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The year past and the year ahead – some facts and figures about *Eurosurveillance*

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The year 2016 marks the 20th year in which *Eurosurveillance* has been published regularly. And there are good news for the journal's contributors and supporters. *Eurosurveillance* has remained among the top 10 journals in its field in science citation index since it was awarded its first impact factor for the year 2011. Feedback indicates that the journal has a reputation for publishing an interesting mix of public health-relevant and scientific articles to serve its diverse audiences.

Looking back at the year 2015, the wide range of topics included matters that were high on the public health agenda: communicable diseases in connection with the refugee crisis, the Ebola outbreak in West Africa, the Middle East Respiratory Syndrome (MERS) coronavirus epidemic and the largest MERS outbreak outside the Arabian Peninsula shaking the Korean health system, influenza vaccine effectiveness in a season with antigenic mismatch between circulating and vaccine A(H3N2) viruses, and antimicrobial resistance – in particular carbapenemase-producing Gram-negative multidrug-resistant organisms and emergence of colistin resistance. We also dedicated a special issue to HIV and sexually transmitted infections with a focus on epidemiology, prevention and control among men who have sex with men in Europe [1].

We continue with a mix of topics also in the first issue of 2016. It features a rapid communication on cholera importation from the Philippines which serves as reminder to consider this in advice for travellers to endemic areas other than Haiti and Africa [2]. Another rapid communication reports the likely establishment of schistosomiasis in the Canu River on Corsica and its implications [3]. Furthermore, an article from New Zealand on the influenza vaccine effectiveness from the most recent influenza season in the southern hemisphere gives some indication for what might be expected during the ongoing season in the northern hemisphere [4].

As is our tradition at the beginning of every year, we publish a list with the names of peer reviewers who supported us in the past year [5]. We are grateful to some 530 experts who dedicated their time and reviewed for us in 2015. Their thoughts and expertise are invaluable for our decision-making. We are also guided times and again by our board and a wholehearted 'Thank you' goes to our associate editors and editorial advisors for this. Other supporters and colleagues who help us and who are often partners for testing ideas remain unnamed here, still we would like to thank them warmly and hope to be able to count on them also in 2016. We are grateful for continued funding, logistic support and encouragement from our publisher the European Centre for Disease Prevention and Control (ECDC) who grants us the editorial freedom we need to work according to the scientific standards we aspire.

With all this support, *Eurosurveillance* fared well. The impact factor for 2014, released in 2015, is at 5.7 (4.6 in 2013) and the journal is well positioned also in other metrics such as those provided by SCImago and Google scholar. The editorial office received on average 64 submissions per month. Of the total 770 articles submitted in 2015 (491 regular, 240 rapid communications, 39 other), we selected for peer-review those that we deemed of most interest for our readers. The rejection rate currently stands at around 73%, i.e. ca one in four submissions will make it to publication. The geographical origin of our submissions showed a worldwide distribution also in 2015. A number of articles from outside of Europe were accepted for publication while the bulk of published work was from Europe and published articles generally are of European relevance. From January 2016 onwards, two new associate editors, Professor Magnus Boman, Royal Institute of Technology, Stockholm, Sweden and Professor Jacob Moran-Gilad, Ben-Guirion University, Beer-Sheva, Israel, have joined the editorial board as associate editors. They will complement the strength of the present

group with their respective expertise as computational epidemiologist and clinical microbiologist, and in public health.

Success and recognition of a journal come with better visibility and more attention. Scientists in academia and public health are under pressure to publish in journals with a solid impact factor to advance their careers. Timely publication, authorship and data ownership are highly relevant. Publication ethics have been on the editors' agenda for many years and in the resolution of complaints, appeals and requests for authorship changes we have followed available guidance from the Committee on Publication Ethics (COPE, http://publicationethics.org/). In 2015, we invited a council member of COPE to give a presentation at our board meeting. To inform our contributors and readers about our procedures, we recently published policies on appeals and complaints and on changes in authorship on our website.

Eurosurveillance has always been an open access journal and from the beginning of 2016, articles will be published under a Creative Commons Attribution (CC BY) licence and authors retain the copyright. Readers are free to share and adapt the published material, but must give appropriate credit, provide a link to the licence, and indicate if changes were made. They may do so in any reasonable manner, but not in any way that suggests the licensor endorses them or the use.

Every year comes with new challenges and surprises. We are looking forward to what 2016 will bring. We are confident that together with our board members, authors, supporters and readers, we will face the new challenges and continue to provide timely and important data for public health action and evidence for policymaking. In November, we will celebrate the 20th anniversary of *Eurosurveillance* at our scientific seminar on the margins of the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) in Stockholm.

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Imported cholera with acute renal failure after a short business-trip to the Philippines, Germany, October 2015

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A German businessman developed acute watery diarrhoea after a three-day trip to the Philippines. He was admitted with severe hypotension and acute renal failure, but recovered with rapid rehydration. *Vibrio cholerae* O1 serotype Ogawa was isolated. Physicians need to be aware of endemic cholera in Asia including the Philippines and consider this in their pre-travel advice.

