**Supplementary Table 1: Comparison of characteristics of HIV-infected and -uninfected influenza-positive index cases, Klerksdorp and Pietermaritzburg in South Africa, 2013-2014**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Characteristic** | **HIV infected**  **n/N (%)**  **N=28** | **HIV uninfected (%)**  **N=59** | **Univariate**  **OR (95% CI)** | **p** |
| Age group (years)  <1  1-4  5-14  15-24  25-44  45-64  ≥65 | 1/28 (4)  1/28 (4)  2/28 (7)  1/28 (4)  17/28 (61)  6/28 (21)  0/28 (0) | 1/59 (2)  17/59 (29)  20/59 (34)  13/59 (22)  5/59 (8)  3/59 (5)  0/59 (0) | 13.0 (0.4-405)  0.8 (0.1-13.4)  1.3 (0.1-15.8)  Reference  44.2 (4.6-425.7)  26.0 (2.2-304.7)  Not included | 0.144  0.854  0.837  Reference  0.001  0.009 |
| Female | 20/28 (71) | 32/59 (54) | 2.1 (0.8-5.5) | 0.121 |
| Pietermaritzburg site | 15/28 (54) | 27/59 (46) | 1.4 (0.6-3.4) | 0.495 |
| Enrolled in 2014 | 20/28 (71) | 38/59 (64) | 1.4 (0.5-3.7) | 0.517 |
| Alcohol usea | 8/20 (40) | 5/21 (24) | 2.1 (0.6-8.2) | 0.269 |
| Smokinga | 3/20 (15) | 5/21 (24) | 0.6 (0.1-2.8) | 0.474 |
| Underlying medical condition (not HIV) d | 2/28 (7) | 0/59 (0) | 11.2 (0.5-242.0)c | 0.123 |
| Currently taking treatment for tuberculosis | 2/23 (9) | 1/56 (2) | 5.4 (0.5-62.9) | 0.178 |
| Received influenza vaccine | 0/24 (0) | 1/55 (2) | 0.7 (0.1-18.9)c | 0.856 |
| Influenza type A (vs B) | 24/28 (86) | 53/59 (90) | 1.5 (0.4-5.7) | 0.579 |
| Influenza type and subtype  A(H1N1)pdm09  A(H3N2)  A(unsubtyped)  B | 6/28 (21)  17/28 (61)  1/28 (4)  4/28 (14) | 11/59 (19)  40/59 (68)  2/59 (3)  6/59 (10) | Reference  0.8 (0.2-2.4)  0.9 (0.1-12.3)  1.2 (0.2-6.1) | Reference  0.669  0.948  0.807 |
| Influenza cycle threshold (Ct) value <30 | 21/28 (75) | 41/58 (71) | 1.2 (0.4-3.5) | 0.674 |
| Viral coinfectionb | 5/28 (18) | 13/59 (22) | 0.8 (0.2-2.4) | 0.650 |
| Pneumococcal colonisation | 6/14 (43) | 29/39 (74) | 0.25 (0.1-0.9) | 0.036 |
| Sore throat | 13/24 (54) | 22/56 (39) | 1.8 (0.7-4.8) | 0.221 |
| Runny nose | 21/24 (88) | 44/56 (79) | 1.9 (0.5-7.5) | 0.337 |
| Headache | 16/24 (67) | 25/56 (45) | 2.5 (0.9-6.7) | 0.075 |
| Myalgia | 7/24 (29) | 11/56 (20) | 1.7 (0.6-5.1) | 0.353 |
| **Household characteristics** |  |  |  |  |
| >3 people per room | 8/28 (29) | 18/59 (31) | 0.9 (0.3-2.5) | 0.853 |
| Number in household (excluding index case)  2-3  4-6  7+ | 14/28 (50)  11/28 (39)  3/28 (11) | 16/59 (27)  38/59 (64)  5/59 (8) | Reference  0.9 (0.3-2.5)  0.5 (0.3-0.8) | Reference  0.644  0.027 |
| Child <5 years in the house (excluding index case) | 9/28 (32) | 14/59 (24) | 1.5 (0.6-4.1) | 0.410 |
| ≥2 secondary cases in household | 2/28 (7) | 16/59 (27) | 0.2 (0.04-0.9) | 0.021 |
| Smoke exposure in home | 3/19 (16) | 4/38 (11) | 1.6 (0.3-7.9) | 0.574 |
| Home has a tap inside | 4/19 (21) | 14/39 (36) | 0.5 (0.1-1.7) | 0.241 |
| Soap available for hand washing | 10/19 (53) | 20/38 (53) | 0.6 (0.3-3.0) | 0.969 |
| Cook with electric stove | 18/19 (95) | 36/39 (92) | 1.5 (0.1-15.4) | 0.721 |

