Supplementary Appendix

This supplementary material is hosted by Eurosurveillance as supporting information alongside the article, “The impact of repeated vaccination using 10-year vaccination history on protection against influenza in older adults: a test-negative design study across the 2010/11 to 2015/16 influenza seasons in Ontario, Canada,” on behalf of the authors who remain responsible for the accuracy and appropriateness of the content. The same standards for ethics, copyright, attributions and permissions as for the article apply. Supplements are not edited by Eurosurveillance and Eurosurveillance is not responsible for the maintenance of any links or email addresses provided therein.

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Table S1. Participating laboratories and research ethics approval numbers

| Laboratory                                           | Ethics approval numbers |
|------------------------------------------------------|-------------------------|
| Children’s Hospital of Eastern Ontario               | 14/124X                 |
| London Health Sciences Centre                        | 106495                  |
| Mount Sinai Hospital                                | 14-0142-C               |
| North York General Hospital                         | 14-0028                 |
| Public Health Ontario                               | 2013-051.04             |
| St. Joseph’s Healthcare Hamilton                    | 14-785-C                |
| Sunnybrook Health Sciences Centre                   | 082-2014                |
| University Health Network                           | 14-7887.6               |
| William Osler Health System                         | 14-0014                 |
Table S2. Descriptive characteristics of individuals with subtyped and unsubtyped influenza A specimens obtained from community-dwelling adults aged > 65 years, 2010/11 to 2015/16 influenza seasons (n=9,364)

| Characteristic                        | Subtyped Specimens (n=4,592) | Not Subtyped Specimens (n=4,772) | p-value |
|---------------------------------------|------------------------------|----------------------------------|---------|
| Influenza season                      |                              |                                  | < 0.001 |
| 2010/11                               | 807 (17.6)                   | 331 (6.9)                        |         |
| 2011/12                               | 80 (1.7)                     | 28 (0.6)                         |         |
| 2012/13                               | 999 (21.8)                   | 1,130 (23.7)                     |         |
| 2013/14                               | 371 (8.1)                    | 350 (7.3)                        |         |
| 2014/15                               | 1,787 (38.9)                 | 2,290 (48.0)                     |         |
| 2015/16                               | 548 (11.9)                   | 643 (13.5)                       |         |
| Age (years), mean ± SD                | 80.2 ± 8.1                   | 80.5 ± 8.1                       | 0.076   |
| Age group in years                    |                              |                                  | 0.24    |
| 66-75                                 | 1,395 (30.4)                 | 1,411 (29.6)                     |         |
| 76-85                                 | 1,886 (41.1)                 | 1,923 (40.3)                     |         |
| ≥ 86                                  | 1,311 (28.5)                 | 1,438 (30.1)                     |         |
| Male sex                              | 2,171 (47.3)                 | 2,218 (46.5)                     | 0.44    |
| Neighbourhood income quintile         |                              |                                  | 0.012   |
| 1 (lowest)                            | 1,086 (23.6)                 | 1,087 (22.8)                     |         |
| 2                                     | 1,025 (22.3)                 | 944 (19.8)                       |         |
| 3                                     | 847 (18.4)                   | 944 (19.8)                       |         |
| 4                                     | 807 (17.6)                   | 917 (19.2)                       |         |
| 5 (highest)                           | 804 (17.5)                   | 849 (17.8)                       |         |
| Missing                               | 23 (0.5)                     | 31 (0.6)                         |         |
| Received homecare services, past 1y   | 2,159 (47.0)                 | 2,143 (44.9)                     | 0.041   |
| Hospitalisations, past 3y, mean ± SD  | 1.3 ± 2.0                    | 1.3 ± 2.0                        | 0.49    |
| Outpatient visits, past 1y, mean ± SD | 13.9 ± 11.1                  | 12.2 ± 9.6                       | < 0.001 |
| Prescription medications, past 1y, mean ± SD | 15.8 ± 9.3              | 15.5 ± 8.9                       | 0.049   |
| Month of influenza testing            |                              |                                  | < 0.001 |
| November                              | 84 (1.8)                     | 40 (0.8)                         |         |
| December                              | 1,581 (34.4)                 | 1,149 (24.1)                     |         |
| January                               | 1,646 (35.8)                 | 1,967 (41.2)                     |         |
| February                              | 685 (14.9)                   | 889 (18.6)                       |         |
| March                                 | 430 (9.4)                    | 615 (12.9)                       |         |
| April                                 | 130 (2.8)                    | 96 (2.0)                         |         |
| May                                   | 36 (0.8)                     | 16 (0.3)                         |         |
| Vaccinated against influenza          | 2,127 (46.3)                 | 2,425 (50.8)                     | < 0.001 |
Supplementary Text. Sensitivity analysis involving manual reclassification of past vaccination status based on misclassification of current season vaccination status