Case report

On 4 November 2015, a 56-year-old German businessman was hospitalised in Tübingen, Germany, with acute watery, non-bloody diarrhoea (6–8x/d, no mucus), hypotension, malaise, weight loss of 5 kg and anuria. Onset of symptoms i.e. watery diarrhoea (8–12x/d), slight nausea and abdominal pain, was on 30 October towards the end of his return flight from a short business-trip to the Philippines, where he visited Subic Bay and Manila from 27 to 29 October. He consulted his general practitioner (GP) on 2 November, but his condition deteriorated despite increased oral fluid intake. Upon hospital admission he looked unwell, temperature and heart beats were normal, blood pressure was 70/50mmHg; his skin was dry, his tongue white but still humid; otherwise physical examination was normal. He was on antihypertensive medication (amlodipine 10mg, candesartan 16mg) and had a history of polycystic kidney syndrome with previously normal kidney function. He had not received a cholera vaccination prior to his trip. He had only been eating in high standard restaurants with a variety of foods including Japanese dinner (Sashimi and other raw fish) on 28 October in Subic Bay, and briefly cooked/fried seafood on 29 October in Makati, Manila. He had neither consumed tap water nor drinks with ice cubes. He was started on intravenous rehydration therapy immediately, given intravenous metoclopramide as antiemetic treatment, and encouraged to drink as much as possible.

Laboratory analyses showed creatinine of 4.4 (normal range 0.7–1.2mg/dl), urea 80 (normal range 10–50mg/dl), and slightly increased CRP (13 mg/L; normal range 0–6mg/L). White blood count showed normal leucocytes (9,860/µl; normal range: 4,000-10,000/µl) with only slight neutrophilia (73%; normal range: 50-70%). Potassium (3.5mmol/L; normal range: 3.5-5.1mmol/L) and sodium (135mmol/L; normal range: 135-145mmol/L) were borderline low. Abdominal ultrasound confirmed a polycystic kidney disease without further obvious changes. With extensive parenteral and oral fluid and electrolyte replacement of over 5 L within the first 20 hours, he started producing urine and kidney function normalised rapidly (creatinine on 5 and 6 November, 2 and 3 day of admission: 2.4 and 1.4mg/dl; urea 72 and 55mg/dl, respectively). His antihypertensive therapy was halted during the whole hospital stay. He remained afebrile and diarrhoea ceased slowly.

Stool culture from 2 and 4 November (GP visit and hospital admission, respectively) grew *Vibrio cholerae*, fully sensitive to all standard antibiotics tested for cholera (except to nitrofurantoin). Further specification revealed O1, Biovar El Tor, Serotype Ogawa, *sodB*- and *ctxA*-positive by real-time PCR, cholera toxin in vitro production was relatively low at ca. 1ng/ml compared with › 100 ng/ml by other *ctxA*-positive isolates [1, data not shown]. After receiving the microbiological results, the option of antibiotic therapy was discussed with the patient and doxycycline (300mg single dose) was given. He was discharged on 6 November without diarrhoea or fever. Follow-up as outpatient revealed normal blood tests, including kidney function tests.

Background

After an absence of cholera cases for more than 25 years [2] cholera has again become endemic in the Philippines since 1961 [3], coinciding with the beginning of the ongoing seventh cholera pandemic [4]. Cholera typically occurs in crowded settings with poor water and sanitation infrastructure. Travel advice usually takes into consideration current outbreak reports

but imported cholera in returning travellers to Europe is rare [5-8].

The annual incidence of cholera cases (suspected and confirmed) in the Philippines was recently calculated at 9.1 per 100,000 individuals but is likely to be higher due to under-reporting [2]. Ninety-six per cent of analysed cholera isolates in the Philippines have been of Ogawa serotype and have shown susceptibility to first-line antibotics [2]. Case fatality was calculated at 0.62% and up to 2% in outbreaks in the Philippines [2].

Mortality rates of more than 10% have been observed early in cholera epidemics but can be reduced to < 0.2% with effective therapy [4]. Severe dehydration and hypotension can lead to renal impairment. Early antibiotic treatment can decrease and shorten diarrhoea by 50% and is recommended for patients with moderate to severe dehydration [4].

Discussion

There have been no documented cholera cases imported to Germany from the Philippines for more than 15 years [9]. It is noteworthy that a short business trip to and around the capital Manila would not be considered to constitute an important risk for cholera especially with recent outbreaks being reported from more peripheral areas of the Philippines [2], and the country being listed among cholera-endemic countries with the lowest incidence rates [10]. The source of infection in the present case presumably was consumption of contaminated raw or undercooked fish or seafood in high standard restaurants.

