



Collection of routine national seasonal influenza vaccine coverage data from GP practices in England using a web-based collection system

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ABSTRACT

This paper describes a web-based system developed to collect data on influenza (flu) vaccine uptake in near real time during the flu season in England. Data are collected from all GP practices providing the immunisation programme. Data are submitted either monthly or weekly on-line to a website using manual, automated and semi-automated methods. During the 2008/09 season, a final response rate of 96.2% was achieved ($n = 7980/8293$). This equates to 52,217,430 GP registered patients aged 6 months and over being included in the survey. The majority of reports (65.5%) were submitted via automated or semi-automated methods. We were also able to collect the data weekly from a sentinel group of GP practices (approximately 50%) that have fully automated data extraction facilities. This system successfully provides data locally and nationally to monitor the annual seasonal flu programme, with a large sample size, quickly and efficiently, with minimal burden on the NHS. At a time when the first influenza pandemic of the 21st century is occurring, the ability to measure influenza vaccine uptake coverage in near real time will be invaluable.

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1. Introduction

Immunisation coverage data are important to public health organisations as, along with other relevant data (for example disease surveillance and adverse incident reporting), they can be used to help:

- evaluate the quality, costs and benefits of vaccination programs;
- monitor performance;
- manage vaccine purchase, supply and distribution;
- target under-performance (by organisation, area or risk group, etc.);
- evaluate vaccine effectiveness and safety;
- modelling scenarios; and
- policy makers make evidence-based decisions.

However, late collection renders the data inappropriate for programme management although whilst immunisation is ongoing they may be used as proxies for outcome. We noted with interest a recent report (Harris et al. paper [1]) on the feasibility of

using an internet-based panel survey to obtain timely and accurate population-based data on influenza vaccination. A nationally representative sample of US adults ($n = 3043$) was surveyed via the internet about use of influenza vaccination during the 2007–08 influenza vaccination season. They compared the internet-based rates to those from the 2004 and 2008 National Health Interview Surveys (NHIS). The internet-based rates were comparable to those from the NHIS and were obtained in less than six weeks following the end of influenza vaccination season. They conclude that an internet-based approach can yield accurate estimates of end-of-season influenza vaccination rates in time to support improved management of the subsequent season. In England, the Department of Health (DH) is able to obtain accurate data from the medical practitioners who deliver the influenza vaccination programme whilst the programme is still in progress. We publish weekly provisional data within 3 days of the end of each week and the monthly provisional data within two weeks of the month end, from around 50% (weekly) to over 90% (monthly) of over 8000 data providers, representing over 52 million registered patients.

National influenza vaccine uptake data for patients aged 65 years and over has been collected in England since the national vaccination programme was introduced in 2000. These data have been collected on a monthly basis by Primary Care Trust (PCT) from October to the end of January each year to allow near real-time analysis of the implementation of the seasonal influenza vacci-

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nation campaign. Since 2004, this collection has moved from a paper-based survey to a web-based reporting system, collected from General Practitioner (GP) practices. The web-based collection allows automatic and semi-automatic upload of data directly from GP practice information technology (IT) systems, increasing efficiency and accuracy and minimising (and in most cases avoiding) any burden on the National Health Service (NHS) in England to provide these data. Manual data entry is also allowed. The change to web-based reporting also allowed vaccine uptake data to be accurately collected by clinical risk groups for those aged 6 months to under age 65, with disease groups accurately determined by READ codes that are used to define clinical conditions.

Since 2007, weekly vaccine uptake data have been collected in addition to the monthly data from a geographically representative sample of approximately 50% of GP practices during the influenza vaccination season. These data are collected only from those GP practices that have a fully automated data extraction process provided by their IT system suppliers, so there is no burden at all on the NHS in providing these data.

These data are matched by a separate sentinel surveillance system of up to approximately 25 GP practices in England and Wales, undertaken by the Birmingham Research Unit (BRU) of the Royal College of General Practitioners (RCGP)² that also monitors vaccine coverage. Although the RCGP sample size of GP practices is small, they have very stringent quality assurance processes to ensure that data recording is followed rigorously and their data are generally accepted as being of high quality.

Vaccine coverage data are also reported for other vaccines using this web-based collection system, including seasonal influenza vaccination in healthcare workers and poultry workers, pneumococcal polysaccharide vaccine (PPV) for older adults, MMR vaccination for children 2–18 years and HPV vaccination for girls 12–18 years of age.

We outline how the system operated during the recent 2008/09 influenza season and conclude that this approach yields accurate near 'real-time' estimates of influenza vaccination rates from a very large sample size, allowing local, regional and national management of the influenza vaccination programme during the campaign, with minimum burden on the NHS in providing these data. The purpose of this paper is to illustrate the large sample size and the speed and efficiency with which we are able to collect the data. Uptake data are published routinely at www.immunisation.nhs.uk.

At a time when the first influenza pandemic of the 21st century is occurring, the ability to measure influenza vaccine uptake coverage in near real time will be invaluable. The vaccine uptake collection methods used for seasonal influenza can and are being adapted to collect H1N1 swine influenza vaccine uptake data.