For each execution of the misclassification macro developed by Fox et al.,(1) thousands of iterations of exposure re-classification are performed on the observed data, with each iteration using a different combination of sensitivity and specificity values within the pre-specified ranges to calculate an OR. Thus, some individuals could be deemed misclassified in one iteration but not the next. The reported misclassification-corrected adjusted vaccine effectiveness (VE) estimate is based on the median odds ratio (OR) calculated from all iterations.

We modified the macro to retain the re-classified current season vaccination status for each individual from each iteration, which we used to determine the overall proportion vaccinated separately among test-positive cases and test-negative controls for each iteration. After all iterations were completed, we calculated the proportion of iterations for which each individual was re-classified as vaccinated. We also calculated the median overall proportion vaccinated for cases and controls. If an individual’s proportion was greater than the median for their case status, their current season vaccination status was set to vaccinated.

For those individuals whose current season vaccination status was re-classified, we created two scenarios to also change their past seasons’ vaccination history. In the first scenario, we assumed that for all previous seasons where they were considered to be unvaccinated in the administrative data, we changed them to vaccinated. Consequently, these individuals were re-categorized to the highest past vaccination history group in each respective analysis (e.g., in the one previous season analysis, all were re-categorized into the ‘vaccinated in the previous season’ group; in the five previous seasons analysis, all were re-categorized to the ‘vaccinated in 4-5 previous seasons’ group). In the second scenario, we assumed that only some of the previous seasons were misclassified as unvaccinated. To achieve this, we moved these individuals ‘up’ one past vaccination history category (e.g., for the analysis examining 5-year vaccination history, those initially considered vaccinated in none of the previous five seasons were re-categorized to the ‘vaccinated in 1-3 of the previous five seasons’ group). We conducted stratified analyses using these new past vaccination history groups for both scenarios.

Reference

Fox MP, Lash TL, Greenland S. A method to automate probabilistic sensitivity analyses of misclassified binary variables. Int J Epidemiol. 2005 Dec 1;34(6):1370–6.
Table S3. Descriptive characteristics of influenza test-positive and influenza test-negative community-dwelling adults aged > 65 years, 2010/11 to 2015/16 influenza seasons (n=58,304)