Besides pre-travel advice on general water and food precautions, the German Society for Tropical Medicine and International Health (DTG) recommends cholera vaccination for travellers to areas with current cholera outbreaks [11]. Oral cholera vaccination has also been shown to provide some protection against traveller's diarrhoea [12], but a recent systematic review of randomised controlled trials concluded that sufficient evidence is still lacking for its use to protect travellers against diarrhoea caused by enterotoxigenic *Escherichia coli* [13].

Antibiotic therapy and microbiological diagnosis certainly came too late to contribute to the rapid improvement of acute renal failure in our patient, instead improvement presumably resulted from simple and rapid rehydration therapy. Aggressive fluid therapy remains the cornerstone of pre-renal failure management in cholera [14]. In view of the patients underlying kidney disease and potential benefits from antibiotics in reducing fluid loss and duration of fecal excretion of the pathogen [15], late antibiotic therapy was still performed.

The presented case demonstrates physicians in Europe should be aware of endemic cholera not only in Haiti and several African countries but also in certain parts of Asia including the Philippines [16] and consider this in pre-travel advice. Rapid rehydration therapy is needed for returning travellers presenting with acute watery diarrhoea and signs of severe dehydration.

Conflict of interest

None declared.

Authors' contributions

Günther Slesak wrote the manuscript. Günther Slesak and Johannes Schäfer treated the patient. Ralf Fleck performed the initial microbiological tests. Daniela Jacob and Roland Grunow performed microbiological tests for confirmation and further specification of the patient's pathogen. Ralf Fleck, Daniela Jacob, Roland Grunow, and Johannes Schäfer read and revised the manuscript.

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Evidence for a permanent presence of schistosomiasis in Corsica, France, 2015

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We present a case of acute schistosomiasis acquired in Corsica after bathing in the Cavu River during the summer of 2015. The diagnosis was made following epidemiological, laboratory and serological assessments. After a previous outbreak of urogenital schistosomiasis during the summer of 2013, when more than 120 infections were diagnosed, this further case indicates transmission was still effective in 2015, thus suggesting a permanent presence of schistosomiasis in Corsica.

We report a case of schistosomiasis acquired in 2015 in Corsica, indicating that permanent transmission of this helminthiasis has been established on the island.

Case description

On 11 September 2015, a person in their 40s presented to the Consultation Board at the Infectious and Tropical Disease Department of Toulouse University Hospitals in France with a 15-day history of diffuse abdominal pain, headache and asthenia. The patient had no fever, and physical examination was unremarkable. In particular, the patient neither displayed any skin rash nor complained of pruritus. The white blood cell count was 6.0 × 10^9/L, within the normal range (4.0–10.0 × 10^9 cells/L), but a blood eosinophilia (3.2 × 10^9 cells/L, normal range: < 0.5 × 10^9 cells/L) was observed by differential count. Biochemical tests of liver function found several abnormalities, namely a serum alanine aminotransferase level at 140 UI/L (normal range: 0–40 UI/L) and a gamma-glutamyl transferase level at 323 IU/L (normal range: 0–60 IU/L). Aspartate aminotransferase and total bilirubin levels were within the normal range. C-reactive protein was 11.7 mg/L (normal value: < 5 mg/L).

By serology, the patient tested negative for cytomegalovirus, Epstein–Barr virus, hepatitis A, B and C, and *Leptospira* infections. Serodiagnostics of ascariasis, alveolar and cystic echinococcoses, fascioliasis, filariases, strongyloidiasis, trichinellosis and schistosomiasis were negative. The ELISA result for schistosomiasis (expressed as a ratio), although negative with a ratio of 0.770, was close to the cut-off value of 1.0. Schistosomiasis serology relied upon commercial ELISA kits (Bordier Affinity Products, Crissier, Switzerland) and indirect haemagglutination assay (IHA) (Fumouze Diagnostics, Levallois-Perret, France), which are both screening tests using *Schistosoma mansoni* extracts as antigen.

Because an aetiological diagnosis was not reached, the patient attended a further consultation on 24 September. The clinical picture remained unchanged, but blood eosinophilia decreased to 2 × 10^9 cells/L. By that time, specific laboratory examinations for urogenital schistosomiasis had been carried out because of the previous ELISA result and also because the patient informed us of their vacation in Corsica in summer 2015. Urinalysis was normal, and microscopic search for *Schistosoma haematobium* eggs remained negative. Serology was positive, with an ELISA ratio of 2.65 (cut-off: 1.0). The IHA result (expressed as a titre of dilution) was 160 (cut-off: 160). These results were checked by a commercial Western blot using a mixture of adult *S. haematobium* and *S. mansoni* antigens (SCHISTO II Western blot IgG, LDBIO Diagnostics, Lyon, France). Faintly positive bands were observed at 30 kDa and 34 kDa, a result which was specific for the *Schistosoma* genus.

On 15 October, the patient was asymptomatic, the eosinophil count had decreased to 0.5 × 10^9 cells/L and hepatic tests were back to normal values. The level of *Schistosoma*-specific antibodies, as measured by ELISA (ratio: 4.67) or IHA (titre: 320) had increased.

