Detection of influenza A(H3N2) clade 3C.2a viruses in patients with suspected mumps in British Columbia, Canada, during the 2014/15 influenza season

C Chambers¹, DM Skowronski¹, S Sabaiduc¹, M Murti², R Gustafson³, S Pollock⁴, D Hoyano⁵, S Allison⁶, M Krajden⁷

1. British Columbia Centre for Disease Control, Vancouver, Canada

2. Fraser Health Authority, Surrey, Canada

3. Vancouver Coastal Health Authority, Vancouver, Canada

4. Interior Health Authority, Kelowna, Canada

5. Vancouver Island Health Authority, Victoria, Canada

6. Northern Health Authority, Prince George, Canada

7. British Columbia Public Health Microbiology and Reference Laboratory, Vancouver, Canada

Correspondence: Danuta M. Skowronski (danuta.skowronski@bccdc.ca)

Citation style for this article:

Chambers C, Skowronski DM., Sabaiduc S, Murti M, Gustafson R, Pollock S, Hoyano D, Allison S, Krajden M. Detection of influenza A(H3N2) clade 3C.2a viruses in patients with suspected mumps in British Columbia, Canada, during the 2014/15 influenza season. *Euro Surveill.* 2015;20(36):pii=30015. DOI: <http://dx.doi.org/10.2807/1560-7917.ES.2015.20.36.30015>

Article submitted on 31 August 2015 / accepted on 10 September 2015 / published on 10 September 2015

To the editor: In their recent paper, Thompson et al. describe the detection of influenza A(H3N2) viruses belonging to the emergent clade 3C.2a in oral fluid from a subset of children in England with a clinical diagnosis of mumps from December 2014 to February 2015 [1]. We conducted influenza testing of mumps virus-negative specimens without age restriction in British Columbia (BC), Canada, in response to reports of unexpected numbers of influenza-associated parotitis in the United States during the 2014/15 influenza season [2], and unusual mumps-like illness in BC also temporally associated with the influenza season.

The BC Public Health Microbiology and Reference Laboratory (PHMRL) conducts all diagnostic testing for mumps virus in BC. A total of 122 specimens collected between 1 September 2014 and 17 February 2015 were submitted to the BC PHMRL with a request for mumps virus testing and were negative by real-time reverse-transcription polymerase chain reaction (RT-PCR). Although details on clinical presentation were not systematically collected, all cases presented with symptoms that prompted the clinician to request diagnostic testing for mumps. Further patient details, including immunisation status, were not obtained.

All of these specimens were re-tested for influenza A virus, influenza B virus and respiratory syncytial virus (RSV) using an in-house RT-PCR multiplex assay [3]. Testing for other non-influenza or non-RSV respiratory viruses was not undertaken.

Of the 122 mumps virus RT-PCR-negative specimens, 16 (13%), comprising 15 buccal swabs and one throat

swab, were positive for influenza A virus, comparable to the 15% positivity reported by Thompson et al. [1] but higher than the 7% reported by Shepherd et al. in their cohort of patients in Scotland [4]. The latter difference may reflect variation in the date of collection of mumps virus-negative specimens included in the analysis in relation to the timing, mix and intensity of influenza and other respiratory virus circulation regionally. One (1%) mumps virus-negative specimen in BC was positive for RSV.

The haemagglutinin (HA) gene for 13 of the 16 influenza virus-positive specimens belonged to the A(H3N2) clade 3C.2a viruses that predominated during the 2014/15 epidemic in Canada [5], similar to findings reported by Thompson et al. [1]. The genetic clade of the other three influenza A virus-positive specimens could not be determined.

Influenza virus was detected in mumps virus-negative specimens collected from 19 December 2014 (week 51) to 15 February 2015 (week 7), with the highest number and percentage of specimens that were influenza positive having been collected in week 53, corresponding to the peak of the influenza A(H3N2) clade 3C.2a epidemic in BC (Figure).

Influenza virus was detected in mumps virus-negative specimens across all patient age groups (age range: 4–70 years) but with peak influenza positivity in children aged 5–9 years ($n = 6/16$), followed by that in children under five years ($n = 2/12$) and 10–14 years ($n = 2/12$). The remaining influenza virus detections were in non-elderly adults aged 20–59 years ($n = 4/64$) and

FIGURE

Influenza virus detections in mumps virus-negative specimens compared with percentage of influenza virus positive detections in respiratory specimens, British Columbia Public Health Microbiology and Reference Laboratory, Canada, week 36 2014–week 7 2015 (1 September 2014–17 February 2015) (n = 122)

Influenza virus testing was conducted on mumps virus-negative specimens collected from 1 September 2014 to 17 February 2015; weeks 36 and 7 represent partial weeks. Respiratory specimens are those submitted to the BC Public Health Microbiology and Reference Laboratory for influenza A virus, influenza B virus, and respiratory syncytial virus (RSV) testing, included as part of routine provincial surveillance for influenza and other respiratory viruses.

elderly adults 65 years and over (n = 2/12). Of the 16 influenza virus-positive specimens, eight were from children aged under 10 years, compared with 20 of 106 (19%) influenza virus-negative specimens. No influenza viruses were detected in mumps virus-negative specimens collected from 15–19 year-old adolescents.

