

# SURVEILLANCE OF INFLUENZA-LIKE ILLNESS IN ENGLAND AND WALES DURING 1966-2006

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We report surveillance data collected since 1966 from a general practice database in England and Wales. Incidence rates of influenza-like illness (ILI) peaked during the winter of 1969/70, and were then followed by a decade of heightened activity. There has since been a gradual downward trend of ILI, interspersed with winters of heightened activity; since 1999/2000, the incidence of ILI has been at its lowest for 40 years. We argue that the decade following the herald waves of the pandemic could be equally important for the planning of healthcare services in the community.

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## Introduction

Despite decades of research and recent advances in the fields of influenza vaccines and antivirals, the influenza viruses continue to cause high levels of morbidity and mortality in the community during each winter season. Although current attention is focused on the impending challenge of the introduction of a novel pandemic strain (H5N1) into the human population [1,2], it has long been recognised that the cumulative effect of 'inter-pandemic' periods of influenza are more significant in respect of mortality [3]. In this surveillance report, we aimed to investigate the long term trends of influenza-like illness (ILI) collected from a sentinel general practice network over the last 40 years in England and Wales and to assess its changing burden on primary care.

## Methods

The Royal College of General Practitioners Weekly Returns Service (WRS) is a clinical information system based on a national network of sentinel general practices throughout England and Wales and is best known for its routine surveillance of respiratory illnesses [4]. Clinical diagnostic data are recorded by general practitioners (GPs) and stored as Read codes [5], which are mapped to the International Classification of Diseases (version 9; ICD-9) for analytical purposes. New episodes of illness are distinguished from ongoing consultations; new episodes of recurring or chronic conditions such as asthma are deemed to occur when exacerbations occur or when the condition is out of control. Currently (winter 2005/06), the network consists of 94 practices, comprising approximately 427 GPs, who continually record data on a twice-weekly basis, covering a patient population of approximately 940 000 (1.6% of the population of the United Kingdom). The network is representative of the national population in terms of both urban/rural and socioeconomic demographic spread [6]. A virological sampling scheme runs concurrently during the winter season: GPs take a combined nose and throat swab from a proportion of patients presenting with ILI or an acute respiratory infection. In collaboration with the Health Protection Agency, swabs undergo a molecular analysis for currently circulating influenza A viruses (subtypes H3 and H1), influenza B and respiratory syncytial virus [7]. This scheme is unique in providing virological validation of the clinical incidence data and timely information relating to

the antigenicity and genetic composition of the influenza viruses circulating the community [8]. Swabs taken from this scheme have also been tested retrospectively to assess the clinical burden of newly discovered pathogens, e.g., human metapneumovirus, and their contribution to respiratory morbidity in different age groups [9].

Weekly episode incidence rates of ILI (ICD-9 487) were calculated for combined male and female and all-ages. GPs in the WRS do not adhere to strict clinical case definitions of ILI as used in some other European influenza surveillance systems [10]. It is routinely accepted, however, that symptoms of ILI are recognised by the sudden onset of one or more prominent systemic symptoms including fever, headache, myalgia and malaise, and one or more respiratory symptoms including cough, coryza, sore throat and shortness of breath.

Influenza seasons were defined as weeks 40 to 20, that is, a period from approximately October through to May the following year. Thresholds used to define levels of ILI activity in the community are based upon analyses of clinical and virological data [8,11]. The differing threshold levels of ILI are defined as: baseline activity (rates of <30 per 100 000); normal seasonal activity (30-200 per 100 000); above average seasonal activity (200-400 per 100 000); and epidemic activity (>400 per 100 000).