2. Materials and method

2.1. Website platform

Seasonal influenza (flu) vaccine uptake in the general population is measured in England using a web-based collection system—now known as the ImmForm website. Data are provided by GP practices, with the assistance of Primary Care Trusts (PCTs), including PCT-based Care Trusts.

The ImmForm website was designed and built and is hosted by the Immunisation Branch of the Department of Health.

The website has been developed using the Microsoft.Net toolset and Microsoft SQLServer database.

2.2. Survey design

The policy for the seasonal flu vaccination campaign is determined several months in advance. It takes account of any recommendations made by the Joint Committee on Vaccination and Immunisation (JCVI)³ and in light of previous campaigns. Details of the annual programme are published in the Chief Medical Officer (CMO) Letter to the NHS for the Seasonal Flu vaccination programme, typically in March each year (see www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Professionalletters/Chiefmedicalofficerletters/DH.097550 for the 2008/09 season letter).

Once the policy is determined, the dataset is developed with the Health Protection Agency. Often there are no changes to the dataset from the previous season. This allows direct comparison of data across multiple seasons. However, if it is decided to add in a new risk group (for example, due to a change in policy), then the dataset is modified accordingly. In this way, the survey is aligned to the targeted groups set out in the policy.

2.3. Dataset

The dataset provides uptake data for all those aged 65 years and over and also for those under 65 years by risk group, as specified in the CMO Letter. The dataset is shown in Table 1.

The READ Codes⁴, used to identify the coded clinical conditions that map to the identified risk groups, are reviewed annually to take account of any omissions or changes to the risk groups and any changes or additions to the READ Codes. PRIMIS+⁵ is commissioned by DH to document the READ Codes. The READ Code specification is published on the immunisation website (see www.immunisation.nhs.uk/Vaccines/Flu/Resources/seasonal_flu), along with GP practice and PCT user guidance and other guidance documents.

2.4. ImmForm website design

Data are entered via an on-line form which mirrors the dataset. For each category on which we collect data, we collect the number of registered patients within that category on the date of extraction (the denominator) and the number of registered patients that were vaccinated in a specified period that season (the numerator). The on-line form then calculates the uptake rate (numerator divided by denominator) for that category (e.g. all patients aged 65 and over) and displays it for the data provider.

Only the key summary fields are mandatory. The detailed breakdown by individual risk group is optional to allow those GP practices that do not have access to sufficient IT tools to opt out of providing these data. However, most practices are able to provide these data (see Section 3 below).

In addition to the data items in the dataset, we also collect information on upload method and the IT supplier of the GP practice. This helps us in assessing the burden (or lack of it) and in identifying any IT supplier-specific issues.

³ JCVI—see www.advisorybodies.doh.gov.uk/jcvi/.

⁴ READ Codes are a coded thesaurus of clinical terms, which enable clinicians to make effective use of computer systems. The codes facilitate the access of information within patient records to enable reporting, auditing, research, automation of repetitive tasks, electronic communication and decision support. The Read codes are named after James Read who developed the codes. See www.connectingforhealth.nhs.uk/systemsandservices/data/readcodes for more details.

⁵ PRIMIS+ is a free service to primary care organisations in England to help them improve patient care through the effective use of their clinical computer systems—see www.primis.nhs.uk/.

² RCGP—see www.rcgp.org.uk/clinical_and_research/bru/weekly_data.aspx.

Table 1
Influenza Programme 2008/09—ImmForm Website Vaccine Uptake Survey dataset.

Seasonal flu survey dataset requirement for 2008/09 collection	(A) Registered on day of data extraction	(B) Vaccinated between 1st September—end of previous month	Vaccine uptake (%) calculated by system
All patients			
Aged 65 and over	A ¹ mandatory	B ¹ mandatory	
Aged 6 month to under 2 years	A ² mandatory	B ² mandatory	
Aged 2 years to under 16 years	A ³ mandatory	B ³ mandatory	
Aged 16 to under 65	A ⁴ mandatory	B ⁴ mandatory	
Summary of patients in one or more at-risk group(s)			
Aged 6 month to under 2 years	A ⁵ mandatory	B ⁵ mandatory	
Aged 2 years to under 16 years	A ⁶ mandatory	B ⁶ mandatory	
Aged 16 to under 65	A ⁷ mandatory	B ⁷ mandatory	
Patients with chronic heart disease			
Aged 6 month to under 2 years	A ⁸	B ⁸	
Aged 2 years to under 16 years	A ⁹	B ⁹	
Aged 16 to under 65	A ¹⁰	B ¹⁰	
Patients with chronic respiratory disease			
Aged 6 month to under 2 years	A ¹¹	B ¹¹	
Aged 2 years to under 16 years	A ¹²	B ¹²	
Aged 16 to under 65	A ¹³	B ¹³	
Patients with chronic renal disease			
Aged 6 month to under 2 years	A ¹⁴	B ¹⁴	
Aged 2 years to under 16 years	A ¹⁵	A ¹⁵	
Aged 16 to under 65	A ¹⁶	A ¹⁶	
Patients with chronic liver disease			
Aged 6 month to under 2 years	A ¹⁷	B ¹⁷	
Aged 2 years to under 16 years	A ¹⁸	B ¹⁸	
Aged 16 to under 65	A ¹⁹	B ¹⁹	
Patients with diabetes			
Aged 6 month to under 2 years	A ²⁰	B ²⁰	
Aged 2 years to under 16 years	A ²¹	B ²¹	
Aged 16 to under 65	A ²²	B ²²	
Patients with immunosuppression			
Aged 6 month to under 2 years	A ²³	B ²³	
Aged 2 years to under 16 years	A ²⁴	B ²⁴	
Aged 16 to under 65	A ²⁵	B ²⁵	
Patients with stroke/TIA			
Aged 6 month to under 2 years	A ²⁶	B ²⁶	
Aged 2 years to under 16 years	A ²⁷	B ²⁷	
Aged 16 to under 65	A ²⁸	B ²⁸	
Patients with chronic degenerative neurological disease including MS			
Aged 6 month to under 2 years	A ²⁹	B ²⁹	
Aged 2 years to under 16 years	A ³⁰	B ³⁰	
Aged 16 to under 65	A ³¹	B ³¹	
Patients with diabetes on medication ^a			
Aged 6 month to under 2 years	A ²⁰	B ²⁰	
Aged 2 years to under 16 years	A ²¹	B ²¹	
Aged 16 to under 65	A ²²	B ²²	
Carers			
Aged under 65 not at-risk who fulfil the 'carer' definition	A ³²	B ³²	

