                                  | 1.364                       |
| Saturday                 | 0.987                | 0.975                                  | 0.999                       |
| Expected Prior Week      |                      |                                        |                            |
| Temperature              |                      |                                        |                            |
| Less than 10.56°C        | 1.013                | 1.009                                  | 1.018                       |
| More than 10.56°C        | 1.030                | 1.027                                  | 1.034                       |
| Deviation from Expected  |                      |                                        |                            |
| Temperature in °C         |                      |                                        |                            |
| Cooler than -5.56        | 1.006                | 0.979                                  | 1.033                       |
| -5.56 to -2.78           | 0.987                | 0.976                                  | 0.998                       |
| -2.78 to -1.67           | 0.990                | 0.979                                  | 1.000                       |
| -1.67 to -1.11           | 0.989                | 0.977                                  | 1.001                       |
| -1.11 to -0.56           | 1.009                | 0.998                                  | 1.020                       |
| -0.56 to 0               | Reference            |                                        |                            |
| 0 to +0.56               | 1.003                | 0.991                                  | 1.015                       |
| 0.56 to 1.11             | 1.010                | 0.998                                  | 1.022                       |
| 1.11 to 1.67             | 1.006                | 0.994                                  | 1.018                       |
| 1.67 to 2.78             | 1.012                | 1.000                                  | 1.023                       |
| 2.78 to 5.56             | 1.027                | 1.016                                  | 1.039                       |
| Warmer than 5.6          | 1.033                | 1.010                                  | 1.057                       |
**eTable 4. Full Model Estimates Stratified by Severity—Observed Temperature**

|                      | With Peritonitis | Without Peritonitis | Other Appendicitis |
|----------------------|------------------|---------------------|-------------------|
| **Female Sex**       | 0.793 (0.785, 0.802) | 0.869 (0.862, 0.875) | 0.926 (0.917, 0.935) |
| **Age**              |                  |                     |                   |
| 0-5                  | Reference        | Reference           | Reference         |
| 6-10                 | 5.348 (5.116, 5.591) | 9.738 (9.22, 10.286) | 7.413 (7.022, 7.825) |
| 11-15                | 4.834 (4.579, 5.103) | 11.51 (10.787, 12.282) | 8.074 (7.565, 8.618) |
| 16-20                | 4.088 (3.864, 4.325) | 10.061 (9.423, 10.743) | 7.149 (6.677, 7.654) |
| 21-30                | 3.921 (3.708, 4.147) | 8.416 (7.901, 8.965) | 6.098 (5.702, 6.521) |
| 31-40                | 3.905 (3.698, 4.123) | 6.589 (6.195, 7.009) | 4.893 (4.586, 5.221) |
| 41-50                | 3.636 (3.487, 3.791) | 5.811 (5.567, 6.066) | 4.77 (4.558, 4.991) |
| 51-60                | 4.181 (3.957, 4.417) | 5.506 (5.17, 5.865) | 4.211 (3.933, 4.509) |
| 61-70                | 4.28 (4.043, 4.532) | 4.663 (4.377, 4.967) | 3.618 (3.382, 3.871) |
| 71-80                | 4.132 (3.902, 4.375) | 3.699 (3.477, 3.934) | 3.064 (2.872, 3.269) |
| 81+                  | 3.727 (3.523, 3.942) | 2.823 (2.662, 2.993) | 2.364 (2.208, 2.532) |
| **Day of Week**      |                  |                     |                   |
| Sunday               | Reference        | Reference           | Reference         |
| Monday               | 1.391 (1.360, 1.423) | 1.390 (1.373, 1.407) | 1.559 (1.529, 1.590) |
| Tuesday              | 1.374 (1.346, 1.402) | 1.381 (1.366, 1.397) | 1.556 (1.528, 1.585) |
| Wednesday            | 1.307 (1.283, 1.332) | 1.335 (1.319, 1.351) | 1.501 (1.475, 1.527) |
| Thursday             | 1.289 (1.262, 1.318) | 1.301 (1.285, 1.317) | 1.462 (1.436, 1.490) |
| Friday               | 1.253 (1.228, 1.279) | 1.265 (1.250, 1.280) | 1.414 (1.389, 1.440) |
| Saturday             | 0.989 (0.969, 1.008) | 0.980 (0.968, 0.992) | 0.992 (0.977, 1.008) |
| **Prior Week**       |                  |                     |                   |
| Temperature (per 5.56°C) |                  |                     |                   |
| Below 10.56°C        | 1.016 (1.008, 1.024) | 1.019 (1.015, 1.023) | 1.008 (1.002, 1.013) |
| Above 10.56°C        | 1.032 (1.026, 1.038) | 1.036 (1.032, 1.041) | 1.028 (1.022, 1.034) |

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