Post-Acute Care Healthcare Charges After Hospitalization Due to Influenza or COVID-19 Infection

Supplementary Appendix

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Table S1: Linear regression model results for the non-mechanically ventilated stratum.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Post-acute charges (18-44 y/o)</th>
<th>Post-acute charges (45-64 y/o)</th>
<th>Post-acute charges (65+ y/o)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimates CI</td>
<td>Estimates CI</td>
<td>Estimates CI</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>p</td>
<td>b</td>
</tr>
<tr>
<td>Intercept</td>
<td>8.67 (8.22 – 9.12)</td>
<td>&lt;0.001</td>
<td>8.55 (8.29 – 8.81)</td>
</tr>
<tr>
<td>COVID-19</td>
<td>0.16 (-0.08 – 0.39)</td>
<td>0.192</td>
<td>0.08 (-0.06 – 0.21)</td>
</tr>
<tr>
<td>No pre-acute charges</td>
<td>3.70 (3.19 – 4.21)</td>
<td>&lt;0.001</td>
<td>3.26 (2.97 – 3.54)</td>
</tr>
<tr>
<td>Pre-acute charges**</td>
<td>0.46 (0.41 – 0.51)</td>
<td>&lt;0.001</td>
<td>0.40 (0.37 – 0.43)</td>
</tr>
<tr>
<td>Time (spline part 1)</td>
<td>-0.57 (-1.20 – 0.06)</td>
<td>0.075</td>
<td>-0.72 (-1.09 – 0.35)</td>
</tr>
<tr>
<td>Time (spline part 2)</td>
<td>-0.59 (-0.99 – 0.19)</td>
<td>0.004</td>
<td>-0.58 (-0.81 – 0.35)</td>
</tr>
<tr>
<td>Time (spline part 3)</td>
<td>-0.63 (-1.05 – 0.20)</td>
<td>0.004</td>
<td>-0.63 (-0.88 – 0.38)</td>
</tr>
<tr>
<td>Male</td>
<td>-0.23 (-0.30 – 0.16)</td>
<td>&lt;0.001</td>
<td>-0.10 (-0.14 – -0.06)</td>
</tr>
<tr>
<td>Length of stay*</td>
<td>0.20 (0.15 – 0.26)</td>
<td>&lt;0.001</td>
<td>0.13 (0.09 – 0.16)</td>
</tr>
<tr>
<td>Region: Northeast</td>
<td>-0.24 (-0.33 – -0.15)</td>
<td>&lt;0.001</td>
<td>-0.27 (-0.32 – -0.22)</td>
</tr>
<tr>
<td>Region: West</td>
<td>-0.26 (-0.39 – -0.14)</td>
<td>&lt;0.001</td>
<td>-0.29 (-0.37 – -0.22)</td>
</tr>
<tr>
<td>Region: South</td>
<td>-0.24 (-0.32 – -0.16)</td>
<td>&lt;0.001</td>
<td>-0.19 (-0.24 – -0.15)</td>
</tr>
<tr>
<td>Operating expense &lt;$1B</td>
<td>-0.09 (-0.19 – 0.00)</td>
<td>0.061</td>
<td>-0.10 (-0.16 – -0.05)</td>
</tr>
<tr>
<td>Bed size - linear</td>
<td>0.03 (-0.04 – 0.11)</td>
<td>0.378</td>
<td>0.00 (-0.04 – 0.05)</td>
</tr>
<tr>
<td>Bed size - quadratic</td>
<td>0.08 (0.00 – 0.15)</td>
<td>0.046</td>
<td>0.11 (0.06 – 0.15)</td>
</tr>
<tr>
<td>Bed size - cubic</td>
<td>0.05 (-0.02 – 0.13)</td>
<td>0.161</td>
<td>0.11 (0.06 – 0.15)</td>
</tr>
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<td>Not Urban</td>
<td>-0.10 (-0.22 – -0.03)</td>
<td>0.121</td>
<td>-0.10 (-0.16 – -0.04)</td>
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<tr>
<td>Condition</td>
<td>Odds Ratio</td>
<td>95% CI</td>
<td>p-value</td>
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<tr>
<td>---------------------------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
</tr>
<tr>
<td>Cancer</td>
<td>0.86</td>
<td>0.66 – 1.05</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Lung disease</td>
<td>0.17</td>
<td>0.09 – 0.24</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CVD</td>
<td>0.31</td>
<td>0.21 – 0.40</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.06</td>
<td>-0.02 – 0.14</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hypertension</td>
<td>0.20</td>
<td>0.12 – 0.27</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Liver disease</td>
<td>0.09</td>
<td>-0.03 – 0.22</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Renal disease</td>
<td>0.56</td>
<td>0.43 – 0.69</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Obese</td>
<td>-0.27</td>
<td>-0.34 – -0.20</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Black</td>
<td>0.15</td>
<td>0.07 – 0.22</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.33</td>
<td>-0.51 – -0.15</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>COVID-19 x No pre-acute charges</td>
<td>-0.68</td>
<td>-1.22 – -0.14</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>COVID-19 x Pre-acute charges**</td>
<td>-0.03</td>
<td>-0.08 – -0.03</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Observations</td>
<td>11817</td>
<td>37290</td>
<td>56558</td>
</tr>
</tbody>
</table>