^a Those who are diabetics and on medication. This year we are again collecting data for all diabetics, but also wish to collect data on diabetics on medication in order to compare with last year's data.

The survey form is a web page with designated fields for each data item. Each field is a specific data type, which means that, for example, text cannot be entered into an integer field. The on-line form also has in-built validation checks to ensure that the data entered are logically correct (e.g. the number vaccinated must be less than or equal to the number of registered patients, by category).

The validation rules apply to data entered manually and to the automated and semi-automated data upload methods. Any data type or validation errors are shown as a message on the web page. Therefore, if there are errors in the data being entered, it allows them to be corrected at the point of entry. The automated upload methods also generate error messages to allow the data to be corrected before being re-submitted. This process ensures that the data quality is high. The ImmForm website also has the following

facilities:

- News items;
- e-mail;
- Feedback;
- Information Portal (key documents and links, such as user guides);
- Frequently asked questions (FAQs);
- Useful links;
- My Details (e.g. amending login details).

These facilities help improve the user experience. We can use the News Item functionality to put up key messages, such as when surveys open or close, if there are any planned downtimes for the

website, etc. We can also use the e-mail functionality to ‘push’ messages out to the relevant contacts.

The ImmForm website is also used to collect vaccine coverage data for other vaccines, including seasonal influenza vaccination in healthcare workers and poultry workers, pneumococcal polysaccharide vaccine (PPV) for older adults, MMR catch-up vaccination programme for children 2–18 years and HPV vaccination for girls 12–18 years of age.

ImmForm is also used to collect weekly flu disease surveillance data in England and in the UK and has recently been extended to collect daily flu disease surveillance data in response to the advent of the H1N1 swine flu pandemic.

The other major aspect of the ImmForm website is the recent development of a vaccine supply module that integrates with the UK’s contracted vaccine distributor in the UK. This allows GP practices and PCTs to order certain vaccines on-line.

2.5. Request for data

The need for vaccine uptake data is set out as part of the programme in the CMO Letter. The data collection is approved as a mandatory collection via a licence granted by ROCR⁶. All GP practices ($n = 8293$) that provide a seasonal flu vaccination service (as advised by PCT Flu Coordinators) are requested to submit data to the monthly surveys over the seasonal flu vaccination season. Data are collected in November, December, January and February for vaccinations to the end of the previous month. GP practices have five working days from month end to submit their data. For example, data for the period ending 31 October (the ‘October Survey’) are collected in November. PCTs have two additional days to submit data on behalf of practices that have not uploaded and to check and modify data if necessary. Monthly data are then extracted, analysed and published (as provisional data) (see Section 3.5 below).

PCT Flu Coordinators are provided with tools on the ImmForm website so they can identify which GP practices have yet to submit and can generate an e-mail address list of non-responders to facilitate achieving high response rates.

The ImmForm website also allows e-mails to be sent to all PCT Flu Coordinators (or sub-sets or individuals) when appropriate. Typically, DH would e-mail all PCT Flu Coordinators once the dataset has been confirmed and again prior to the start of the campaign with the user guides and reminders of the survey dates, etc. News items can also be posted, for example reminding ImmForm users when a monthly survey opens and closes.

2.6. Data submission methods

All data collected are anonymised and aggregated by GP practice—individual patient identifiable data are not collected and individuals cannot be identified.

Some GP IT system suppliers (EMIS, Microtest and TPP) provide a XML bulk extract facility for their customers. This enables the anonymised, aggregated data to be extracted from the GP practices’ databases (with the GP practices’ approval) to a specified XML file format, which the participating suppliers then package up into a bulk file. They can either upload directly to the ImmForm website (using a login and password assigned to them), or e-mail the file to DH to upload. This method is quick, accurate and efficient and provides no burden on the NHS to provide the data. The XML spec-

⁶ ROCR – Review of Central Returns – The Review of Central Returns (ROCR) process is concerned with supporting the Department of Health (DH) and its Arms Length Bodies (ALBs) to implement the government’s policy in ‘Reducing the burden’ of data collections from the NHS—see <http://www.ic.nhs.uk/services/the-review-of-central-returns-rocr>.

ification mirrors the survey dataset. Data submitted via this route are typically posted within one or two working days of the month end.