| Characteristic                                      | Test-Positive (n=11,496) | Test-Negative (n=46,808) | p-value |
|-----------------------------------------------------|--------------------------|--------------------------|---------|
| Influenza season*                                   |                          |                          | < 0.001 |
| 2010/11                                             | 1,204 (10.5)             | 4,980 (10.6)             |         |
| 2011/12                                             | 413 (3.6)                | 3,216 (6.9)              |         |
| 2012/13                                             | 2,253 (19.6)             | 8,577 (18.3)             |         |
| 2013/14                                             | 1,554 (13.5)             | 9,665 (20.6)             |         |
| 2014/15                                             | 4,432 (38.6)             | 12,044 (25.7)            |         |
| 2015/16                                             | 1,640 (14.3)             | 8,326 (17.8)             |         |
| Age* (years), mean ± SD                             | 80.2 ± 8.2               | 79.4 ± 8.1               | < 0.001 |
| Age group in years                                  |                          |                          | < 0.001 |
| 66-75                                               | 3,601 (31.3)             | 16,716 (35.7)            |         |
| 76-85                                               | 4,548 (39.6)             | 18,181 (38.8)            |         |
| ≥86                                                 | 3,347 (29.1)             | 11,911 (25.4)            |         |
| Male sex*                                           | 5,348 (46.5)             | 22,446 (48.0)            | 0.006   |
| Neighbourhood income quintile*                      |                          |                          | 0.036   |
| 1 (lowest)                                          | 2,630 (22.9)             | 10,473 (22.4)            |         |
| 2                                                   | 2,475 (21.5)             | 9,909 (21.2)             |         |
| 3                                                   | 2,177 (18.9)             | 8,805 (18.8)             |         |
| 4                                                   | 2,088 (18.2)             | 8,308 (17.7)             |         |
| 5 (highest)                                         | 2,062 (17.9)             | 9,022 (19.3)             |         |
| Missing                                             | 64 (0.6)                 | 291 (0.6)                |         |
| Medical conditions                                  |                          |                          |         |
| Cardiovascular disease*                             | 7,021 (61.1)             | 30,293 (64.7)            | < 0.001 |
| Chronic obstructive pulmonary disease               | 5,376 (46.8)             | 24,376 (52.1)            | < 0.001 |
| Diabetes                                            | 5,020 (43.7)             | 19,930 (42.6)            | 0.034   |
| Cancer                                              | 2,877 (25.0)             | 14,244 (30.4)            | < 0.001 |
| Asthma                                              | 3,102 (27.0)             | 13,112 (28.0)            | 0.027   |
| Anaemia                                             | 2,445 (21.3)             | 11,581 (24.7)            | < 0.001 |
| Chronic kidney disease                              | 2,331 (20.3)             | 10,546 (22.5)            | < 0.001 |
| Dementia/frailty                                     | 2,505 (21.8)             | 8,947 (19.1)             | < 0.001 |
| Immunocompromised                                    | 1,363 (11.9)             | 6,843 (14.6)             | < 0.001 |
| Any of the above medical conditions*                | 10,806 (94.0)            | 44,773 (95.7)            | < 0.001 |
| Received homecare services*, past 1y                 | 5,193 (45.2)             | 23,203 (49.6)            | < 0.001 |
| Hospitalisations*, past 3y, mean ± SD              | 1.3 ± 1.9                | 1.7 ± 2.3                | < 0.001 |
| Outpatient visits*, past 1y, mean ± SD              | 13.0 ± 10.4              | 14.5 ± 11.1              | < 0.001 |
| Prescription medications*, past 1y, mean ± SD       | 15.5 ± 9.0               | 16.8 ± 9.4               | < 0.001 |
| Month of influenza testing*                         |                          |                          | < 0.001 |
| November                                            | 127 (1.1)                | 1,284 (2.7)              |         |
| December                                            | 2,763 (24.0)             | 6,763 (14.4)             |         |
| January                                             | 3,676 (32.0)             | 11,420 (24.4)            |         |
| February                                            | 1,780 (15.5)             | 8,565 (18.3)             |         |
| March                                               | 1,802 (15.7)             | 8,953 (19.1)             |         |
| April                                               | 1,057 (9.2)              | 6,593 (14.1)             |         |
| May                                                 | 291 (2.5)                | 3,230 (6.9)              |         |
| Tested sample from inpatient setting                | 9,170 (79.8)             | 40,695 (86.9)            | < 0.001 |
| Vaccinated against influenza                        | 5,575 (48.5)             | 25,429 (54.3)            | < 0.001 |
| Vaccinated in prior season                          | 6,177 (53.7)             | 27,068 (57.8)            | < 0.001 |

*a* Included in multivariable models for estimating vaccine effectiveness  
a Includes acute ischaemic stroke, arrhythmias, congestive heart failure, ischaemic heart disease, and transient ischaemic attack.
Table S4. Descriptive characteristics of vaccinated and unvaccinated community-dwelling adults aged > 65 years, 2010/11 to 2015/16 influenza seasons (n=58,304)

