Pandemic Influenza Diagnosis and Subsequent Risk of Type 1 Diabetes

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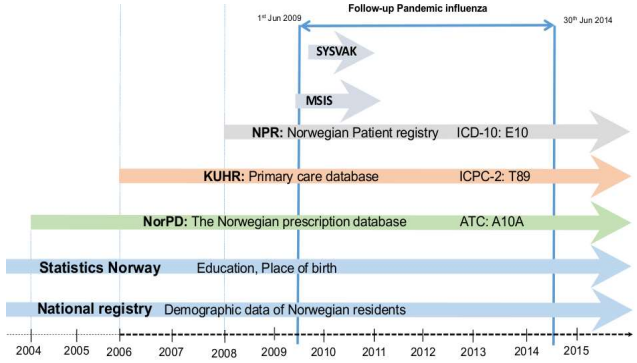
Background and aims

The 2009 pandemic influenza A H1N1 (swine flu) has been associated with development of autoimmune diseases. In this register-based study, we aimed to test whether diagnosis of pandemic influenza were associated with higher subsequent risk of type 1 diabetes.

Material and methods



*SYSVAK: Norwegian immunization registry. MSIS: Surveillance System for Communicable Diseases Register, lab-confirmed H1N1 influenza cases

The Norwegian population <30 years (approx.. 2.28 million) was followed (June 2009-June 2014) by linking prospective national health registries with patient level information. Pandemic influenza was defined as influenza or influenza like illness diagnosis during the pandemic outbreak in Norway, or laboratory-confirmed influenza A (H1N1). Incident cases of T1D defined as registration of T1D diagnosis and insulin treatment ≥6 months.

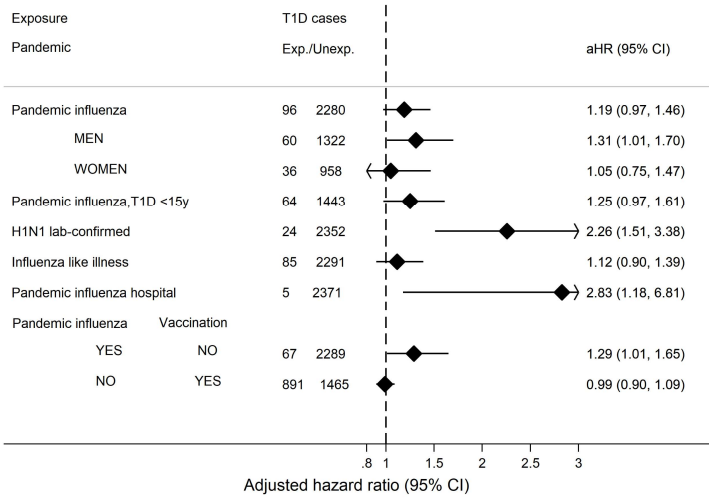
Results

About 3 % of the study population (76,173 participants) were diagnosed with pandemic influenza, and 2,376 were diagnosed with T1D during follow-up. Individuals diagnosed with influenza during the 2009-2010 pandemic had an adjusted hazard ratio (aHR) for T1D of 1.19 (95%CI: 0.97 - 1.46). In subjects <15 years of age, pandemic influenza gave an aHR of 1.25 (95%CI: 0.97 - 1.61) for T1D. PCR-confirmed influenza A (H1N1) was associated with T1D risk in age <30 years with an aHR of 2.26 (95%CI: 1.51-3.38).

Characteristics of the study population < 30 years in the Pandemic analysis.

Characteristics n (%)	All subjects 2,286,650 (100)	Subjects with Pandemic Influenza † 76,173 (3)	Subjects with Incident type 1 diabetes 2,376 (0.1)
Sex			
Male	1,169,485 (51)	37,344 (49)	1,382 (58)
Female	1,117,165 (49)	38829 (51)	994(42)
Year of birth			
1979-1989	713,963 (31)	25,563 (33.6)	339 (14)
1990-1999	665,198 (29)	24,904 (32.7)	934 (39)
2000-2009	628,606 (27)	25,694 (33.7)	1,020 (43)
>2010	278,883 (12)	12 (0.02)	83 (4)
Education level *			
≤10 years	200,040 (9)	7,838 (10)	165 (7)
11-13 years	779,682 (34)	30,289 (40)	953 (40)
≥14 years	1,214,276 (53)	37,076 (49)	1,244(52)
No information	92,652 (4)	970 (1)	15 (0.6)
Place of birth			
Norway	1,973,332 (86)	67,667 (89)	2,260 (95)
Europe (except Norway)	166,130 (7)	3,582 (5)	63 (3)
Outside Europe	147,188 (6)	4,924 (6)	53 (2)

Association between pandemic influenza diagnosis and risk of type 1 diabetes in up to 2.28 million Norwegians. Hazard ratios (aHRs) were adjusted for year of birth, sex, place of birth, education and pandemic influenza vaccination. Influenza like illness: diagnosed in primary care only. Pandemic influenza hospital: diagnosed in non-primary care.



Conclusions

We found evidence for increased T1D risk after pandemic influenza diagnosis, particularly if diagnosed in specialist health care, or if confirmed to be H1N1 by PCR. This extends the viral hypothesis, and further supports a suggested role of respiratory infections in the etiology of T1D.

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