Table

Chronology of events and laboratory results

Date (2015)	30 July and 11 August	From 24 August	30 August	7 September	11 September	24 September	15 October	**26 October**
Event	Bathing in the Cavu River	None	MC[a]	MC[a]	MC	MC	MC	MC
Symptoms and treatment	ND	Abdominal pain and headache	Idem	Idem	Idem	Decreasing symptoms	No symptoms	Praziquantel, 40 mg/kg once
Eosinophil count (G/L)	ND	ND	0.67	2.0	3.2	2.0	0.5	NA
ELISA[b] (cut-off: 1.0)	ND	ND	NA	NA	0.77	2.65	4.67	NA
IHA[c] (cut-off: 160)	ND	ND	NA	NA	Negative	160	320	NA
Western blot[d] (kDa bands)	ND	ND	NA	NA	Negative	30 /34 (faint)	30/34	NA
Urinary sediment examination	ND	ND	NA	NA	NA	NA	Normal	Normal
S. haematobium eggs in urine	ND	ND	NA	NA	NA	NA	Negative	Negative

ELISA: enzyme-linked immunosorbent assay; IHA: indirect haemagglutination assay; NA: not available; ND: not done.

[a] Medical consultations outside the Department of Infectious and Tropical Diseases.

[b] ELISA using extracts from adult worms and eggs of *Schistosoma mansoni* (Bordier Affinity Products, Crissier, Switzerland).

[c] Indirect haemagglutination using *S. mansoni* adult worm extracts (Fumouze Diagnostics, Levallois-Perret, France).

[d] Western blot using extracts from adult *S. haematobium/S. mansoni* worms (LDBIO Diagnostics, Lyon, France). Detection of genus-specific bands.

At that point, the Western blot result was clearly positive, with two sharp bands at 30 and 34 kDa. Results of immunodiagnoses for other helminthiases (see above) remained negative.

On 26 October, the patient attended the Consultation Board for the last time and received a single 40 mg/ kg dose of praziquantel. Microscopic examination of the sediment from the whole-morning micturition failed again to find any *S. haematobium* eggs.

The course of clinical signs and laboratory results is displayed in the Table.

During the last consultation, the patient reported bathing twice for more than one hour in the Cavu River on 30 July and 11 August 2015. The patient had not been bathing in other rivers in Corsica and had no previous history of staying in or travelling to any classic or usual endemic area for schistosomiasis.

The patient's family (four persons) had also been bathing in the Cavu River at the same time, but for a shorter time. Three had unremarkable laboratory results and one child had discrepant immunodiagnostic results for schistosomiasis with a positive ELISA (ratio: 1.53), a negative IHA (titre: 80) and a negative Western blot (performed on 26 October). Because of the unclear result, this child was treated with a single dose of praziquantel (40 mg/kg) and serology will be repeated three months later to confirm or exclude the diagnosis of schistosomiasis.

Discussion

Here we present a case of schistosomiasis very probably acquired through bathing in the Cavu River in Corsica in summer 2015. Although microscopical examination of the patient's urine failed to find *S. haematobium* eggs, the combination of clinical symptoms, a transient blood eosinophilia, positive results from three immunodiagnostic tests (two screening tests and one confirmatory test), along with the kinetics of anti-*Schistosoma* antibodies consistent with a seroconversion, presented a syndrome that was diagnosed as acute schistosomiasis. Furthermore, the patient did not report any history of bathing in other Rivers in Corsica or staying in or travelling to classic or usual endemic areas for schistosomiasis. Previously, an outbreak of urogenital schistosomiasis had been identified in connection with bathing in the same river during the summer of 2013 [1-5]. That no schistosomiasis infections were observed in the 2014 summer is probably due to the fact that the French authorities prohibited bathing in the Cavu River. This ban had been lifted by spring 2015.

In 1966, Jean-Marie Doby, a French parasitologist, stated that Corsica met all the requirements for permanent transmission of urogenital schistosomiasis [6]. This became true nearly 50 years later when more than 120 cases of autochthonous schistosomiasis were

diagnosed in France. All these infections were acquired after bathing in the Cavu River in southern Corsica and all were consistent with an infection during summer 2013 [1-5]. Transmission occurring before and after 2013 has been reported in two articles [7,8]. However, in both series, the diagnosis of schistosomiasis was questionable in our view, since it relied only upon conflicting serological results that were not followed up by a second test [9].

The present case who got infected in summer 2015 raises the question about the parasite's origin. The hypothesis of an aetiological link between the 2013 outbreak and the present case is attractive, although the lack of molecular evidence makes this assumption purely speculative. If true, the parasite would have survived either in an infected human or in the environment, in an intermediate mollusk host or a domestic or wild mammal definitive host.