*Log-transformed
**Log-transformed and centered
CVD: Cardiovascular disease
Table S2: Linear regression model results for the mechanically ventilated stratum.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Post-acute charges (18-44 y/o)</th>
<th></th>
<th>Post-acute charges (45-64 y/o)</th>
<th></th>
<th>Post-acute charges (65+ y/o)</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Estimates</td>
<td>CI</td>
<td>p</td>
<td>Estimates</td>
<td>CI</td>
<td>p</td>
</tr>
<tr>
<td>Intercept</td>
<td>9.29</td>
<td>7.28 – 11.29</td>
<td>&lt;0.001</td>
<td>8.14</td>
<td>6.81 – 9.47</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>COVID-19</td>
<td>-0.73</td>
<td>-1.85 – 0.38</td>
<td>0.196</td>
<td>-0.42</td>
<td>-1.02 – 0.17</td>
<td>0.165</td>
</tr>
<tr>
<td>No pre-acute charges</td>
<td>1.10</td>
<td>-1.55 – 3.76</td>
<td>0.415</td>
<td>3.27</td>
<td>1.62 – 4.91</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pre-acute charges**</td>
<td>0.21</td>
<td>-0.05 – 0.48</td>
<td>0.116</td>
<td>0.43</td>
<td>0.26 – 0.60</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time (spline part 1)</td>
<td>-1.37</td>
<td>-3.98 – 1.23</td>
<td>0.300</td>
<td>-0.50</td>
<td>-2.19 – 1.18</td>
<td>0.557</td>
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<tr>
<td>Time (spline part 2)</td>
<td>-0.08</td>
<td>-2.11 – 1.95</td>
<td>0.939</td>
<td>0.72</td>
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<td>0.284</td>
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<tr>
<td>Time (spline part 3)</td>
<td>0.20</td>
<td>-1.92 – 2.33</td>
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<td>-0.69 – 2.09</td>
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</tr>
<tr>
<td>Male</td>
<td>0.02</td>
<td>-0.29 – 0.33</td>
<td>0.879</td>
<td>0.07</td>
<td>-0.10 – 0.23</td>
<td>0.416</td>
</tr>
<tr>
<td>Length of stay*</td>
<td>0.13</td>
<td>-0.06 – 0.32</td>
<td>0.183</td>
<td>0.22</td>
<td>0.11 – 0.33</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Region: Northeast</td>
<td>-0.47</td>
<td>-0.92 – 0.03</td>
<td>0.038</td>
<td>-0.37</td>
<td>-0.58 – 0.15</td>
<td>0.001</td>
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<tr>
<td>Region: West</td>
<td>-0.37</td>
<td>-0.96 – 0.22</td>
<td>0.223</td>
<td>-0.58</td>
<td>-0.90 – 0.26</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Region: South</td>
<td>-0.34</td>
<td>-0.71 – 0.03</td>
<td>0.074</td>
<td>-0.40</td>
<td>-0.60 – 0.20</td>
<td>&lt;0.001</td>
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<tr>
<td>Operating expense</td>
<td>0.10</td>
<td>-0.34 – 0.54</td>
<td>0.653</td>
<td>-0.19</td>
<td>-0.42 – 0.04</td>
<td>0.105</td>
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<tr>
<td>Bed size - linear</td>
<td>-0.27</td>
<td>-0.60 – 0.07</td>
<td>0.120</td>
<td>-0.13</td>
<td>-0.32 – 0.06</td>
<td>0.172</td>
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<tr>
<td>Bed size - quadratic</td>
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<td>-0.23 – 0.43</td>
<td>0.560</td>
<td>0.25</td>
<td>0.07 – 0.43</td>
<td>0.007</td>
</tr>
<tr>
<td>Bed size - cubic</td>
<td>-0.05</td>
<td>-0.40 – 0.29</td>
<td>0.756</td>
<td>0.20</td>
<td>0.01 – 0.39</td>
<td>0.035</td>
</tr>
<tr>
<td>Not Urban</td>
<td>-0.18</td>
<td>-0.86 – 0.50</td>
<td>0.606</td>
<td>0.01</td>
<td>-0.29 – 0.31</td>
<td>0.953</td>
</tr>
<tr>
<td>Cancer</td>
<td>0.32</td>
<td>-0.75 – 1.39</td>
<td>0.553</td>
<td>0.47</td>
<td>0.11 – 0.84</td>
<td>0.011</td>
</tr>
<tr>
<td>Condition</td>
<td>Coefficient 1</td>
<td>Coefficient 2</td>
<td>Coefficient 3</td>
<td>Coefficient 4</td>
<td>Coefficient 5</td>
<td>Coefficient 6</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Lung disease</td>
<td>0.36</td>
<td>0.02 – 0.71</td>
<td>0.041</td>
<td>0.23</td>
<td>0.06 – 0.41</td>
<td>0.007</td>
</tr>
<tr>
<td>CVD</td>
<td>-0.10</td>
<td>-0.45 – 0.26</td>
<td>0.601</td>
<td>0.10</td>
<td>-0.07 – 0.28</td>
<td>0.239</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.09</td>
<td>-0.24 – 0.42</td>
<td>0.584</td>
<td>0.21</td>
<td>0.05 – 0.38</td>
<td>0.012</td>
</tr>
<tr>
<td>Hypertension</td>
<td>0.05</td>
<td>-0.27 – 0.38</td>
<td>0.750</td>
<td>0.04</td>
<td>-0.17 – 0.24</td>
<td>0.730</td>
</tr>
<tr>
<td>Liver disease</td>
<td>-0.16</td>
<td>-0.68 – 0.35</td>
<td>0.534</td>
<td>-0.24</td>
<td>-0.49 – 0.01</td>
<td>0.061</td>
</tr>
<tr>
<td>Renal disease</td>
<td>0.57</td>
<td>-0.01 – 1.15</td>
<td>0.054</td>
<td>0.44</td>
<td>0.22 – 0.66</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Obese</td>
<td>0.07</td>
<td>-0.26 – 0.41</td>
<td>0.674</td>
<td>-0.18</td>
<td>-0.35 – 0.02</td>
<td>0.032</td>
</tr>
<tr>
<td>Black</td>
<td>0.23</td>
<td>-0.15 – 0.60</td>
<td>0.237</td>
<td>-0.03</td>
<td>-0.23 – 0.18</td>
<td>0.803</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.54</td>
<td>-0.20 – 1.27</td>
<td>0.150</td>
<td>-0.44</td>
<td>-0.84 – 0.39</td>
<td>0.027</td>
</tr>
<tr>
<td>COVID-19 x No pre-acute charges</td>
<td>0.83</td>
<td>-1.99 – 3.65</td>
<td>0.564</td>
<td>-1.32</td>
<td>-3.02 – 0.39</td>
<td>0.131</td>
</tr>
<tr>
<td>COVID-19 x Pre-acute charges**</td>
<td>0.09</td>
<td>-0.20 – 0.38</td>
<td>0.549</td>
<td>-0.14</td>
<td>-0.31 – 0.04</td>
<td>0.130</td>
</tr>
</tbody>
</table>

