Multimedia Appendix 4: N-grams having the highest increase in occurrence week over week.

| n | N-gram | Week starting on | $\begin{aligned} & \text { Previous week } \\ & \text { n/N (\%) } \end{aligned}$ | n/N (\%) | Change <br> Week over Week n (\%) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | vaccine | November 09, 2020 | $\begin{gathered} 8,151 / 2,046,418 \\ (0.40 \%) \end{gathered}$ | $\begin{gathered} 50,987 / 2,046,418 \\ (2.49 \%) \end{gathered}$ | $\begin{gathered} +42,836 \\ (525.5 \%) \end{gathered}$ |
| 1 | covid | February 24, 2020 | $\begin{gathered} 1,988 / 865,901 \\ (0.23 \%) \end{gathered}$ | $\begin{gathered} 11,838 / 865,901 \\ (1.37 \%) \end{gathered}$ | $\begin{gathered} +9,850 \\ (495.5 \%) \end{gathered}$ |
| 1 | flu | February 24, 2020 | $\begin{gathered} 6,606 / 850,385 \\ (0.78 \%) \end{gathered}$ | $\begin{gathered} 26,603 / 850,385 \\ (3.13 \%) \end{gathered}$ | $\begin{gathered} +19,997 \\ (302.7 \%) \end{gathered}$ |
| 1 | get | November 09, 2020 | $\begin{gathered} 2,953 / 686,401 \\ (0.43 \%) \end{gathered}$ | $\begin{gathered} 10,398 / 686,401 \\ (1.51 \%) \end{gathered}$ | $\begin{gathered} +7,445 \\ (252.1 \%) \end{gathered}$ |
| 1 | people | February 24, 2020 | $\begin{gathered} 947 / 391,101 \\ (0.24 \%) \end{gathered}$ | $\begin{gathered} \text { 6,789/391,101 } \\ (1.74 \%) \end{gathered}$ | $\begin{gathered} +5,842 \\ (616.1 \%) \end{gathered}$ |
| 1 | say | November 09, 2020 | $\begin{gathered} 1,223 / 265,933 \\ (0.46 \%) \end{gathered}$ | $\begin{gathered} 7,436 / 265,933 \\ (2.80 \%) \end{gathered}$ | $\begin{gathered} +6,213 \\ (508.0 \%) \end{gathered}$ |
| 1 | go | November 09, 2020 | $\begin{gathered} 1,385 / 241,735 \\ (0.57 \%) \end{gathered}$ | $\begin{gathered} 5,462 / 241,735 \\ (2.26 \%) \end{gathered}$ | $\begin{gathered} +4,077 \\ (294.4 \%) \end{gathered}$ |
| 1 | take | November 09, 2020 | $\begin{gathered} 974 / 230,778 \\ (0.42 \%) \end{gathered}$ | $\begin{gathered} 7,110 / 230,778 \\ (3.08 \%) \end{gathered}$ | $\begin{gathered} +6,136 \\ (630.0 \%) \end{gathered}$ |
| 1 | vaccination | November 09, 2020 | $\begin{gathered} 537 / 228,432 \\ (0.24 \%) \end{gathered}$ | $\begin{gathered} 1,830 / 228,432 \\ (0.80 \%) \end{gathered}$ | $\begin{gathered} +1,293 \\ (240.1 \%) \end{gathered}$ |
| 1 | virus | February 24, 2020 | $\begin{gathered} 1,186 / 222,040 \\ (0.53 \%) \end{gathered}$ | $\begin{gathered} 5,366 / 222,040 \\ (2.42 \%) \end{gathered}$ | $\begin{gathered} +4,180 \\ (352.4 \%) \end{gathered}$ |
| 2 | covid, vaccine | February 24, 2020 | $\begin{gathered} 162 / 334,092 \\ (0.05 \%) \end{gathered}$ | $\begin{gathered} 1,549 / 334,092 \\ (0.46 \%) \end{gathered}$ | $\begin{gathered} +1,387 \\ (856.2 \%) \end{gathered}$ |
| 2 | get, vaccine | November 09, 2020 | $\begin{gathered} 302 / 149,333 \\ (0.20 \%) \end{gathered}$ | $\begin{gathered} 1,987 / 149,333 \\ (1.33 \%) \end{gathered}$ | $\begin{gathered} +1,685 \\ (557.9 \%) \end{gathered}$ |
| 2 | flu, shot | February 24, 2020 | $\begin{gathered} 407 / 68,518 \\ (0.59 \%) \end{gathered}$ | $\begin{gathered} 1,414 / 68,518 \\ (2.06 \%) \end{gathered}$ | $\begin{gathered} +1,007 \\ (247.4 \%) \end{gathered}$ |