The hypothesis of an independent introduction to the same river by an infected person coming from an endemic country, appears unlikely. However, the hypothesis of an environmental reservoir also appears unlikely. The time between the first contaminations in August 2013 and the present case was ca 24 months, including two winter seasons. Although nothing is known of the persistence of *Schistosoma* in cold conditions, such a period seems too long for the parasite to persist inside a mollusk host. Indeed, mollusks from the Cavu River that were experimentally infected by low inoculums of the Corsica strain of *S. haematobium* survived up to nine months in laboratory conditions (25 °C constant temperature and ad libitum feeding). Moreover, since the Corsica strain is a hybrid form between human and bovine *Schistosoma* [10], potential animal reservoir hosts have been screened for *Schistosoma* infections. Ruminants (cows and goats) that grazed along the Cavu River tested negative for *Schistosoma* infection. Trapped rodents were also found free of blood flukes (data not shown).

The most likely hypothesis is that people who were initially infected in 2013 in the Cavu River re-seeded the waterway with blood flukes by urinating. This suggests that the wide-scale screening of more than 37,000 people in France [6] did not identify all human carriers shedding *Schistosoma* eggs. If that is the case, it is possible that schistosomiasis could be spread to other rivers in Corsica, and to all of southern Europe (continental France, Spain, Portugal, Italy, and Greece) where the snail intermediate host is present.

Conclusion

Permanent transmission of schistosomiasis in Corsica is a new challenge for the French and European health authorities, whose goals should be to improve the effectiveness of screening and consecutive treatment of the infected, and to list any new case of autochthonous schistosomiasis. These measures will improve control of the initial focus and may prevent a possible expansion of urogenital schistosomiasis across southern Europe. General practitioners and specialists should become aware that schistosomiasis is not exclusively a tropical disease but has to be added to other possible aetiologies of blood eosinophilia or haematuria, even in patients without a history of staying in Africa or the Middle East.

Physicians should also be reminded that the pre-patent period of the infection, during which serological tests are still negative, may last formore than three months [11] and that seroconversion such as assessed by Western blot could be delayed when compared with the results provided by ELISA or IHA screening tests.

Conflict of interest

None declared.

Authors' contributions

All authors were involved in the case investigation and contributed to the manuscript. This included expertise in infectious diseases (GMB, BM, PD), parasitology (AB, JF, JB, JFM, XI), diagnosis (AB, JF, XI, PD), and drafting the manuscript (AB, JF, JB, JFM, PD).

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Effectiveness of seasonal influenza vaccine in preventing influenza primary care visits and hospitalisation in Auckland, New Zealand in 2015: interim estimates

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Preliminary results for influenza vaccine effectiveness (VE) against acute respiratory illness with circulating laboratory-confirmed influenza viruses in New Zealand from 27 April to 26 September 2015, using a case test-negative design were 36% (95% confidence interval (CI): 11–54) for general practice encounters and 50% (95% CI: 20–68) for hospitalisations. VE against hospitalised influenza A(H3N2) illnesses was moderate at 53% (95% CI: 6–76) but improved compared with previous seasons.

Introduction

Seasonal influenza vaccines are used widely to reduce the burden of influenza, but effectiveness measures vary by a range of factors including season, age and underlying co-morbidities [1,2]. The Southern Hemisphere Influenza and Vaccine Effectiveness, Research and Surveillance (SHIVERS) study [3], running since 2012, allows estimation of vaccine effectiveness (VE) against patients presenting with influenza illness to general practice (primary care) and against influenza requiring hospitalisation. Reports were published for 2012, 2013 and 2014 [4–6]. Here we report the preliminary VE results for the 2015 influenza season in New Zealand.

Methods

We used the case test-negative design, as previously described [4], to estimate VE of southern hemisphere trivalent inactivated influenza vaccine (IIV3) against laboratory-confirmed influenza in patients presenting during the 2015 winter season. We included patients who had presented to selected general practices with an influenza-like illness (ILI) or who had been hospitalised with a severe acute respiratory infection (SARI). Both syndromes were defined as onset of an acute illness with a cough and a history of fever or measured temperature ≥ 38 °C; illnesses with onset within the past seven days before presentation were included in this report.

Ethics approval was obtained from the Northern A Health and Disability Ethics Committee (11/11/102/AM02). The analysis was done on data collected between 27 April and 26 September 2015. The study population for both ILI and SARI came from the Central, South and East Auckland city districts with a population of ca 900,000.

ILI patients were recruited from 16 sentinel general practices that serve ca 100,000 enrolled patients. All identified ILI patients were screened for influenza by a general practitioner or practice nurse, and data were entered through an electronic form into the practice management system. SARI patients were recruited by a research nurse screening all patients admitted overnight with a respiratory illness, and data were collected on a case report form and completed with information from electronic hospital records. All consenting patients had a nasopharyngeal or throat swab collected for influenza virus testing.