Observations 698 2286 1732

*Log-transformed
**Log-transformed and centered
CVD: Cardiovascular disease
Table S3: Sensitivity analysis results: ratio of per-patient total charges post-COVID-19 hospitalization relative to post-influenza hospitalization in patients who received pre-acute care within the healthcare system of record prior to hospital admission.

<table>
<thead>
<tr>
<th>Vent Status</th>
<th>Age</th>
<th>n</th>
<th>Estimate (Ratio)</th>
<th>95% CI LB</th>
<th>UB</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not mechanically ventilated</td>
<td>young</td>
<td>7347</td>
<td>1.06</td>
<td>0.81</td>
<td>1.38</td>
<td>0.684</td>
</tr>
<tr>
<td>Not mechanically ventilated</td>
<td>middle</td>
<td>24875</td>
<td>0.96</td>
<td>0.83</td>
<td>1.12</td>
<td>0.634</td>
</tr>
<tr>
<td>Not mechanically ventilated</td>
<td>older</td>
<td>41508</td>
<td>1.03</td>
<td>0.91</td>
<td>1.18</td>
<td>0.597</td>
</tr>
<tr>
<td>Mechanically ventilated</td>
<td>young</td>
<td>324</td>
<td>0.40</td>
<td>0.10</td>
<td>1.62</td>
<td>0.198</td>
</tr>
<tr>
<td>Mechanically ventilated</td>
<td>middle</td>
<td>1232</td>
<td>0.66</td>
<td>0.34</td>
<td>1.30</td>
<td>0.232</td>
</tr>
<tr>
<td>Mechanically ventilated</td>
<td>older</td>
<td>1100</td>
<td>1.13</td>
<td>0.53</td>
<td>2.43</td>
<td>0.754</td>
</tr>
</tbody>
</table>

Table S3 legend: Results of sensitivity analysis excluding patients without any known prior contact in the healthcare system before hospitalization. Ratios and confidence intervals of per-patient charges post-COVID-19 hospitalization relative to post-influenza hospitalization are presented for each stratum. A ratio >1 indicates higher per-patient post-acute charges for COVID-19 hospitalizations relative to influenza hospitalizations in the stratum.