

Institution: University of Lincoln		
Unit of Assessment: 03 – Allied Health Professions, Dentistry, Nursing and Pharmacy		
Title of case study: Promoting Uptake of Influenza Vaccination and its Role in Preventing Heart Attack and Stroke		
Period when the underpinning research was undertaken: 2010 - 2015		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): SIRIWARDENA Aloysius Niroshan ASGHAR Zahid	Role(s) (e.g. job title): Professor of Primary and Pre-Hospital Healthcare Senior Lecturer	Period(s) employed by submitting HEI: 23 Mar 07 to date 13 Sep 11 to date
Period when the claimed impact occurred: 2014 - 2018		
Is this case study continued from a case study submitted in 2014? N		
<p>1. Summary of the impact (indicative maximum 100 words) Influenza ('flu') causes many deaths and hospitalisations each winter, including from heart attack and stroke. Influenza vaccination although a highly cost-effective preventive measure is poorly taken up by at-risk individuals.</p> <p>Our research, funded by the NIHR, on methods for increasing flu vaccination uptake, has changed national UK guidance for general practice. It has been cited annually in the Chief Medical Officer for England's winter flu letter on organising flu vaccination programmes and in the national UK (NICE) guideline on increasing flu vaccination uptake and directly educating practitioners on risk groups to vaccinate and how to improve processes for increasing vaccine uptake.</p> <p>Our work on the potential benefit of flu vaccine in preventing heart attack and stroke has been cited in national (UK) and international (US, European and Australian) guidelines and has affected policy and guidance for organisations and healthcare professionals.</p>		
<p>2. Underpinning research (indicative maximum 500 words) This case study highlights our research demonstrating which immunisation strategies in general practice work best and identifying important associations between influenza immunisation and prevention of heart attack and stroke.</p> <p>Influenza (flu) is a common, potentially severe, but preventable infection that places a high burden on patients and healthcare providers. A safe, effective vaccine is offered annually by general practices to at-risk groups in the UK. People in at-risk groups, +comprising 27% of the population, have a higher chance of contracting severe flu infection or its complications. There are 36/100,000 population deaths per year in the UK (an additional 12,000 per year) due directly to influenza, and of these, approximately two-thirds are in a vaccination risk group. However, only a quarter of those at risk receive vaccination and uptake of seasonal influenza vaccination in the UK's at-risk population is below the national and international target of 75% [3.1].</p> <p>Furthermore two-thirds of influenza deaths are due to respiratory disease but a third are due to cardiovascular disease (AMI or stroke) with increasing evidence that respiratory infections, particularly influenza, might trigger heart attacks and strokes [3.2, 3.3, 3.4, 3.5].</p> <p>Outline of underpinning research The Community and Health Research Unit (CaHRU), a research centre led by Siriwardena, has conducted a programme of interdisciplinary research to increase flu vaccination rates in high-risk groups. The work combines different areas of specialism (clinical, academic and service) but was also conducted by professionals who held dual research/clinical positions.</p>		

The research, with funding exceeding £200,000 from the NIHR, aimed to improve uptake of seasonal flu and pneumococcal vaccination in the UK's at-risk population, particularly in people aged under 65 years with pre-existing health conditions who are at risk from influenza and who have had low vaccination rates (at or below 50% compared to the recommended rates of over 75%).

This also led to our work investigating the link between respiratory infection and AMI or stroke/transient ischaemic attack (TIA or 'mini-stroke') and exploring the potential for flu or pneumococcal vaccination to prevent AMI or stroke/TIA.

We collaborated in a cross-sectional study that was used to investigate methods for improving flu and pneumococcal vaccination practice [3.1].

We used case control and self-controlled case series studies to investigate the potential for influenza (and pneumococcal) vaccination to prevent AMI and AMI and stroke [3.2, 3.3, 3.4, 3.5].

Research findings related to impact

We identified key strategies that were significantly associated with success of general practice seasonal flu vaccination campaigns including: having a lead staff member planning the flu campaign; producing a written report of practice performance; sending a personal invitation to all eligible patients; only stopping vaccination when Quality and Outcomes Framework targets were reached; using an in-house search programme for interrogating the practice IT system; and provision of flu vaccine to pregnant women [3.1].

We conducted a large case-control study in over 78,706 patients which showed that influenza vaccination, but not pneumococcal vaccination, was associated with a reduced rate of 19% in first acute myocardial infarction [3.2]. This finding was confirmed in a self-controlled case series study which showed that the incidence of AMI was significantly reduced in the 60 days following vaccination [3.3].

We also showed in a large case-control study of 26,784 cases of stroke and 20,227 cases of TIA that influenza vaccination was associated with a 24% reduction in risk of stroke but not TIA.[3.4] This finding was confirmed in our subsequent self-controlled case series study, which showed that the incidence of stroke was significantly reduced in the first 59 days following influenza vaccination [3.5].

3. References to the research (indicative maximum of six references)

- 3.1 Dexter LJ, Teare MD, Dexter M, Siriwardena AN, Read RC. Strategies to increase influenza vaccination rates: outcomes of a nationwide cross-sectional survey of UK general practice. *BMJ Open* 2012; 2:e000851.
<https://doi.org/10.1136/bmjopen-2011-000851>
- 3.2 Siriwardena AN, Gwini S, Coupland C. Influenza vaccination, pneumococcal vaccination, and the risk of acute myocardial infarction: matched case-control study. *Canadian Medical Association Journal* 2010; 182 (15): 1617- 1623.
<https://doi.org/10.1503/cmaj.091891>
- 3.3 Gwini SM, Coupland C, Siriwardena AN. The effect of influenza vaccination on risk of acute myocardial infarction: self-controlled case-series study. *Vaccine* 2011; 29: 1145-1149.
<https://doi.org/10.1503/cmaj.091891>
- 3.4 Siriwardena AN, Asghar Z, Coupland C. Influenza and pneumococcal vaccination and risk of stroke or transient ischaemic attack – matched case control study. *Vaccine* 2014; 32(12): 1354-1361.
<https://doi.org/10.1016/j.vaccine.2014.01.029>