| 2 | take, vaccine | November 09, 2020 | $\begin{gathered} 138 / 51,553 \\ (0.27 \%) \end{gathered}$ | $\begin{gathered} 1,207 / 51,553 \\ (2.34 \%) \end{gathered}$ | $\begin{gathered} +1,069 \\ (774.6 \%) \end{gathered}$ |
| 2 | get, flu | February 24, 2020 | $\begin{gathered} 487 / 50,962 \\ (0.96 \%) \end{gathered}$ | $\begin{gathered} 1,517 / 50,962 \\ (2.98 \%) \end{gathered}$ | $\begin{gathered} +1,030 \\ (211.5 \%) \end{gathered}$ |
| 2 | get, covid | November 09, 2020 | $\begin{gathered} 134 / 48,993 \\ (0.27 \%) \end{gathered}$ | $\begin{gathered} 486 / 48,993 \\ (0.99 \%) \end{gathered}$ | $\begin{gathered} +352 \\ (262.7 \%) \end{gathered}$ |
| 2 | flu, season | February 24, 2020 | $\begin{gathered} 401 / 47,727 \\ (0.84 \%) \end{gathered}$ | $\begin{gathered} 1,211 / 47,727 \\ (2.54 \%) \end{gathered}$ | $\begin{gathered} +810 \\ (202.0 \%) \end{gathered}$ |
| 2 | wear, mask | November 09, 2020 | $\begin{gathered} 288 / 46,062 \\ (0.63 \%) \end{gathered}$ | $\begin{gathered} 1,049 / 46,062 \\ (2.28 \%) \end{gathered}$ | $\begin{gathered} +761 \\ (264.2 \%) \end{gathered}$ |


| 2 | swine, flu | February 24, 2020 | $\begin{gathered} 73 / 41,231 \\ (0.18 \%) \end{gathered}$ | $\begin{gathered} 1,046 / 41,231 \\ (2.54 \%) \end{gathered}$ | $\begin{gathered} +973 \\ (1313.5 \%) \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | spanish, flu | February 24, 2020 | $\begin{gathered} 114 / 36,555 \\ (0.31 \%) \end{gathered}$ | $\begin{gathered} 815 / 36,555 \\ (2.23 \%) \end{gathered}$ | $\begin{gathered} +701 \\ (614.9 \%) \end{gathered}$ |
| 3 | get, covid, vaccine | November 30, 2020 | $\begin{gathered} 272 / 33,108 \\ (0.82 \%) \end{gathered}$ | $\begin{gathered} 1,208 / 33,108 \\ (3.65 \%) \end{gathered}$ | $\begin{gathered} +936 \\ (344.1 \%) \end{gathered}$ |
| 3 | get, flu, shot | February 24, 2020 | $\begin{gathered} 178 / 25,909 \\ (0.69 \%) \end{gathered}$ | $\begin{gathered} 635 / 25,909 \\ (2.45 \%) \end{gathered}$ | $\begin{gathered} +457 \\ (256.7 \%) \end{gathered}$ |
| 3 | vaccine, appointment, available | March 15, 2021 | $\begin{gathered} 205 / 18,678 \\ (1.10 \%) \end{gathered}$ | $\begin{gathered} 748 / 18,678 \\ (4.00 \%) \end{gathered}$ | $\begin{gathered} +543 \\ (264.9 \%) \end{gathered}$ |
| 3 | vaccine, appointments, longer | March 15, 2021 | $\begin{gathered} 115 / 16,287 \\ (0.71 \%) \end{gathered}$ | $\begin{gathered} 543 / 16,287 \\ (3.33 \%) \end{gathered}$ | $\begin{gathered} +428 \\ (372.2 \%) \end{gathered}$ |
| 3 | appointments, longer, available | March 15, 2021 | $\begin{gathered} 115 / 16,287 \\ (0.71 \%) \end{gathered}$ | $\begin{gathered} 543 / 16,287 \\ (3.33 \%) \end{gathered}$ | $\begin{gathered} +428 \\ (372.2 \%) \end{gathered}$ |
| 3 | sign, zip, code | March 15, 2021 | $\begin{gathered} 114 / 16,035 \\ (0.71 \%) \end{gathered}$ | $\begin{gathered} 562 / 16,035 \\ (3.50 \%) \end{gathered}$ | $\begin{gathered} +448 \\ (393.0 \%) \end{gathered}$ |