The efficiency and speed of the XML bulk upload submission method allows the collection of weekly returns from those GP practices with suppliers that offer this functionality. The data are for the period ending midnight each Sunday. The suppliers run their extraction routines and submit the data typically the next day, or the latest by midday the following Wednesday. We are therefore able to collect data in near real time that is at best 1 day and at worst 3 days old, from around 50% of GP practices, representing over 27 million patients (data from week ending 25 January 2009). Weekly data are also published on the NHS Immunisation website. The two suppliers that participate in the weekly collection are EMIS (LV platform only) and TPP.

The UK Government provides guidelines on the recommended use of web based data exchange. The e-Government Interoperability Framework (E-GiF) Standards state “. . . There is a strategic decision to adopt XML and XSL as the core standards for data integration and management. This includes the definition and central provision of XML schemas for use throughout the public sector. . .” This is a fundamental part of the ImmForm website design. We would like to move to 100% collection by electronic data exchange, but this is dependent on all GP IT suppliers providing this functionality for their customers. We are working towards this with the suppliers and the relevant NHS IT bodies.

There are query tools called CHART and MIQUEST, which are produced by PRIMIS+. The CHART tool has a feature that exports and appends the data as a datastring to the URL of the ImmForm website. When the person submitting the GP practice’s data pastes the URL datastring into the browser, they are prompted to log in. The data are submitted to the relevant survey without the need for further keying, significantly reducing the burden of providing these data. Data generated by CHART or MIQUEST can be entered manually. Some IT suppliers also provide a similar URL datastring service for their customers. Other IT suppliers provide reporting tools that GP practices can use to run reports locally and then enter the data manually.

2.7. Access to the ImmForm website

As well as providing a data collection tool, the ImmForm website allows the data to be viewed and extracted. The website is login and password controlled. Access is controlled by roles and organisation, so for example an individual might have the flu coordinator role for one or more PCTs. Their login would give them access to the flu surveys for the PCTs they represent.

The organisational hierarchy within the flu survey mirrors the primary care organisational hierarchy of the NHS in England—see Fig. 1.

There are 10 Strategic Health Authorities (SHAs) in England. SHAs are the part of the National Health Service (NHS) in England responsible for enacting the directives and implementing fiscal policy as dictated by the Department of Health at a regional level. In turn, each SHA area contains various NHS trusts, including PCTs, which take responsibility for running or commissioning local NHS services. The SHA is responsible for strategic supervision of these services.

There are 152 PCTs (including 5 PCT based Care Trusts). PCTs are the part of the NHS in England responsible for delivering primary care, including national vaccination programmes, to the general population.

GPs are personal doctors, primarily responsible for the provision of comprehensive and continuing medical care to patients, that are typically contracted by PCTs to provide primary care services, including vaccination. The number of GP practices varies over

