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The TransFLUas influenza transmission study in acute healthcare: attack rates, symptoms and transmission clusters

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Raphaël Tamò¹, Jürg Böni², Roger Kouyos¹, Teja Turk^{1,2}, Heike A. Bischoff-Ferrari³, Oliver Distler⁴, Edouard Battegay⁵, Malcolm Kohler⁶, Rouven Müller⁷, Heidi Petry⁸, Frank Ruschitzka⁹, Allison McGeer¹⁰, Hugo Sax¹, Rainer Weber¹, Alexandra Trkola², Stefan P. Kuster^{*1}

¹Division of Infectious Diseases and Hospital Epidemiology, University Hospital and University of Zurich, ²Institute of Medical Virology, University of Zurich, ³Department of Geriatrics and Aging Research, University Hospital and University of Zurich, ⁴Department of Rheumatology, University Hospital and University of Zurich, ⁵Department of Internal Medicine, University Hospital and University of Zurich, ⁶Pulmonary Division, University Hospital and University of Zurich, ⁷Hematology, University Hospital and University of Zurich, ⁸University Hospital Zurich, ⁹University Heart Center, University Hospital Zurich, ¹⁰Department of Microbiology, Sinai Health System, Toronto

Background: Nosocomial acquisition of influenza from asymptomatic individuals may occur and is a major concern for infection control in hospitals. However, no prospective studies within acute care settings have studied transmission of influenza from asymptomatic individuals. In this study, we aimed to dissect transmission dynamics of influenza virus trajectories in a tertiary care hospital.

Materials/methods: This prospective study followed patients in medical wards and acute care healthcare workers (HCW) working on the same wards over two consecutive influenza seasons. Inpatients and acute care HCW provided mid-turbinate nasal swabs for multiplex real-time PCR and whole-genome sequencing. Illness diaries were recorded on a daily basis, and contacts between study participants were tracked.

Results: We recruited 152 HCWs and 543 inpatients in the 2015/16 and 2016/17 influenza seasons. 16 (10.5%) of HCW and 19 (3.5%) of inpatients were diagnosed with an influenza infection. A total number of 1241 swabs were collected in these 35 subjects. Of these, 108 swabs tested positive. The number of positive swabs per individual ranged from 1 to 13. The majority of subjects (83.1% of HCW and 91.9% of patients) had influenza symptoms when their tests were positive, and this always included respiratory symptoms. However, 12/71 (16.9%) influenza-positive swabs among HCW and 3/37 (8.1%) influenza-positive swabs among patients were collected on days without symptoms. Among the symptomatic individuals, 2/14 (14.3%) of HCW and 0/17 inpatients had a positive influenza test before symptoms developed. 2/16 (12.5%) HCW and 2/19 inpatients (10.5%) remained asymptomatic. Preliminary analyses based on local and temporal proximity of HCW and inpatients revealed at least seven clusters of potential transmission events among HCW, among inpatients or between HCW and inpatients, and one cluster revealed a possible transmission from an asymptomatic HCW to an inpatient.

Conclusions: Influenza infection in acute care is common and a significant proportion of individuals shed influenza virus without harboring any symptoms, thereby potentially exposing their vicinity. We uncovered several transmission clusters that had been undetected in routine surveillance. Based on preliminary analyses, according to spatial and temporal proximity, asymptomatic transmission seems likely in one cluster.