OR – Odds ratio, CI – confidence interval

Data missing for alcohol use (n=4), smoking (n=4), current tuberculosis treatment (n=8), received influenza vaccine (n=9), influenza cycle threshold value (n=1), pneumococcal colonization (n=39), symptoms (sore throat, runny nose, headache and myalgia) (n=7), smoke exposure in home (n=30), tap inside home (n=29), soap available (n=30), cook with electric stove (n=29). Additional factors evaluated but not found to be associated with HIV status of the index case: sharing eating utensils with contacts, avoiding contact with household members, sharing a bed with the index case.

aIndividuals aged >15 years

bTest positive on polymerase chain reaction for at least one of parainfluenza virus types 1-3, respiratory syncytial virus, enterovirus, human metapneumovirus, adenovirus or human rhinovirus

cEstimated using Firth logistic regression

dAsthma, other chronic lung disease, chronic heart disease, liver disease, renal disease, diabetes mellitis, immunocompromising conditions excluding HIV infection, neurological disease or pregnancy. Comorbidities were considered absent in cases for which the medical records stated that the patient had no underlying medical condition or when there was no direct reference to that condition.

**Supplementary table 2: Characteristics of index case and household contacts associated with household secondary infection risk (SIR) individuals testing influenza positive on day 12 visit, Klerksdorp and Pietermaritzburg in South Africa, 2013-2014**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Characteristic** | **SIRa**  **n/N (%)** | **Univariate**  **OR (95% CI)** | **p** | **Multivariable**  **OR (95% CI)** | **p** |
| **Index case characteristics** |  |  |  |  |  |
| Age group (years)  <1  1-4  5-14  15-24  25-44  45-64  ≥65 | 0/6 (0)  26/62 (42)  19/86 (22)  13/56 (23)  21/85 (25)  4/38 (11)  0/0 (0) | Not estimated  2.5 (1.2-5.4)  Reference  1.1 (0.4-2.5)  1.2 (0.5-2.8)  0.4 (0.1-2.6)  Not estimated | 0.016  Reference  0.884  0.742  0.343 | Not estimated  3.3 (1.1-9.7)  Reference  1.9 (0.7-5.7)  4.8 (1.1-22.7)  1.6 (0.2-14.9)  Not included | 0.032  Reference  0.232  0.048  0.684 |
| Sex  Male  Female | 32/122 (26)  51/211 (24) | 1.1 (0.6-2.1)  Reference | 0.736  Reference |  |  |
| Site  Klerksdorp  Edendale | 55/177 (31)  28/156 (18) | 2.1 (1.2-4.0)  Reference | 0.033  Reference |  |  |
| Year  2013  2014 | 21/108 (19)  62/225 (28) | Reference  1.6 (0.8-2.9) | Reference 0.143 |  |  |
| HIV status  Uninfected  Infected | 64/220 (29)  19/113 (17) | Reference  0.5 (0.2-1.2) | Reference  0.112 | Reference  0.3 (0.1-0.9) | Reference  0.042 |
| HIV status  Uninfected  Infected, receiving ART  Infected, not receiving ART | 64/215 (30)  14/77 (18)  5/36 (14) | Reference  0.5 (0.2-1.6)  0.4 (0.1-0.8) | Reference  0.257  0.016 |  |  |
| Non HIV underlying illnessd  Absent  Present | 83/326 (25)  0/7 (0) | Not estimated |  |  |  |