Confirmed cases of influenza were defined as those with a positive laboratory result for any influenza virus detected by real-time reverse transcription PCR (rRT-PCR). As per previous years, all swabs were tested using the United States Centers for Disease Control and Prevention (CDC) protocol [7] or the AusDiagnostic PCR protocol [8]. The assays detected influenza virus types A and B, A subtypes and B lineages. A screening

Figure 1

Study participants with influenza-like illness (n = 1,197) and severe acute respiratory infection (n = 754) who were influenza virus-positive or -negative, by week, Auckland, New Zealand, 27 April–26 September 2015

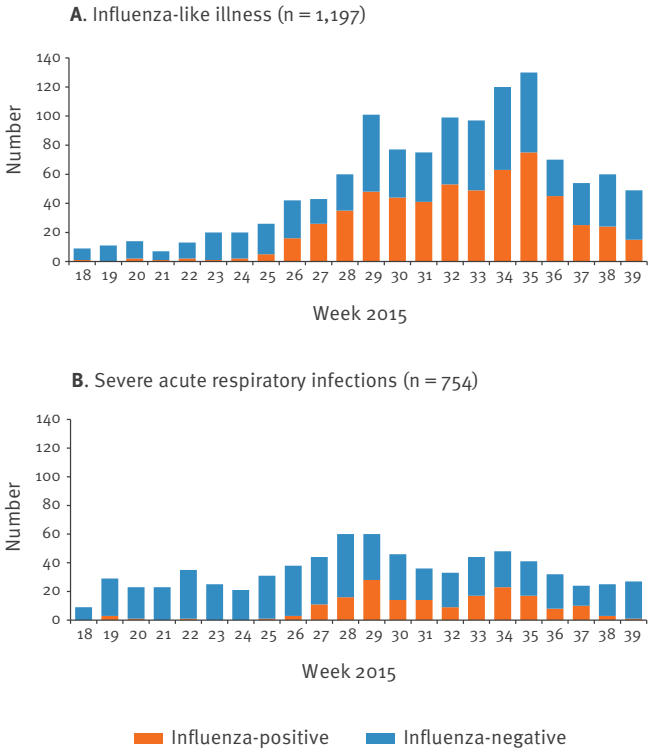
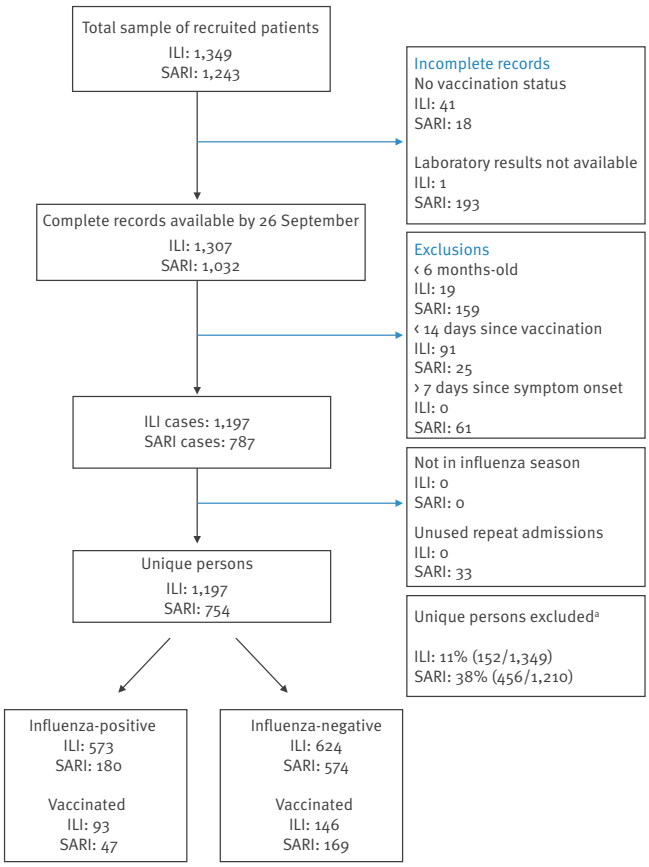


Figure 2

Flowchart of all patients with influenza-like illness (n = 1,197) and severe acute respiratory infection (n = 754) selected, recruited and tested for influenza vaccine effectiveness analysis, Auckland, New Zealand, 27 April–26 September 2015



ILI: Influenza-like illness; SARI: severe acute respiratory infection.

a A number of SARI patients are admitted to hospital multiple times. The total of 1,243 included multiple admissions, which were removed in this box.

of A(H3N2) viruses for genetic markers associated with six major haemagglutinin (HA) genetic groups (3C.2, 3C.2a, 3C.2b, 3C.3, 3C.3a, and 3C.3b) was done with a pyrosequencing assay. The detailed protocol for the H3 genetic groups pyrosequencing assay is available upon request (fluantiviral@cdc.gov).

Vaccination status for ILI patients was ascertained from electronic documentation in the general practice records. For SARI patients, vaccination status was based on self-report. A patient was considered fully vaccinated if they had received at least one self-reported or documented dose of the 2015 influenza vaccine.

We excluded infants younger than six months, those vaccinated less than 14 days before illness onset and those with symptom onset more than seven days before presentation. For patients with multiple illness presentations, the first influenza virus-positive episode was used for the analysis or, when there was no influenza virus-positive episode, the first illness episode.