| 3 | apr, sign, zip | March 29, 2021 | $\begin{gathered} 236 / 13,192 \\ (1.79 \%) \end{gathered}$ | $\begin{gathered} 2,834 / 13,192 \\ (21.48 \%) \end{gathered}$ | $\begin{gathered} +2,598 \\ (1095.8 \%) \end{gathered}$ |
| 3 | appointment, available, walgreens | March 29, 2021 | $\begin{gathered} 553 / 10,721 \\ (5.16 \%) \end{gathered}$ | $\begin{gathered} 2,549 / 10,721 \\ (23.78 \%) \end{gathered}$ | $\begin{gathered} +1,996 \\ (360.9 \%) \end{gathered}$ |
| 3 | longer, available, walgreens | March 29, 2021 | $\begin{gathered} 535 / 10,361 \\ (5.16 \%) \end{gathered}$ | $\begin{gathered} 2,753 / 10,361 \\ (26.57 \%) \end{gathered}$ | $\begin{gathered} +2,218 \\ (414.6 \%) \end{gathered}$ |
| 3 | receive, covid, vaccine | December 14, 2020 | $\begin{gathered} 370 / 9,275 \\ (3.99 \%) \end{gathered}$ | $\begin{gathered} 1,404 / 9,275 \\ (15.14 \%) \end{gathered}$ | $\begin{gathered} +1,034 \\ (279.5 \%) \end{gathered}$ |
| 4 | vaccine, appointments, longer, available | March 15, 2021 | $\begin{gathered} 115 / 16,287 \\ (0.71 \%) \end{gathered}$ | $\begin{gathered} 543 / 16,287 \\ (3.33 \%) \end{gathered}$ | $\begin{gathered} +428 \\ (372.2 \%) \end{gathered}$ |
| 4 | apr, sign, zip, code | March 29, 2021 | $\begin{gathered} 236 / 13,192 \\ (1.79 \%) \end{gathered}$ | $\begin{gathered} 2,834 / 13,192 \\ (21.48 \%) \end{gathered}$ | $\begin{gathered} +2,598 \\ (1095.8 \%) \end{gathered}$ |
| 4 | vaccine, appointment, available, walgreens | March 29, 2021 | $\begin{gathered} 551 / 10,719 \\ (5.14 \%) \end{gathered}$ | $\begin{gathered} 2,548 / 10,719 \\ (23.77 \%) \end{gathered}$ | $\begin{gathered} +1,997 \\ (361.6 \%) \end{gathered}$ |
| 4 | appointments, longer, available, walgreens | March 29, 2021 | $\begin{gathered} \text { 535/10,361 } \\ (5.16 \%) \end{gathered}$ | $\begin{gathered} 2,753 / 10,361 \\ (26.57 \%) \end{gathered}$ | $\begin{gathered} +2,218 \\ (414.6 \%) \end{gathered}$ |
| 4 | apr, apr, sign, zip | March 29, 2021 | $\begin{gathered} 742 / 8,523 \\ (8.71 \%) \end{gathered}$ | $\begin{gathered} \text { 1,485/8,523 } \\ (17.42 \%) \end{gathered}$ | $\begin{gathered} +743 \\ (100.0 \%) \end{gathered}$ |
| 4 | available, walgreens, saint, louis | March 29, 2021 | $\begin{gathered} 163 / 6,889 \\ (2.37 \%) \end{gathered}$ | $\begin{gathered} 2,157 / 6,889 \\ (31.31 \%) \end{gathered}$ | $\begin{gathered} +1,994 \\ (1223.3 \%) \end{gathered}$ |
| 4 | sign, zip, code, vaccine | March 29, 2021 | $\begin{gathered} 290 / 6,716 \\ (4.32 \%) \end{gathered}$ | $\begin{gathered} 1,026 / 6,716 \\ (15.28 \%) \end{gathered}$ | $\begin{gathered} +736 \\ (252.6 \%) \end{gathered}$ |
| 4 | zip, code, vaccine, appointment | March 29, 2021 | $\begin{gathered} 268 / 6,271 \\ (4.27 \%) \end{gathered}$ | $\begin{aligned} & 945 / 6,271 \\ & (15.07 \%) \end{aligned}$ | $\begin{gathered} +677 \\ (252.6 \%) \end{gathered}$ |


| 4 | code, vaccine, <br> appointment, available | March 29, 2021 | $268 / 6,264$ <br> $(4.28 \%)$ | $942 / 6,264$ <br> $(15.04 \%)$ | +674 <br> $(251.5 \%)$ |
| :--- | :--- | :--- | :---: | :---: | :---: |
| 4 | longer, available, <br> walgreens, saint | March 29,2021 | $134 / 4,074$ <br> $(3.29 \%)$ | $1,221 / 4,074$ <br> $(29.97 \%)$ | $+1,087$ <br> $(811.2 \%)$ |