| Characteristic                                      | Vaccinated (n=31,004) | Unvaccinated (n=27,300) | p-value |
|-----------------------------------------------------|-----------------------|-------------------------|---------|
| **Influenza season** *                              |                       |                         | < 0.001 |
| 2010/11                                             | 3,049 (9.8)           | 3,135 (11.5)            |         |
| 2011/12                                             | 2,018 (6.5)           | 1,611 (5.9)             |         |
| 2012/13                                             | 5,327 (17.2)          | 5,503 (20.2)            |         |
| 2013/14                                             | 6,079 (19.6)          | 5,140 (18.8)            |         |
| 2014/15                                             | 9,128 (29.4)          | 7,348 (26.9)            |         |
| 2015/16                                             | 5,403 (17.4)          | 4,563 (16.7)            |         |
| **Age* (years), mean ± SD**                         |                       |                         | < 0.001 |
| 66-75                                               | 9,912 (32.0)          | 10,405 (38.1)           |         |
| 76-85                                               | 12,730 (41.1)         | 9,999 (36.6)            |         |
| ≥86                                                 | 8,362 (27.0)          | 6,896 (25.3)            |         |
| **Male sex*                                         |                       |                         | < 0.001 |
|                                                     | 15,081 (48.6)         | 12,713 (46.6)           |         |
| **Neighbourhood income quintile***                  |                       |                         | < 0.001 |
| 1 (lowest)                                          | 6,665 (21.5)          | 6,438 (23.6)            |         |
| 2                                                   | 6,589 (21.3)          | 5,795 (21.2)            |         |
| 3                                                   | 5,860 (18.9)          | 5,122 (18.8)            |         |
| 4                                                   | 5,586 (18.0)          | 4,810 (17.6)            |         |
| 5 (highest)                                         | 6,147 (19.8)          | 4,937 (18.1)            |         |
| **Medical conditions**                              |                       |                         |         |
| Cardiovascular disease a                            | 20,258 (65.3)         | 17,056 (62.5)           | < 0.001 |
| Chronic obstructive pulmonary disease               | 16,561 (53.4)         | 13,193 (48.3)           | < 0.001 |
| Diabetes                                            | 13,595 (43.8)         | 11,355 (41.6)           | < 0.001 |
| Cancer                                              | 9,290 (30.0)          | 7,831 (28.7)            | < 0.001 |
| Asthma                                              | 9,340 (30.1)          | 6,874 (25.2)            | < 0.001 |
| Anaemia                                             | 7,673 (24.7)          | 6,353 (23.3)            | < 0.001 |
| Chronic kidney disease                              | 6,874 (22.2)          | 6,003 (22.0)            | 0.578   |
| Dementia/frailty                                     | 5,829 (18.8)          | 5,623 (20.6)            | < 0.001 |
| Immunocompromised                                    | 4,599 (14.8)          | 3,607 (13.2)            | < 0.001 |
| **Any of the above medical conditions*              | 29,808 (96.1)         | 25,771 (94.4)           | < 0.001 |
| **Received homecare services**, past 1y              | 14,523 (46.8)         | 13,873 (50.8)           | < 0.001 |
| Hospitalisations*, past 3y, mean ± SD               | 1.5 ± 2.1             | 1.7 ± 2.3               | < 0.001 |
| Outpatient visits*, past 1y, mean ± SD              | 15.6 ± 10.8           | 12.6 ± 10.9             | < 0.001 |
| Prescription medications*, past 1y, mean ± SD       | 17.2 ± 8.9            | 15.7 ± 9.6              | < 0.001 |
| **Month of influenza testing**                      |                       |                         | < 0.001 |
| November                                            | 509 (1.6)             | 902 (3.3)               |         |
| December                                            | 4,674 (15.1)          | 4,852 (17.8)            |         |
| January                                             | 7,919 (25.5)          | 7,177 (26.3)            |         |
| February                                            | 5,592 (18.0)          | 4,753 (17.4)            |         |
| March                                               | 5,969 (19.3)          | 4,786 (17.5)            |         |
| April                                               | 4,329 (14.0)          | 3,321 (12.2)            |         |
| May                                                 | 2,012 (6.5)           | 1,509 (5.5)             |         |
| **Tested sample from inpatient setting**            | 26,583 (85.7)         | 23,282 (85.3)           | 0.116   |
| **Specimen positive for influenza**                 | 5,575 (18.0)          | 5,921 (21.7)            | < 0.001 |
| **Vaccinated in prior season**                      | 24,594 (79.3)         | 8,651 (31.7)            | < 0.001 |

* Included in multivariable models for estimating vaccine effectiveness

* Includes acute ischaemic stroke, arrhythmias, congestive heart failure, ischaemic heart disease, and transient ischaemic attack.
### Table S5. Influenza vaccine effectiveness estimates for community-dwelling adults aged > 65 years, by influenza type/subtype and influenza season (2010/11 to 2015/16)\(^a\)