## Results

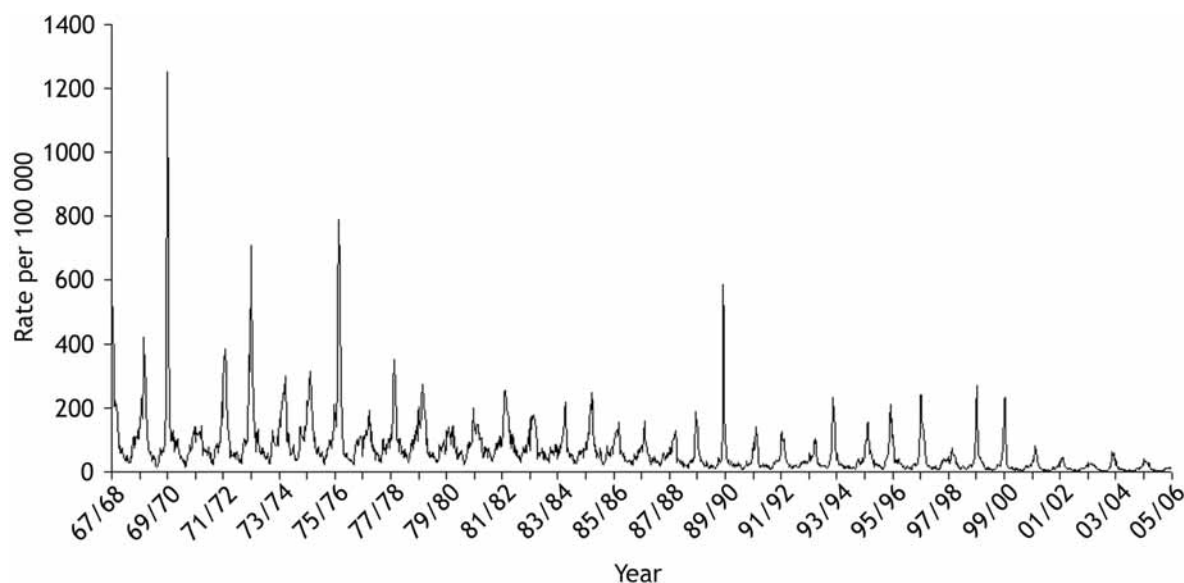
During the forty years of influenza surveillance, there have been four discernable winters of high ILI rates [FIGURE]. The highest rates of ILI were recorded during the winter of 1969/70, peaking at 1252 per 100 000 during week 01. This was followed by a season of low activity where the peak rate was 144 per 100 000 during week 11 of 1971. During 1972/73 ILI peaked in week 52 (707 per 100 000) but the second highest seasonal rates were recorded during 1975/76 (789 per 100 000, week 08 1976); this was followed by a season of relatively low activity. After the 1975/76 season, there were 13 years of moderate activity until the last substantial epidemic of influenza, which occurred in 1989/90; rates reached a peak of 584 per 100 000 during week 49 of 1989. During the decade following the 1989/90 epidemic, there was moderate activity, except for the season of 1997/98, when there was an unusually low season of ILI activity. Following the winter of 1999/2000 there was low ILI activity; rates did not exceed 81 per 100 000 during any week within this period. There was evidence of a reducing trend of ILI which started from the early 1980s and continued through to the 2005/06 season. The last six winters have seen such low activity that the baseline threshold was reduced accordingly in 2003, from an incidence rate of 50 to 30 per 100 000 [11].

## Discussion

The WRS was established in 1964 and has archived all data since 1966/67, providing an unrivalled opportunity to look at long-term trends of a variety of diseases. In this report we investigated the long term trends of ILI in England and Wales over a forty year period. The clinical impact of the 1968/69 pandemic was felt in the UK during the winter of 1969/70 when the WRS recorded higher rates of ILI than during any subsequent winter. Although there was much reduced morbidity in the following season, the next ten years saw sustained high levels of ILI. It is interesting to note that during the last years of H2N2 circulation (1966/67 to 1968/69) rates of ILI were relatively high compared to the rest of the time series. It is important to remember that the H2N2 subtype was introduced into the population during the

## FIGURE

## Clinical incidence of influenza-like illness in England and Wales: weekly episode incidence rates from 1967 to 2006



1957/58 pandemic and therefore had been circulating for fewer than ten years when the WRS first began recording ILI morbidity statistics. The time series also incorporates the 1977/78 pandemic, when the influenza A H1N1 subtype was re-introduced and co-circulated with the H3N2 subtype. The clinical impact of this pandemic was not as great; rates peaked at 351 per 100 000, less than one third of rates recorded during 1969/70, and were not discernibly higher than any other winter during that decade. During this pandemic, H1N1 infection was limited to young people; this might explain why the impact of this pandemic was so clinically understated.

The introduction of a novel influenza subtype into a mainly immunologically naive population (with the possible exception of the elderly population who might have had previous exposure to similar antigenic strains [12]) provides the influenza virus with the optimal conditions to infect, transmit and thus inflict high levels of morbidity on the community. Analysis of the figure reveals that over the years following the winter season of 1980/81, there was a general reducing trend of ILI, with the exception of intermittent periods of heightened activity, for example 1989/90. This may reflect the declining ability of the H3N2 virus to efficiently infect susceptible hosts. Factors influencing this might include mutational changes to the virus structure (especially in domains of the haemagglutinin associated with receptor binding), forced by decades of immunological pressure from the population. This could result in a gradual decrease in viral fitness and thus a virus that is not able to infect and transmit as efficiently as when first introduced to the population.

If this scenario were true, then we would predict that the H3N2 subtype is making way for another pandemic strain, whether H5N1, or possibly another subtype from a yet unknown source. From analysis of our data, we would expect that following the introduction of a novel pandemic strain, incidence rates of ILI would peak at extremely high levels during the initial waves of the pandemic, but would then be sustained for a period of approximately 10 years following its introduction. Potentially, it is this ten year period that presents more problems to healthcare systems than the original pandemic waves, as both primary and secondary healthcare resources would be stretched over much longer periods of time. This, in combination with an increasingly ageing population, may present serious problems in the post-pandemic decade. Current debate revolving around pandemic planning has only considered the initial herald waves of the pandemic, and not the subsequent years in the post-pandemic era, which we argue could be equally important. This report does not advocate changing current pandemic plans, its aim is rather to raise awareness of the challenges we face in the post-pandemic decade.

The WRS currently reports incidence rates of ILI in the community that are very close to baseline threshold levels. The reduction may also

reflect changes in social behaviour: family sizes are smaller; levels of hygiene have increased; air quality has improved; smoking has decreased; all might have played a part in reducing the transmissibility of influenza viruses and thus have contributed to the reduction of ILI. However, we must not be complacent in the face of the apparent decline of ILI in recent years, it is most likely that this is not a result of our attempts to control the spread of the influenza virus through treatment and prophylaxis; we must remember that this may simply be the calm before the storm.

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