Extracting general practice data for timely vaccine coverage estimates: The England experience

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ABSTRACT

In England, primary care providers use standardised coding systems to record health events such as vaccination as well as patient characteristics. This information can be automatically extracted to estimate coverage for vaccine programmes delivered through primary care, in the general population as well as in specific geographical, ethnic, age or clinical groups. This system provides timely vaccine coverage estimates as well as the flexibility to extract tailored data in order to directly inform a continuously evolving national vaccine programme. It is however limited by the quality and completeness of clinical coding in primary care. A centralised, individual-level register would however improve data quality, completeness and reliability and remains the gold standard.

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1. Introduction

Measuring vaccine coverage enables the national evaluation of vaccine programme delivery and the assessment of the overall level of population protection. Vaccine coverage data are also used to estimate vaccines' effectiveness and impact, and in making policy decisions [1]. At the local level, coverage data are also used for performance management; risk assessment; identifying under-immunised groups or areas; and responding to community outbreaks of vaccine-preventable diseases. Timely and high quality vaccine coverage data enables better delivery of vaccine programmes [2]. In England, most vaccine programmes are delivered in primary care through general practice (GP). Public Health England (PHE), the executive agency of England's Department of Health, is responsible for collecting and reporting coverage of vaccines included in the national vaccination schedule. Since the 1980s, PHE has used Child Health Information Systems (CHIS), local population registers of all children including those not registered with a GP, as a source of data to estimate coverage for routine and selective childhood immunisations as part of the Cover of vaccination evaluated rapidly (COVER) programme [3]. CHIS vaccination data mainly originates from GP data, as well as other settings where vaccination is delivered. COVER vaccine coverage measurements are published quarterly as official statistics and annually as national statistics [4]. The use of CHIS data to estimate vaccine coverage and the COVER programme have been described elsewhere [1]. To estimate coverage of some programmes delivered after the age of five, and for most new vaccine programmes since 2013, PHE has also used data automatically extracted from GP systems. This approach started in 2004 with the influenza and pneumococcal polysaccharide vaccine programmes in over 65 years-olds and has now been extended to an increasing number of vaccine uptake collections. Reporting was originally undertaken manually and moved to automatic extraction from around 50% of practices by 2008/09 [5]– this has now increased to over 95%. Extracting data automatically from almost all GP systems allows estimation of practice-level vaccine coverage in near real-time, enabling timely targeted action and analysis of dose-specific coverage by specific criteria, such as ethnicity, gender or co-morbidity. England is one of few countries to report vaccine coverage using this data source. The applications, challenges and limitations of this data may be of interest to other countries in Europe and beyond. We sought to describe how vaccine coverage is estimated

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using primary care data in England and to outline the advantages and limitations as well as future initiatives for measuring vaccine coverage using primary care data.

## 2. Vaccine coverage using general practice data

2.1. Clinical coding in general practice

In England, general practice is often the first point of contact when seeking healthcare and acts as a gatekeeper to specialist services. Individuals residing in England must register with a practice to see a general practitioner or to be referred for most secondary or other health services. As a result the vast majority of the population is registered with a GP [6]. The majority of clinical GP records have been fully computerised since the early 2000s [7]. When a patient registers with a practice several key demographic characteristics such as age, sex and ethnicity are recorded using Read codes [8], and this system is also used for recording clinical events such as vaccine administration and underlying clinical history. Read codes are currently used in England and are scheduled to be replaced by the Systematized Nomenclature of Medicine Clinical Teams (SNOMED-CT), an internationally used clinical terminology [9], in 2020. All clinical events should be recorded in the patients' records, including those occurring outside of a primary care setting, such as school and pharmacy delivered vaccinations (Fig. 1), although there are challenges to getting this information promptly back into the GP patient record. GPs receive financial incentives to accurately record some of these codes.