| Analysis | Test-Positive, No. Vaccinated/Total | Test-Negative, No. Vaccinated/Total | Unadjusted VE% (95% CI) | Adjusted VE% (95% CI) |
|----------|-----------------------------------|-----------------------------------|------------------------|-------------------------|
| **2010/11** |                                  |                                   |                        |                         |
| Influenza A |                                  |                                   |                        |                         |
| A(H1N1)pdm09 ≤ 5\(^b\) / ≤ 26\(^b\) | 2,561 / 4,980 | 2,561 / 4,980 | 76 (37, 91) | 72 (25, 90) |
| A(H3N2) | 311 / 782 | 311 / 782 | 76 (37, 91) | 72 (25, 90) |
| A(unsubtyped) | 144 / 331 | 144 / 331 | 76 (37, 91) | 72 (25, 90) |
| Influenza B | 28 / 66 | 28 / 66 | 76 (37, 91) | 72 (25, 90) |
| **2011/12** |                                  |                                   |                        |                         |
| Influenza A |                                  |                                   |                        |                         |
| A(H1N1)pdm09 | 14 / 33 | 1,823 / 3,216 | 44 (–13, 72) | 31 (–41, 66) |
| A(H3N2) | 22 / 47 | 1,823 / 3,216 | 44 (–13, 72) | 31 (–41, 66) |
| A(unsubtyped) | 18 / 28 | 1,823 / 3,216 | 44 (–13, 72) | 31 (–41, 66) |
| Influenza B | 141 / 305 | 1,823 / 3,216 | 44 (–13, 72) | 31 (–41, 66) |
| **2012/13** |                                  |                                   |                        |                         |
| Influenza A |                                  |                                   |                        |                         |
| A(H1N1)pdm09 | 29 / 47 | 4,339 / 8,577 | –57 (–184, 13) | –59 (–191, 14) |
| A(H3N2) | 421 / 953 | 4,339 / 8,577 | –57 (–184, 13) | –59 (–191, 14) |
| A(unsubtyped) | 484 / 1,130 | 4,339 / 8,577 | –57 (–184, 13) | –59 (–191, 14) |
| Influenza B | 54 / 124 | 4,339 / 8,577 | –57 (–184, 13) | –59 (–191, 14) |
| **2013/14** |                                  |                                   |                        |                         |
| Influenza A |                                  |                                   |                        |                         |
| A(H1N1)pdm09 | 103 / 269 | 5,368 / 9,665 | 50 (36, 61) | 44 (28, 57) |
| A(H3N2) | 54 / 103 | 5,368 / 9,665 | 50 (36, 61) | 44 (28, 57) |
| A(unsubtyped) | 160 / 350 | 5,368 / 9,665 | 50 (36, 61) | 44 (28, 57) |
| Influenza B | 394 / 834 | 5,368 / 9,665 | 50 (36, 61) | 44 (28, 57) |
| **2014/15** |                                  |                                   |                        |                         |
| Influenza A |                                  |                                   |                        |                         |
| A(H1N1)pdm09 ≤ 5\(^b\) / ≤ 5\(^b\) | 6,712 / 12,044 | 6,712 / 12,044 | 47 (–217, 91) | 31 (–346, 89) |
| A(H3N2) | 926 / 1,783 | 6,712 / 12,044 | 47 (–217, 91) | 31 (–346, 89) |
| A(unsubtyped) | 1,302 / 2,290 | 6,712 / 12,044 | 47 (–217, 91) | 31 (–346, 89) |
| Influenza B | 186 / 356 | 6,712 / 12,044 | 47 (–217, 91) | 31 (–346, 89) |
| **2015/16** |                                  |                                   |                        |                         |
| Influenza A |                                  |                                   |                        |                         |
| A(H1N1)pdm09 | 194 / 451 | 4,626 / 8,326 | 40 (27, 50) | 37 (24, 49) |
| A(H3N2) | 46 / 97 | 4,626 / 8,326 | 40 (27, 50) | 37 (24, 49) |
| A(unsubtyped) | 317 / 643 | 4,626 / 8,326 | 40 (27, 50) | 37 (24, 49) |
| Influenza B | 224 / 453 | 4,626 / 8,326 | 40 (27, 50) | 37 (24, 49) |

\(^a\)The model adjusted for age, sex, census area-level neighbourhood income quintile, number of hospitalisations in the past 3 years, number of outpatient visits in the past year, receipt of home care services in the past year, number of prescription medications in the past year, comorbidities that increase the risk of influenza complications (anaemia, cancer, cardiovascular disease, dementia, diabetes, frailty, immunodeficiency due to underlying disease and/or therapy, as well as renal disease and respiratory disease), and calendar time.