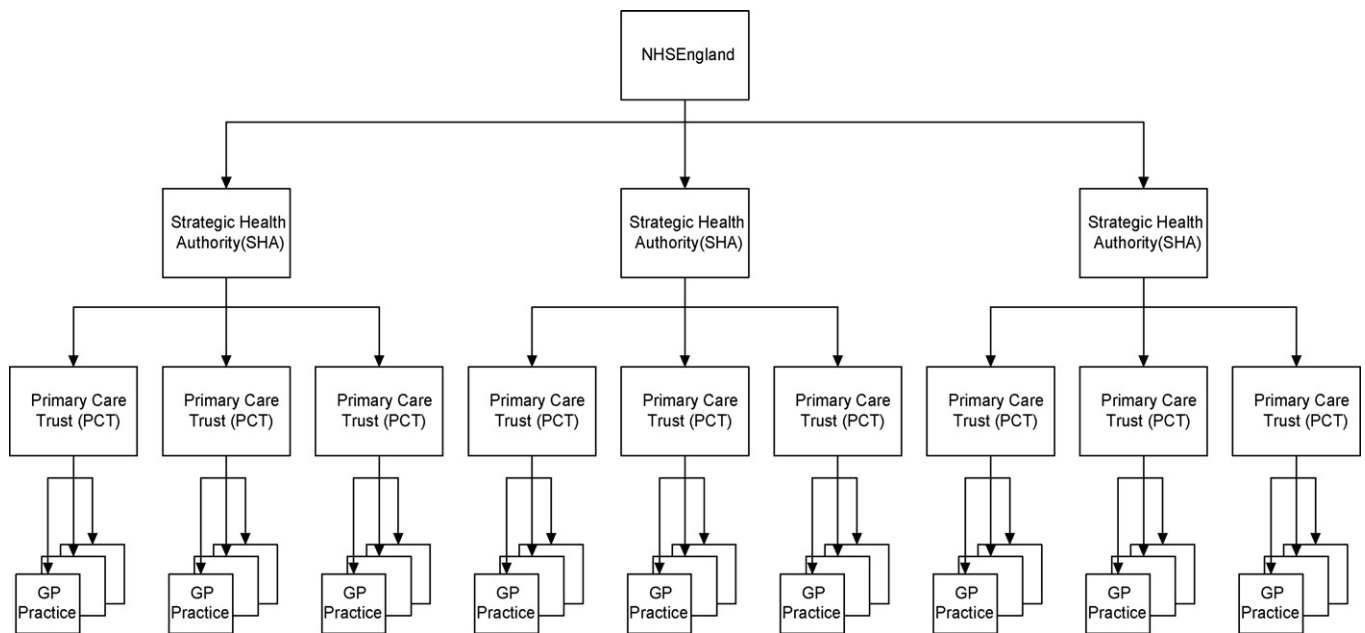


Fig. 1. Primary care organisational hierarchy of the NHS in England.

time; for the final monthly survey (January 2009), the number of GP practices participating in the flu immunisation programme was recorded as 8283.

The hierarchy within the survey is important, as it allows data collected at GP practice level to be aggregated up to PCT level, SHA level and national level in England. This allows reporting and extraction of data to these levels.

A limited number of SHA staff (typically SHA Immunisation Leads) have read-only access to their PCTs' data and to the GP practices below them; they cannot see data for other SHAs and the PCTs and GP practices below them. A limited number of PCT staff (typically PCT Flu Coordinators) have access to their PCT's data and the GP practices below them; they cannot see data for other PCTs and GP practices below them.

3. Results

3.1. Sample size and response rate

All GP practices ($n=8293$) that participate in the seasonal flu vaccination campaign were included within the survey. PCTs (typically PCT Flu Coordinators) advise DH of any deletions, amendments or additions to the GP practices.

For the January 2009 survey, which is the final monthly survey of the seasonal flu vaccination season, 7980 GP practices out of 8293 (96.2%) submitted data. This represents 52,217,430 registered patients aged 6 months and over. For the other monthly surveys (October, November and December), response rates were 85.7%, 88.4% and 90.4% respectively.

For the weekly survey, typically around 50% of GP practices have data submitted on their behalf. Geographical coverage is good, with around a third (32.8%) and in some cases over two-thirds (70.5%) of GP practices included in each SHA. The breakdown of response rates for a typical weekly survey (week ending 25 January 2009), by SHA, is shown in Table 2. All but two PCTs have at least one GP practice, although some PCTs have very small numbers of GP practices in the sentinel group. For risk group data, the data items are optional. Despite this, of those GP practices that submitted data, over 95% submitted the optional data as shown in Table 3.

3.2. Data entry methods

The breakdown by data entry method is shown in Table 4.

3.3. Vaccination uptake rates

Seasonal flu vaccine uptake for those aged 65 and over for 2008/09 was reported at 74.1%; for those under 65 years of age falling into a clinical risk group, it was reported as 47.1%. A comprehensive breakdown of data is already published (see Section 3.5 below).

3.4. Weekly data

Fig. 2 shows weekly seasonal flu vaccine uptake data collected from approximately half of GP practices (the number varies week-on-week).

These data show very similar uptake rates for those aged 65 and over from a separate sentinel surveillance system of up to approximately 25 GP practices in England and Wales, undertaken by the Birmingham Research Unit (BRU) of the Royal College of Gen-

Table 2
Influenza Programme 2008/09—ImmForm website weekly survey response summary, by Strategic Health Authority (week ending 25/1/2009).

SHA name	Response summary week ending 25/1/2009		
	No. of practices	No. of practices responding	% of practices responding
North East SHA	403	284	70.5
North West SHA	1278	419	32.8
Yorkshire and The Humber SHA	809	557	68.9
East Midlands SHA	632	429	67.9
West Midlands SHA	972	405	41.7
NHS East of England	790	502	63.5
London SHA	1537	773	50.3
South East Coast SHA	646	238	36.8
South Central SHA	508	226	44.5
South West SHA	740	319	43.1
Total	8315	4152	49.9

Table 3
Influenza Programme 2008/09 – ImmForm Website Vaccine Uptake Survey – response rates for clinical risk groups (optional data).