The median age of influenza-positive cases detected among those who were mumps virus negative was 10 years (age range: 4–70) compared with 26 years (age range: 1–90) among influenza virus-negative cases. Conversely, most mumps cases reported in Canada are among adults aged 20–45 years who received only one childhood dose of a mumps virus-containing vaccine [6]. Among patients whose specimens were mumps virus negative, those who were influenza virus positive were more often male than were those who were influenza virus negative (14/16 vs 46/104).

Our Canadian findings corroborate those reported in Great Britain by Thompson et al. [1] and Shepherd et al. [4] and provide evidence for laboratory-confirmed influenza A infection among children and adults with

suspected mumps infection during the 2014/15 winter in North America. Mumps infection is infrequent in BC, with provincial incidence rates typically ranging from less than 1 per 100,000 population to 3 per 100,000 annually. Public immunisation campaigns in BC target children at one year of age and at school entry (4–6 years-old), and coverage of mumps virus-containing vaccine exceeds 85% in these age groups [7,8]. While parotitis is a common clinical presentation for mumps, cases of influenza-associated parotitis, although uncommon, have been recognised for several decades [9]. Clinicians should consider influenza as a possible cause of acute parotitis during seasonal influenza epidemics, particularly among paediatric patients in regions where immunisation coverage of a mumps-virus containing vaccine is high.

Conflict of interest

Within 36 months, Mel Krajden has received research grants from Roche, Merck, Hologic, Siemens and Boehringer Ingelheim. All other authors declare that they have no conflict of interest.

Authors' contributions

Conception or design of the work: DMS, CC, MK; data acquisition: MM, RG, SP, DH, SA, MK; data/specimen analysis: DMS, CC, SS, MK; interpretation of the data for the work: All authors; approval of manuscript submission: All authors.

References

1. ThompsonCI, EllisJ, GalianoM, RamsayM, BrownKE, ZambonM. Detection of influenza A(H3N2) virus in children with suspected mumps during winter 2014/15 in England. *Euro Surveill.* 2015;20(31). pii: 21203. DOI: 10.2807/1560-7917.ES2015.20.31.21203 PMID: 26290428
2. United States Centers for Disease Control and Prevention (CDC). What you should know for the 2014-2015 influenza season. Atlanta, GA: CDC. [Updated 12 Mar 2015; accessed 24 Aug 2015]. Available from: <http://www.cdc.gov/flu/about/season/flu-season-2014-2015.htm>
3. ChenY, CuiD, ZhengS, YangS, TongJ, YangD, et al. Simultaneous detection of influenza A, influenza B, and respiratory syncytial viruses and subtyping of influenza A H3N2 virus and H1N1 (2009) virus by multiplex real-time PCR. *J Clin Microbiol.* 2011;49(4):1653-6. DOI: 10.1128/JCM.02184-10 PMID: 21270233
4. Shepherd SJ, MacLean AR, Aitken C, Gunson RN. Letter to the editor: There is a need to consider all respiratory viruses in suspected mumps cases. *Euro Surveill.* 2015;20(33):pii=21210.
5. SkowronskiDM, ChambersC, SabaiducS, De SerresG, DickinsonJA, WinterAL, et al. Interim estimates of 2014/15 vaccine effectiveness against influenza A(H3N2) from Canada's Sentinel Physician Surveillance Network, January 2015. *Euro Surveill.* 2015;20(4):21022.
6. Public Health Agency of Canada (PHAC). Part 4 – Active vaccines. In: Canadian Immunization Guide. Ottawa: PHAC; 2014. Available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php>
7. British Columbia Centre for Disease Control (BCCDC). Immunization uptake in children by the second birthday, 2007-2014. Vancouver: BCCDC; 2014. Available from: http://www.bccdc.ca/NR/rdonlyres/B8FB94AC-A216-4AEF-B88A-5C3C539F2575/o/2_Year_Old_Coverage_20082012_Birth_Cohorts.pdf
8. British Columbia Centre for Disease Control (BCCDC). Immunization uptake in children by the seventh birthday, 2012-2014. Vancouver: BCCDC; 2014. Available from: http://www.bccdc.ca/NR/rdonlyres/60740019-8581-4428-B5D6-73DA44AF737E/o/7_Year_Old_Coverage_2006_Birth_Cohort.pdf
9. BrillSJ, GilfillanRF. Acute parotitis associated with influenza type A: a report of twelve cases. *N Engl J Med.* 1977;296(24):1391-2. DOI: 10.1056/NEJM197706162962408 PMID: 859547