\(^b\)Suppressed due to small cell sizes (direct or by inference), which cannot be reported as per privacy regulations.
**Figure S1.** Forest plots of (A) current season vaccine effectiveness estimates against influenza A(H3N2) for community-dwelling adults aged > 65 years, taking into account vaccination histories for one, five, and 10 previous seasons and stratifying according to number of vaccinations received, and (B) also correcting for misclassification of current season vaccination status.

For analysis:

- **Vaccination History**:
  - 1 prev. season: Vaccinated prev. season, Not vaccinated prev. season
  - 5 prev. seasons: Vaccinated 4–5 of prev. 5 seasons, Vaccinated 1–3 of prev. 5 seasons, Vaccinated 0 of prev. 5 seasons
  - 10 prev. seasons: Vaccinated 9–10 of prev. 10 seasons, Vaccinated 7–8 of prev. 10 seasons, Vaccinated 4–6 of prev. 10 seasons, Vaccinated 1–3 of prev. 10 seasons, Vaccinated 0 of prev. 10 seasons

| Analysis  | Vaccination History | VE (95% CI) | Trend Test |
|-----------|---------------------|-------------|------------|
| 1 prev. season | Vaccinated prev. season | 18% (9, 26) | p=0.252 |
|            | Not vaccinated prev. season | 24% (13, 33) | |
| 5 prev. seasons | Vaccinated 4–5 of prev. 5 seasons | 18% (7, 27) | p=0.107 |
|                | Vaccinated 1–3 of prev. 5 seasons | 29% (19, 38) | |
|                | Vaccinated 0 of prev. 5 seasons | 31% (1, 52) | |
| 10 prev. seasons | Vaccinated 9–10 of prev. 10 seasons | 11% (~5, 25) | p=0.012 |
|                 | Vaccinated 7–8 of prev. 10 seasons | 24% (8, 37) | |
|                 | Vaccinated 4–6 of prev. 10 seasons | 33% (19, 44) | |
|                 | Vaccinated 1–3 of prev. 10 seasons | 33% (12, 50) | |
|                 | Vaccinated 0 of prev. 10 seasons | 41% (~3, 66) | |

**a** The model adjusted for age, sex, census area-level neighbourhood income quintile, number of hospitalisations in the past 3 years, number of outpatient visits in the past year, receipt of home care services in the past year, number of prescription medications in the past year, comorbidities that increase the risk of influenza complications (anaemia, cancer, cardiovascular disease, dementia, diabetes, frailty, immunodeficiency due to underlying disease and/or therapy, as well as renal disease and respiratory disease), calendar time, and influenza season.
Figure S2. Forest plots of (A) current season vaccine effectiveness estimates against influenza A(H1N1)pdm09 for community-dwelling adults aged > 65 years, taking into account vaccination histories for one, five, and 10 previous seasons and stratifying according to number of vaccinations received, and (B) also correcting for misclassification of current season vaccination status.

The model adjusted for age, sex, census area-level neighbourhood income quintile, number of hospitalisations in the past 3 years, number of outpatient visits in the past year, receipt of home care services in the past year, number of prescription medications in the past year, comorbidities that increase the risk of influenza complications (anaemia, cancer, cardiovascular disease, dementia, diabetes, frailty, immunodeficiency due to underlying disease and/or therapy, as well as renal disease and respiratory disease), calendar time, and influenza season.
Figure S3. Forest plots of (A) current season vaccine effectiveness estimates against influenza B for community-dwelling adults aged > 65 years, taking into account vaccination histories for one, five, and 10 previous seasons and stratifying according to number of vaccinations received, and (B) also correcting for misclassification of current season vaccination status.

The model adjusted for age, sex, census area-level neighbourhood income quintile, number of hospitalisations in the past 3 years, number of outpatient visits in the past year, receipt of home care services in the past year, number of prescription medications in the past year, comorbidities that increase the risk of influenza complications (anaemia, cancer, cardiovascular disease, dementia, diabetes, frailty, immunodeficiency due to underlying disease and/or therapy, as well as renal disease and respiratory disease), calendar time, and influenza season.
**Figure S4.** Forest plots of (A) current season vaccine effectiveness estimates against any influenza restricted to community-dwelling adults aged ≥ 75 years, taking into account vaccination histories for one, five, and 10 previous seasons and stratifying according to number of vaccinations received, and (B) also correcting for misclassification of current season vaccination status.