	No. patients registered	No. vaccinated	% uptake	No. of practices that provided data for this question	% of responding practices that provided data for this question
Aged 6 months to under 2 years					
Patients with chronic heart disease	4,571	540	11.8	7629	95.6
Patients with chronic respiratory disease	5,296	303	5.7	7629	95.6
Patients with chronic renal disease	125	15	12	7628	95.6
Patients with chronic liver disease	143	24	16.8	7623	95.5
Patients with diabetes	308	18	5.8	7627	95.6
Patients with immunosuppression	1,420	47	3.3	7619	95.5
Patients with stroke/TIA	136	7	5.1	7618	95.5
Patients with chronic degenerative neurological disease or MS	727	79	10.9	7609	95.4
Patients with diabetes on medication	255	17	6.7	7579	95
Aged 2 years to under 16 years					
Patients with chronic heart disease	54,113	8,803	16.3	7630	95.6
Patients with chronic respiratory disease	374,876	96,583	25.8	7631	95.6
Patients with chronic renal disease	4,262	984	23.1	7629	95.6
Patients with chronic liver disease	2,173	507	23.3	7624	95.5
Patients with diabetes	16,473	8,910	54.1	7629	95.6
Patients with immunosuppression	18,380	4,274	23.3	7620	95.5
Patients with stroke/TIA	1,554	347	22.3	7619	95.5
Patients with chronic degenerative neurological disease or MS	25,004	3,814	15.3	7613	95.4
Patients with diabetes on medication	14,913	8,370	56.1	7579	95
Aged 16 years to under 65 years					
Patients with chronic heart disease	629,052	365,846	58.2	7633	95.7
Patients with chronic respiratory disease	1,635,765	816,861	49.9	7632	95.6
Patients with chronic renal disease	178,440	86,328	48.4	7631	95.6
Patients with chronic liver disease	137,120	51,031	37.2	7626	95.6
Patients with diabetes	993,667	673,275	67.8	7631	95.6
Patients with immunosuppression	353,532	158,599	44.9	7623	95.5
Patients with stroke/TIA	175,439	101,163	57.7	7620	95.5
Patients with chronic degenerative neurological disease or MS	228,070	81,101	35.6	7607	95.3
Patients with diabetes on medication	778,704	552,136	70.9	7580	95

eral Practitioners (RCGP) that also monitors vaccine coverage. The two are comparable, showing a close correlation, as illustrated in Fig. 3.

3.5. Data publication

Weekly and monthly provisional uptake data are published on the NHS Immunisation website (www.immunisation.nhs.uk). The

final January data are cumulative data from 1 September 2008 to 31 January 2009 inclusive. These data were submitted in early February, which enabled the data to be assured, analysed and published in February (summary data only), with a full report published in April 2009 on the NHS Immunisation website. The final January data are also published as part of National Statistics by the NHS Information Centre (see www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles/immunisation).

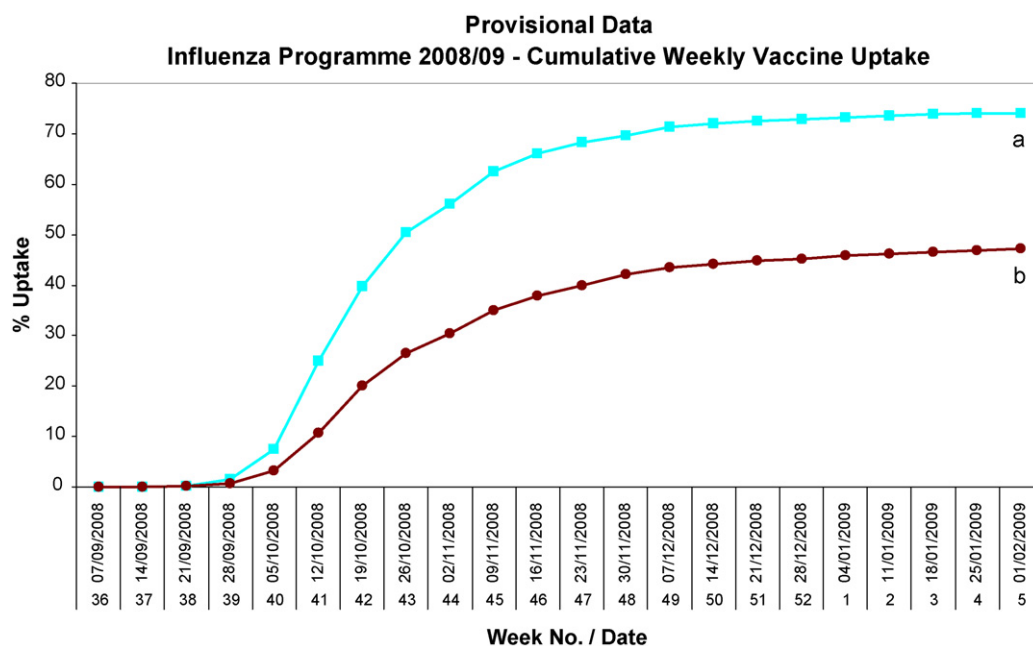


Fig. 2. Influenza Programme 2008/09—cumulative weekly vaccine uptake. a, percentage uptake aged 65 and over; b, percentage uptake under 65 at risk.