| Currently taking treatment for tuberculosis  No  Yes | 66/281 (23)  9/15 (60) | Reference  4.9 (2.2-10.9) | Reference  0.002 |  |  |
| Alcohol usec  No  Yes | 24/89 (27)  5/43 (12) | 2.8 (0.9-8.0)  Reference | 0.038  Reference |  |  |
| Smokingc  No  Yes | 25/108 (23)  4/24 (17) | 1.5 (0.5-4.8)  Reference | 0.476  Reference |  |  |
| Influenza type  A  B | 71/288 (24)  12/39 (31) | Reference  1.4 (0.5-4.3) | Reference  0.517 |  |  |
| Influenza type and subtype  A(H3N2)  A(H1N1)pdm09  B  A (Unsubtyped) | 57/219 (26)  12/65 (18)  12/39 (31)  2/10 (20) | 1.6 (0.7-3.3)  Reference  1.9 (0.6-6.6)  1.1 (0.2-7.9) | 0.242  Reference  0.275  0.921 |  |  |
| Influenza cycle threshold (Ct) value  <30  ≥30 | 68/243 (28)  14/88 (16) | 2.1 (1.0-4.1)  Reference | 0.042  Reference | 2.4 (1.1-5.2)  Reference | 0.031  Reference |
| Pneumococcal colonisation  Yes  No | 38/131 (29)  24/75 (32) | 0.9 (0.4-2.1)  Reference | 0.744  Reference |  |  |
| Viral coinfectionb  Yes  No | 18/64 (28)  65/269 (24) | 1.2 (0.6-2.4)  Reference | 0.553  Reference |  |  |
| Received influenza vaccine  Yes  No | 0/5 (0)  74/298 (25) | Not estimated |  |  |  |
| Sore throat  Yes  No | 23/135 (17)  53/173 (31) | 0.5 (0.2-0.9)  Reference | 0.030  Reference |  |  |
| Myalgia  Yes  No | 9/64 (14)  67/244 (27) | 0.4 (0.1-1.2)  Reference | 0.119  Reference |  |  |
| **Household contact characteristics** |  |  |  |  |  |
| Age group (years)  <1  1-4  5-14  15-24  25-44  45-64  ≥65 | 3/6 (50)  14/28 (50)  20/82 (24)  11/76 (14)  18/84 (21)  11/40 (28)  6/17 (35) | 3.1 (0.8-12.7)  3.1 (1.2-8.1)  Reference  0.5 (0.2-1.2)  0.8 (0.4-1.8)  1.2 (0.5-3.0)  1.7 (0.6-5.1) | 0.113  0.023  Reference  0.121  0.668  0.734  0.348 | 1.5 (0.4-5.4)  3.7 (1.3-10.5)  Reference  0.5 (0.2-1.1)  0.8 (0.4-1.9)  1.1 (0.4-3.5)  2.0 (0.6-7.4) | 0.503  0.016  Reference  0.088  0.635  0.816  0.253 |
| Sex  Male  Female | 28/109 (26)  50/200 (25) | 1.0 (0.6-1.8)  Reference | 0.893  Reference |  |  |
| HIV status  Uninfected  Infected | 41/140 (29)  5/26 (19) | Reference  0.6 (0.2-1.9) | Reference  0.351 |  |  |
| Non HIV underlying illnessd  Absent  Present | 80/321 (25)  3/12 (25) | Reference  1.0 (0.3-3.6) | Reference  0.995 |  |  |
| Alcohol usec  No  Yes | 33/145 (23)  11/57 (19) | Reference  0.8 (0.4-1.8) | Reference  0.614 |  |  |
| Smokingc  No  Yes | 37/169 (22)  7/33 (21) | Reference  1.0 (0.4-2.5) | Reference  0.934 |  |  |
| Received influenza vaccine  Yes  No | 2/12 (17)  60/259 (23) | Reference  1.5 (0.3-7.5) | Reference  0.611 |  |  |
| Share a bed with the index case  Yes  No | 32/86 (37)  48/226 (21) | 2.2 (1.2-3.9)  Reference | 0.008  Reference | 2.7 (1.4-5.3)  Reference | 0.004  Reference |
| Number of people in household  3-4  4-7  >7 | 15/85 (18)  46/195 (24)  22/53 (42) | Reference  1.4 (0.7-3.1)  3.3 (1.1-9.6) | Reference  0.344  0.027 | Reference  1.7 (0.6-4.9)  4.2 (1.1-16.4) | Reference  0.299  0.035 |
| Number of children aged <5 years in house  ≤2  >2 | 70/315 (22)  13/18 (72) | Reference  9.1 (3.1-26.4) | Reference  <0.001 |  |  |