| Analysis | Vaccination History | VE (95% CI) | Trend Test |
|----------|---------------------|-------------|------------|
| 1 prev. season | Vaccinated prev. season | 7% (0, 14) | p=0.001 |
| 1 prev. season | Not vaccinated prev. season | 23% (16, 30) | |
| 5 prev. seasons | Vaccinated 4–5 of prev. 5 seasons | 8% (0, 16) | p=0.008 |
| 5 prev. seasons | Vaccinated 1–3 of prev. 5 seasons | 20% (12, 27) | |
| 5 prev. seasons | Vaccinated 0 of prev. 5 seasons | 29% (11, 44) | |
| 10 prev. seasons | Vaccinated 9–10 of prev. 10 seasons | 7% (4, 16) | p=0.001 |
| 10 prev. seasons | Vaccinated 7–8 of prev. 10 seasons | 13% (2, 22) | |
| 10 prev. seasons | Vaccinated 4–6 of prev. 10 seasons | 24% (15, 33) | |
| 10 prev. seasons | Vaccinated 1–3 of prev. 10 seasons | 26% (13, 37) | |
| 10 prev. seasons | Vaccinated 0 of prev. 10 seasons | 34% (9, 52) | |

![Forest plot image](image-url)

* The model adjusted for age, sex, census area-level neighbourhood income quintile, number of hospitalisations in the past 3 years, number of outpatient visits in the past year, receipt of home care services in the past year, number of prescription medications in the past year, comorbidities that increase the risk of influenza complications (anaemia, cancer, cardiovascular disease, dementia, diabetes, frailty, immunodeficiency due to underlying disease and/or therapy, as well as renal disease and respiratory disease), calendar time, and influenza season.
**Figure S5.** Forest plots of current season vaccine effectiveness estimates against any influenza for community-dwelling adults aged > 65 years, taking into account vaccination histories for one, five, and 10 previous seasons and stratifying according to number of vaccinations received and, based on misclassification of current season vaccination status, (A) manually reclassifying vaccination status from unvaccinated to vaccinated for all previous seasons, and (B) moving individuals ‘up’ a single category.

| Analysis | Vaccination History | VE (95% CI) | Trend Test |
|----------|---------------------|-------------|------------|
| 1 prev. season | Vaccinated prev. season | 29% (23, 34) | p<=0.001 |
|          | Not vaccinated prev. season | 45% (40, 49) | |
| 5 prev. seasons | Vaccinated 4–5 of prev. 5 seasons | 32% (26, 38) | p=0.039 |
|          | Vaccinated 1–3 of prev. 5 seasons | 36% (30, 42) | |
|          | Vaccinated 0 of prev. 5 seasons | 51% (40, 61) | |
| 10 prev. seasons | Vaccinated 9–10 of prev. 10 seasons | 29% (20, 38) | p=0.010 |
|          | Vaccinated 7–8 of prev. 10 seasons | 33% (23, 41) | |
|          | Vaccinated 4–6 of prev. 10 seasons | 39% (30, 47) | |
|          | Vaccinated 1–3 of prev. 10 seasons | 44% (33, 52) | |
|          | Vaccinated 0 of prev. 10 seasons | 48% (27, 62) | |

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*The model adjusted for age, sex, census area-level neighbourhood income quintile, number of hospitalisations in the past 3 years, number of outpatient visits in the past year, receipt of home care services in the past year, number of prescription medications in the past year, comorbidities that increase the risk of influenza complications (anaemia, cancer, cardiovascular disease, dementia, diabetes, frailty, immunodeficiency due to underlying disease and/or therapy, as well as renal disease and respiratory disease), calendar time, and influenza season.*
Figure S6. Forest plots of (A) current season vaccine effectiveness estimates against any influenza for community-dwelling adults aged > 65 years, taking into account vaccination histories for one, five, and 10 previous seasons, using the standard approach of a common reference group (i.e., patients who were not vaccinated in the current or any previous seasons under consideration), and (B) also correcting for misclassification of current season vaccination status.
The model adjusted for age, sex, census area-level neighbourhood income quintile, number of hospitalisations in the past 3 years, number of outpatient visits in the past year, receipt of home care services in the past year, number of prescription medications in the past year, comorbidities that increase the risk of influenza complications (anaemia, cancer, cardiovascular disease, dementia, diabetes, frailty, immunodeficiency due to underlying disease and/or therapy, as well as renal disease and respiratory disease), calendar time, and influenza season.