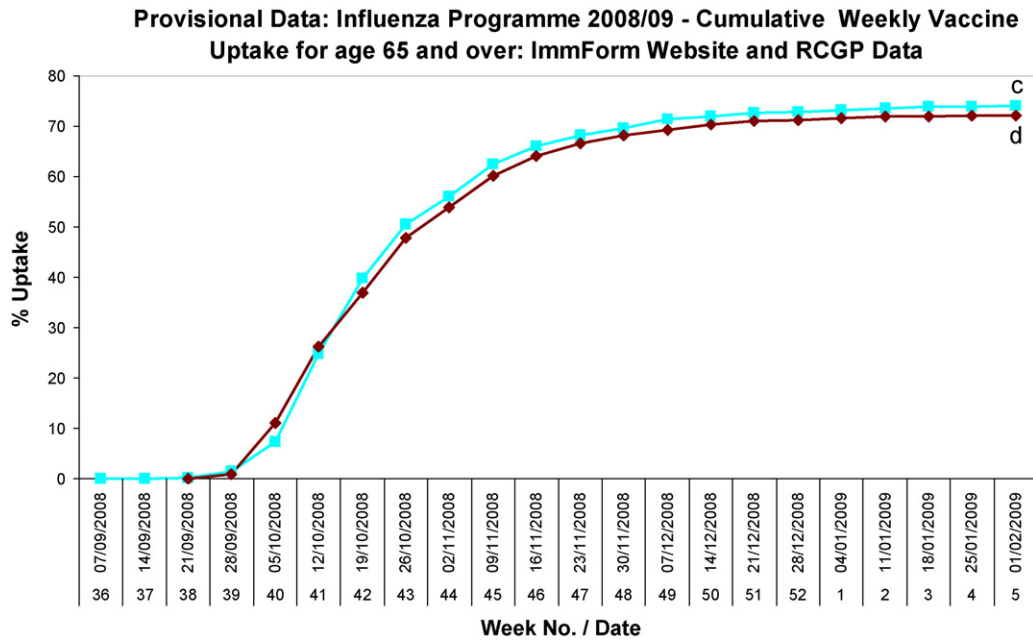


Fig. 3. Influenza Programme 2008/09—cumulative weekly vaccine uptake for age 65 and over: ImmForm website and RCGP Data. c, percentage uptake aged 65 and over (Source: ImmForm website); d, percentage uptake aged 65 and over (Source: RCGP).

Data are available for viewing by those with authorised access to the ImmForm website from the time it is submitted.

4. Discussion

The ImmForm website is a powerful and timely tool for collecting and analysing seasonal flu vaccine uptake and other survey data used in an important public health programme. The data are available immediately after submission for those with access to the ImmForm website. The speed of the data collections allows provisional published data to be available with just a few days of submission, so all relevant stakeholders have access to recent data.

The seasonal flu vaccine uptake data can be used within the vaccination season to adjust the flu campaign programme if necessary. This could be at a national level, where DH would write to the relevant SHAs and PCTs and could adjust national media campaigns to be weighted to areas with lower uptake rates. At a regional or local level, SHAs and PCTs could adjust their own local campaigns and take other interventions to improve uptake.

The early availability of accurate data is important when planning for the following seasonal flu vaccination season. The national policy work to plan for the next flu season is well underway before the current flu season finishes. The availability of data throughout the season allows policy to be reviewed and amended as necessary so it can be set out in the Chief Medical Officer (CMO) Letter to the NHS for the following season, which is typically issued around the end of March each year. Early data allow regional (SHA), local (PCT) and provider level (GP Practice) to review their own performance and their plans for the following season. The early availability of data has also been invaluable in planning for a pandemic flu vaccination programme in England.

The variety of ways in which data can be submitted allows data providers to use whichever method is most suitable for them, facilitating high response rates.

By working closely with the GP practice IT suppliers and providing electronic data exchange facilities to national government standards, we are able to remove or reduce the burden for the majority of GP practices without compromising the breadth of data

surveyed, the number of GP practices surveyed, the timeliness of the collection or the quality of the data collected.

The efficiency and speed of the XML bulk upload submission method allows the collection of weekly returns from those GP practices with suppliers that offer this functionality. This near real time data, from around 50% of GP practices, representing over 27 million patients, allows Ministers and senior policy and public health officials to have access to very timely and accurate data, with no burden to the NHS in providing these data. PCTs and Strategic Health Authorities (SHAs) are also able to view their local weekly data via the ImmForm website for the purposes of local management, allowing the possibility of interventions that could improve the final uptake rates.

The very high response rate from such a large number of data providers allows the collection of very large sample sizes, which reduces the likelihood of occasional statistical anomalies skewing the results. By collecting data directly from source, i.e. the GP practices that administer the vaccine and record the details locally on their IT systems, there is further reassurance that the data are accurate and timely.

The high response rates (over 95%) achieved for the optional data indicate that even the GP practices that enter their data manually have access to data reporting tools locally that make providing the optional data viable for them.

The uptake data collected by RCGP are very similar to the data collected by DH via the ImmForm website (Fig. 3). However, the RCGP data are limited to those aged 65 and over, whereas the ImmForm data include uptake data by clinical risk groups in those under age 65 (see Table 1). The other important difference is sample size;

Table 4
Influenza Programme 2008/09 – ImmForm Website Vaccine Uptake Survey – data entry method.