VE was analysed for all influenza viruses, subtypes and clades. Unconditional logistic regression was used to compare the odds of vaccination among influenza virus-positive vs influenza virus-negative participants for both ILI and SARI datasets, with VE estimated as 100% x (1–OR). VE estimates were adjusted for age group, calendar week, any underlying health condition and days since illness onset at swab collection.

Results

In total, 1,197 ILI and 754 SARI patients were included for analysis (Figure 1 and Figure 2).

Of these, 573 (47.9%) of the ILI and 180 (23.9%) of the SARI were influenza virus-positive (Figure 2). Of all influenza infections, 399 were with influenza A viruses (285 ILI and 114 SARI); 281 were influenza A(H3N2), one was A/California/7/2009(H1N1) and 117 were not subtyped at the time of reporting. All 101 pyrosequenced influenza A(H3N2) samples were identified as clade 3C.2a (86 ILI and 15 SARI), which is like the vaccine component. There were 354 influenza B viruses (288 ILI and 66 SARI); 140 were B/Yamagata (including 95 B/Phuket/3073/2013 lineage), 159 were B/Victoria (including 52 B/Brisbane/60/2008 lineage) and 55 were not genotyped at the time of reporting.

Table

Crude and adjusted estimated influenza vaccine effectiveness by age group and influenza virus type and subtype, Auckland, New Zealand, 27 April–26 September 2015

Influenza type or	Influenza-positive			Influenza-negative			Unadjusted		Adjusted[a]	
Age groups	Number vaccinated	Total	%	Number vaccinated	Total	%	VE %	95% CI	VE %	95% CI
ILI										
Overall	93	573	16	146	624	23	37	15 to 52	36	11 to 54
6 months–17 years	15	260	6	26	258	10	45	−6 to 72	50	1 to 75
18-64 years	59	287	21	89	331	27	30	−2 to 52	27	−8 to 51
≥ 65 years	19	26	73	31	35	89	65	−36 to 91	67	−41 to 92
Influenza A	54	285	19	146	624	23	23	−9 to 46	24	−15 to 50
A(H3N2)	45	216	21	146	624	23	14	−26 to 41	22	−23 to 51
Influenza B	39	288	14	146	624	23	49	25to 65	46	17 to 65
B/Yamagata	18	131	14	146	624	23	48	11 to 69	35	−18 to 64
B/Victoria	19	145	13	146	624	23	56	22 to 75	56	22 to 75
SARI										
Overall	47	180	26	169	574	29	15	−24 to 42	50	20 to 68
6 months–17 years	3	55	5	30	312	10	NA	NA	NA	NA
18-64 years	25	92	27	61	154	40	43	0 to 68	46	1 to 70
≥ 65 years	19	33	58	78	108	72	48	−17 to 77	52	−14 to 79
Influenza A	33	114	29	169	574	29	2	−52 to 37	54	21 to 73
A(H3N2)	19	65	29	169	574	29	1	−74 to 44	53	6 to 76
Influenza B	14	65	22	169	574	29	34	−22 to 65	40	−24 to 71

CI: Confidence interval; ILI: Influenza-like illness; NA: not applicable; SARI: severe acute respiratory infections; VE: vaccine effectiveness.

Overall: includes any influenza and all ages ≥ 6 months; B/Yamagata: B/Yamagata lineage + B/Phuket/3073/2013-like; B/Victoria: B/Victoria lineage + B/Brisbane/60/2008-like.

[a]Adjusted for six age groups (<6, 6–17, 18–45, 46–64, 65–79 and ≥80 years), week in season, any underlying health condition and days since illness onset at swab collection.

Data source: SHIVERS 27 April to 26 September 2015 (week 18–week 39).

Among ILI patients of all ages, 93 of 573 (16%) influenza virus-positive persons and 146 of 624 (23%) influenza virus-negative persons were vaccinated, resulting in a crude VE against all circulating influenza strains of 37% (95% confidence interval (CI): 15–52); VE adjusted for variables listed in the methodology was 36% (95% CI: 11–54). Adjusted VE point estimates by age group were 50%, 27% and 67% for patients aged 6 months to 17 years, 18–64 years and ≥ 65 years, respectively, but with wide confidence intervals (Table).

For all ages, the adjusted VE against ILI with influenza A(H3N2) viruses was 22% (95% CI: −23 to 51), but the VE point estimate, though not statistically significant, was slightly higher for the subset identified as Clade 3C.2a: 27% (95% CI: −46 to 63). For all ages, the adjusted VE against ILI with any influenza B virus was 46% (95% CI: 17–65), but the VE point estimate, though not statistically significant, was slightly higher for the B/Victoria than for B/Yamagata lineage.