- 3.5 Asghar Z, Coupland C, Siriwardena AN. Influenza vaccination and risk of stroke: self-controlled case-series study. *Vaccine* 2015; 33: 5458-5463.
<https://doi.org/10.1016/j.vaccine.2015.08.013>

4. Details of the impact (indicative maximum 750 words)

Impact has been observed in change to national and international policy guidance; effects on practitioner behaviour and improved vaccination rates and NHS and media coverage promoting vaccination. The primary point of influence is at the level of service delivery and design, resolving issues in delivery systems and improving practitioner behaviours to optimise patient care.

Change to National and International Policy and Guidance

Our key study on how to increase flu vaccination rates in general practice [3.1] has been incorporated and cited directly in UK vaccination policy since it was published through the annual flu plan, flu letter and the GP practice checklist which was derived from this publication. The annual flu plan, flu letter and the GP practice checklist were issued each winter and widely circulated to healthcare professionals and organisations in England by the Department of Health, Public Health England and NHS England throughout the period 2014-2020 [5.1, pg 49].

This study [3.1] has also been cited in the current NICE guideline: 'Flu vaccination: increasing uptake (NG103) [5.2] published in August 2018 in which it states on page 26 that 'Results of a cross-sectional survey suggest that well-organised general practices that implement multiple strategies for promoting uptake tend to have highest rates of flu vaccination, particularly among over 65s but also among people from clinical risk groups (Strategies to increase influenza vaccination rates: outcomes of a nationwide cross-sectional survey of UK general practice, Dexter et al. 2012)'. The current annual flu letter in the UK also cites NICE guideline 103 [5.3] and directly refers to the GP practice checklist citing our work [3.1] in appendix K. The GP practice checklist is also included (slide 17) in the National Flu Programme training slide set from Public Health England [5.4] which is widely distributed to healthcare staff.

Our studies on reduction in risk of cardiovascular disease with flu vaccine [3.2, 3.3, 3.4, 3.5] have been cited in recent international US, European and Australian flu vaccination guidance which stress the importance of vaccinating those with or at risk of cardiovascular disease because of the potential benefits of flu vaccination shown in these studies in preventing heart attack and stroke [5.5 ref 210, 5.6 ref 152, 5.7 ref 10].

Effects on Practitioner Behaviour and Improved Vaccination Rates

NHS Wales Influenza campaign Cluster Support Scheme 2017/18 [5.8], which used a combination of recommendations from our research on increasing flu vaccination rates [3.1] together with incentives to increase flu vaccine rates in morbidly obese people, led to a significantly greater increase in flu vaccine uptake in all morbidly obese patients when compared to clusters not in the scheme. Participating practices were more than twice as likely to see increased uptake and the median overall increase in participating practices was 4.2% compared to a 2.4% increase in non-participating practices. Flu vaccine uptake in morbidly obese patients increased from the previous year in 83.2% of the practices that were in the cluster support scheme compared to 68.0% of practices that were not in a participating cluster, a statistically significant difference.

NHS and Media Coverage Promoting Vaccination

Two papers published in *Vaccine* on reduction in risk of stroke with flu vaccine [3.4, 3.5] have led to widespread media coverage, for example in 2015 in the *Telegraph*, *Times*, *Sun* and *Scottish Sun* newspapers, BBC television and radio and online media outlets in the US, Middle East, Asia, Australasia and South America with coverage in *NHS Choices* titled, 'Flu jab "may cut" stroke risk by a quarter [5.9].

5. Sources to corroborate the impact (indicative maximum of 10 references)

- 5.1 Department of Health. Seasonal flu plan: Winter 2014/15 to 2017/18. London, HMSO and Department of Health. The flu immunisation programme from 2013/14 to 2017/18 (Annex B GP practice checklist).
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600532/annual_flu_plan_2017to2018.pdf
- 5.2 National Institute for Health and Care Excellence (NICE) guideline: Flu vaccination: increasing uptake (NG103). 22 August 2018 <https://www.nice.org.uk/guidance/ng103>
- 5.3 The national flu immunisation programme 2019/20 letter and Appendix K GP Practice Checklist Appendix K <https://www.england.nhs.uk/wp-content/uploads/2019/03/annual-national-flu-programme-2019-to-2020-1.pdf>
- 5.4 Public Health England National Flu Programme training slideset 2019-2020 (slides 65-67).
<https://publichealthengland-immunisati.app.box.com/s/4g170e5eyreevnnkqfmlpvh9ulbn7psq>
- 5.5 US Centers for Disease Control and Prevention (CDC), Advisory Committee on Immunization Practices (ACIP). Seasonal influenza (flu) 2019-20 reference 2010
<https://www.cdc.gov/flu/professionals/acip/background/references.htm>
- 5.6 European Guidelines on cardiovascular disease prevention in clinical practice 2016
<http://eurheartj.oxfordjournals.org/content/early/2016/05/23/eurheartj.ehw106.extract>
[accessed 28.2.20]
- 5.7 Australian Immunisation Handbook 10th edition 2013
<https://immunisationhandbook.health.gov.au/vaccine-preventable-diseases/influenza-flu>
[accessed 7.1.20]
- 5.8 NHS Wales. Influenza campaign cluster support scheme 2017/18. <http://bit.ly/31UKhrl>
- 5.9 NHS Choices 'Flu jab "may cut" stroke risk by a quarter' Feb 21 2014]