OR – Odds ratio, CI – confidence interval. For each characteristic, all available data were included in the analysis. Odds ratios and p values for all variables included in the multivariable models are displayed in the two right hand columns of the table. No pairwise interactions were included in the multivariable models as no interaction terms were found significant. Additional factors evaluated but not found to be associated with SIR: pneumococcal colonisation, viral coinfection, index case myalgia, index case runny nose, crowding (≥3 people per room), sharing eating utensils with the index case, avoiding contact with the sick household member.

Missing data: Out of 87 index cases included in the analysis data were missing for alcohol use (n=4), smoking (n=4), current tuberculosis treatment (n=8), received influenza vaccine (n=8), influenza cycle threshold value (n=1), pneumococcal colonization (n=34), symptoms (sore throat, runny nose, headache and myalgia) (n=7). Out of 333 household contacts included in the analysis data were missing for contact sex (n=24), contact HIV status (n=167), contact alcohol use (n=15), contact smoking (n=15), contact influenza vaccine receipt (n=62), contact sharing a bed with index (n=21).

aSecondary infection risk (SIR)=Number of secondary cases in the household/number of exposed household contacts

bTest positive on polymerase chain reaction for at least one of parainfluenza virus types 1-3, respiratory syncytial virus, enterovirus, human metapneumovirus, adenovirus or human rhinovirus

cSelf reported, among individuals aged >15 years

dAsthma, other chronic lung disease, chronic heart disease, liver disease, renal disease, diabetes mellitis, immunocompromising conditions excluding HIV infection, neurological disease or pregnancy. Comorbidities were considered absent in cases for which the medical records stated that the patient had no underlying medical condition or when there was no direct reference to that condition.

**Supplementary table 3: Reported symptoms among household contacts testing influenza positive by age group, Klerksdorp and Pietermaritzburg in South Africa, 2013-2014**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Symptom** | **All ages**  **N=58**  **n (%)** | **<5 years**  **N=11**  **n (%)** | **≥5 years**  **N=47**  **n (%)** | **p** |
| Fever | 29 (50) | 7 (64) | 22 (47) | 0.315 |
| Cough | 42 (72) | 11 (100) | 31 (66) | 0.023 |
| Nasal congestion | 39 (67) | 11 (100) | 28 (60) | 0.010 |
| Sore throat | 27 (47) | 5 (45) | 22 (47) | 0.935 |
| Muscle pains | 21 (36) | 1 (9) | 20 (43) | 0.038 |
| Headache | 32 (55) | 3 (27) | 29 (62) | 0.039 |
| Diarrhoea | 13 (22) | 1 (9) | 12 (26) | 0.239 |
| Any symptom | 46 (79) | 11 (100) | 35 (74) | 0.060 |
| ≥2 symptoms | 41 (71) | 10 (91) | 31 (66) | 0.102 |
| Fever and cough | 28 (48) | 7 (64) | 21 (45) | 0.257 |