Among hospitalised SARI patients of all ages, 47 of 180 (26%) influenza-positive persons and 169 of 574 (29%) influenza-negative persons were vaccinated, resulting in a crude VE of 15% (95% CI: −24 to 42) against circulating influenza viruses. VE adjusted for age, week, underlying conditions and days since onset was higher at 50% (95% CI: 20–68). Adjusted VE point estimates against SARI influenza by age were 49%, 46% and 52% for patients aged 6 months to 17 years, 18–64 years and ≥ 65 years, respectively, but with wide confidence intervals (Table) (p interaction = 0.99). Age-adjusted VE for influenza A(H3N2) virus-associated SARI was 53% (95% CI: 6–76); we did not have a sufficient number of Clade 3C.2a identified viruses to date to do a clade-specific SARI VE estimate. Finally, for SARI associated with influenza B (of either lineage), adjusted VE was 40% (95% CI: −24 to 71).

Background

In New Zealand, the influenza season occurs between March and September, and southern hemisphere IIV3 is offered annually free of charge from early March to all those older than six months with high risk medical conditions, to pregnant women and to those 65 years and older. The influenza strains in the 2015 trivalent vaccine were A/California/7/2009 (H1N1)-like virus, A/Switzerland/9715293/2013 (H3N2)-like virus and B/Phuket/3073/2013-like virus.

Discussion

The 2015 New Zealand influenza season was dominated by influenza A(H3N2) and B viruses (including both B/Victoria and B/Yamagata lineages). Our interim results suggest that IIV3 was ca 37–50% effective at preventing influenza-associated acute respiratory illnesses (with fever and cough) that resulted in general practice visits or hospitalisation. If this trend continues, the overall VE observed in 2015 will be similar to the moderate VE reported during the previous three influenza seasons in New Zealand, even though the virus mix was different. VE point estimates have been consistently around 50% with minimal differences between ambulatory and inpatient medical care [4-6].

In 2014, although influenza A(H1N1)pdm09 was the predominant circulating strain, A(H3N2) viruses were also in circulation. During 2014, we observed no measureable protection of southern hemisphere IIV3 against influenza A(H3N2) virus-associated ILI or SARI [9]. This was consistent with reports from the northern hemisphere during the 2014/15 season, when the A/Texas/50/2012 (H3N2)-like component of the vaccine was not a good match to the circulating strains [10-13]. The influenza A(H3N2) IIV3 component was subsequently changed to A/Switzerland/9715293/2013 (H3N2)-like virus. In this interim 2015 report, all influenza A(H3N2) viruses with pyrosequencing performed to date belonged to the genetic clade 3C.2a, which is antigenically related to the vaccine clade 3C.3a.

We are encouraged by our interim observation of positive VE point estimates for influenza A(H3N2) virus-associated ILI (22%; 95% CI: –23 to 51) and SARI (53%; 95% CI: 6–76), which may indicate that VE improved with the change in vaccine strain.

The precision of our interim estimates was limited by relatively small numbers of observations for some ages and outcomes. Large differences in vaccination uptake and influenza positivity between age groups also resulted in substantial differences between our crude and adjusted VE estimates for SARI. Specifically, when we combined the data across ages, the lower vaccination coverage among children and greater likelihood of older age groups testing positive for influenza virus biased the crude VE estimate towards the null (i.e. Simpson's paradox which occurs because vaccination and the likelihood of testing positive are both correlated with age [14]).

Our interim results are subject to at least four other limitations. Firstly, the hospitalised patient results are based on self-reported vaccination status. However self-reporting has been shown to be generally accurate, especially among hospitalised elderly patients [15], and when comparing self-reporting with documented vaccination status, VE estimates have been shown to be very similar [16]. Secondly, the precision of our age and (sub)type-specific estimates was low given the use of preliminary data with few observations in many categories. Thirdly, we adjusted for covariates included in prior VE analyses, but a complete examination of potential confounders, including confirmation of chronic medical conditions must await our final report. Finally, we examined VE for a single dose only and because of pending vaccination records and small numbers of children enrolled to date we could not examine VE for the two-dose regimen recommended for children under the age of nine years.

Similar to previous SHIVERS studies, this study suggests that inactivated influenza vaccines provided moderate protection against laboratory-confirmed influenza virus illness in general practice and hospital settings.

Southern Hemisphere Influenza Vaccine Effectiveness, Research and Surveillance (SHIVERS) investigation team (listed in an alphabetical order)

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The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the US Centers for Disease Control and Prevention.

Conflict of interest

None declared.

Authors' contributions

Ange Bissielo: involved in study design, data collection and analysis, interpretation and manuscript development. Nevil Pierse: involved in study design, methodological design, data analysis, interpretation and manuscript development. Q Sue Huang: principal investigator for the larger SHIVERS study, involved in study design, implementation, and manuscript development. Mark Thompson: involved in study design, interpretation and manuscript development. Heath Kelly: involved in study design, methodological analysis, data analysis and interpretation, manuscript development and editing. Vasiliy Mishin: involved in methodological and data analysis analysis, Nikki Turner: involved in study design, implementation, analysis, manuscript development.

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