2.2. ImmForm

ImmForm (www.immform.dh.gov.uk) is the secure, web-based system used by the NHS and PHE to collect data on vaccine coverage for selected immunisation programmes and provide vaccine ordering facilities for the NHS. ImmForm allows GPs and local NHS England teams to analyse and review their vaccine coverage data [10]. ImmForm obtains data from each of the four main companies supplying information systems to GPs, covering approximately 7500 practices, 95% of GPs nationally. Aggregate data are directly and automatically extracted from these GP IT systems, following extraction specifications that, for each vaccine collection, specify which Read codes indicate eligibility (for inclusion in the denominator) and vaccination status (for inclusion in the numerator). Extraction details are available in the data specifications [11]. ImmForm also allows stratification of vaccine coverage by any variable recorded, such as age (by date of birth), ethnicity, gender, specific co-morbidities (e.g. chronic heart disease, diabetes) [12] and place of administration (practice, school, pharmacy etc). The specifications and outputs are internally and externally validated and quality assured to ensure the coverage reported is accurate. Data are collected and fed back directly at the GP level. Vaccine coverage estimates are published on PHE's website [3] down to clinical commissioning group (CCG) and local authority (LA) level. CCGs are independent statutory bodies governed by members of local GPs with support from health professionals and direct input from people representing patients and members of the public [13]. The ImmForm platform also allows access to relevant GP level data for local public services for operational purposes. It facilitates monitoring and evaluation of the implementation of the programme by PHE, NHS England and Department of Health (DH), allows early identification of areas where coverage of the vaccine is low for local public health teams, provides epidemiological data to allow assessment of the effectiveness and impact of the programme, data for vaccine safety assessment, and information for policy makers and the public. As of May 2017, ImmForm was used to collect vaccine coverage directly from GPs for the rotavirus, measles, mumps and rubella (MMR), Meningococcal group B (MenB) and groups ACWY (MenACWY), prenatal pertussis, adult

Fig. 1. Immunisation data flows, England, June 2017.
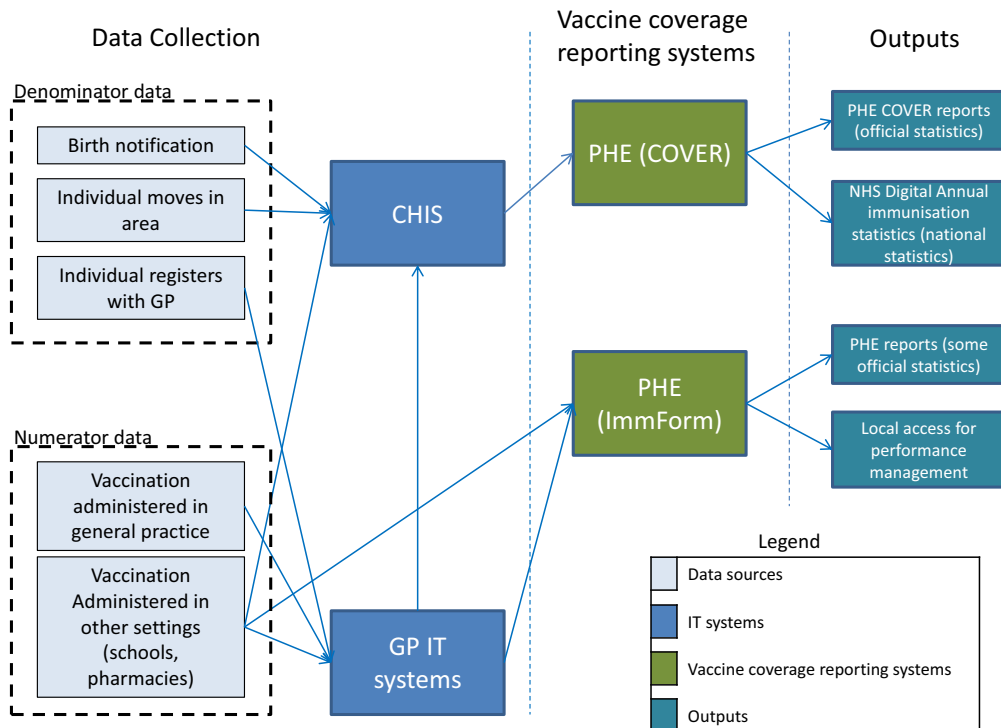
Abbreviations: CHIS: Child Health Information System; GP: General practice; COVER: Coverage of vaccination evaluated rapidly; PHE: Public Health England