Data entry method	Number of GP practices	Percentage
Fully automated (XML bulk upload)	4359	54.6%
Semi-automated (URL datastring)	865	10.8%
Manual entry (keyed in)	2756	34.6%
Total	7980	100%

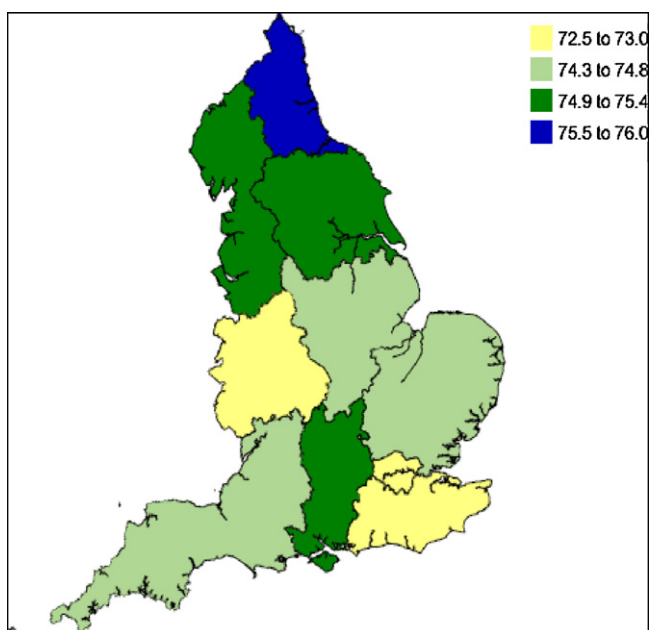


Fig. 4. Map from ImmForm website showing percentage uptake in patients aged 65 and over, by Strategic Health Authority.

RCGP data were collected from a very small sentinel group of just 25 GP practices across England and Wales. The ImmForm data allow PCTs and SHAs to see the data submitted by their practices, so are able to manage their flu vaccination programmes locally and regionally. It allows DH to publish data down to SHA and PCT level.

Data collected are also important for national policy development and planning. For example, data collected by risk groups give us denominator figures for each risk group, which is likely to be important for identification of possible priority groups for pandemic flu vaccination planning.

The advantage of on-line entry is that data can be validated at point of entry, so invalid data are rejected. The automated and semi-automated methods avoid potential transcription errors. The automated method of XML extract removes any burden from the NHS for proving the data and the semi-automated method of URL datastrng significantly reduces the burden.

The ImmForm website also allows data to be viewed and extracted at GP practice level, PCT level, SHA level and national (England) level, depending on access rights. Standard options allow data to be extracted to Excel for further analysis and production of graphs and charts. The ImmForm website also holds reference boundary data for SHAs and PCTs and uses this to display data on maps, as illustrated in Fig. 4, which shows percentage uptake in the 65 and over by SHA.

Anonymous comparison reports allow GP practices to compare their uptake rates with anonymised GP practices within their PCT. SHAs and PCTs are able to compare their aggregated data to their neighbours. In this way, they are able to benchmark their uptake rates with their peers. This helps foster a friendly competitive rivalry that encourages higher uptake. It also encourages those with successful campaigns to share their good practice with others.

The addition of the vaccine supply module will, in the longer term, enable cross-report of vaccine supply and vaccine uptake for certain vaccines, giving a much improved view of management information (nationally and locally), hopefully reducing vaccine wastage and improving stock monitoring and management.

The vaccine uptake collection system could potentially be reproduced by other countries. The key factors to develop a collection system similar to this are as follows:

- Electronic recording in the individual's personal health record at the point of vaccination (i.e. at GP practices), which facilitates easy and accurate recording of data and subsequent extraction of data.
- The use of standard coding systems (i.e. READ Codes and similar bespoke solutions) that allow clinical risk groups to be readily recorded and identified.
- A web-based survey system that allows data to be entered in a variety of ways (electronic as well as manual).
- Close cooperation with the IT suppliers to ensure their systems are compatible with data recording and extraction requirements.
- Use of electronic data upload, compatible with nationally agreed data exchange standards, to reduce or eliminate the burden of health services in providing the data.

The model works well in England as the vast majority of seasonal flu vaccines are delivered through the same providers—general practice. Although there are several different IT suppliers that provide systems to general practice, the use of a common coding system (i.e. READ Codes) by these suppliers (or bespoke versions that match closely) allows the clinical risk groups to be recorded and therefore subsequently reported accurately. By providing and specifying an electronic interface to government standards, we are able to facilitate IT suppliers in providing automated data extraction services to their general practice customers.

The delegation of the management of the vaccination programme, via SHAs to PCTs, allows the effective local management of the national seasonal influenza vaccination programme. PCT immunisation coordinators play a vital role in working with their local general practices to encourage data cleansing, high response rates and high uptake rates.

The extraction of management information from operational information systems is seen as a fundamental requirement in its own right and not just an afterthought. These key management information data are extracted from operational IT systems with minimum additional burden. There is no additional data recording required other than that needed to maintain the individual's personal health record. Therefore, even for those practices that do not have access to automated data upload facilities, there is no additional data recording required in their local IT systems. GP practices are able to extract data from their systems themselves, using bespoke query tools or query tools provided by their suppliers and then manually key the survey data into the ImmForm website.

In England, because data collections from the NHS have to be assessed and approved by ROCR (see above), it is vital that the burden placed on the NHS in providing the data is proportionate to the need and value of the data. The efficient collection methods and, in particular the automated electronic uploads, keep the burden for these very important data to a minimum.

We are not aware of any other vaccine uptake collection system that collects data from such a large sample size, with such speed, quality and efficiency. The ImmForm website is a significant tool in the local, regional and national management of the annual seasonal flu programme and other immunisation programmes.

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