Monitoring population health using routinely recorded family practice clinical data. Evaluation of a sentinel surveillance system in Auckland New Zealand.

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Introduction

The Auckland Regional Public Health Service (ARPHS) provides public health surveillance for the greater Auckland region in New Zealand. The region is made up of 7 districts or cities with a combined population of 1.25 million.

The introduction of electronic systems for doctor reimbursement has resulted in almost universal computer use by family physicians in New Zealand. As well as using computers for office management, most family physicians, or general practitioners (GPs), use computers for at least part of the patient clinical record. Most GP clinics also have, at least, dial-up connectivity to a secure wide area network for transmission and receipt of data such as laboratory results. A smaller number of doctors routinely record patient consultation details using standardised terms and associated codes. Doctors assign codes to summarise their assessment of patient problems or, less commonly, to document clinical features.

This trend within family medicine created an opportunity for ARPHS to develop a sentinel surveillance system. The system (GPSURV) monitors community incidence of specified acute conditions and doctor visit rates for some common chronic conditions. ARPHS undertook a pilot study with 27 volunteer GPs drawn from 9 clinics or practices during 2000 and 2001. Data from the first three months were evaluated to assess internal validity and the usefulness of feedback reports. External validity was assessed after 12 months data had been collected.

Objectives

This paper summarises the evaluation of the GPSURV pilot. The evaluation aimed to measure the following components of internal validity and data quality:

- Completion of data capture
- Validity of methods used and assumptions made to define illness episodes and denominator populations
- Impact of participation in the project on self reported assessments of data quality.

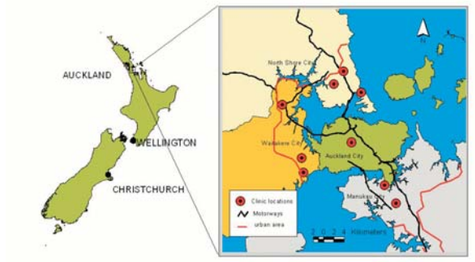
The study also attempted to assess the external validity of influenza like illness reporting.

Methods

System overview

GPs from nine clinics were recruited via umbrella organisations. Clinics were chosen because the doctors working in them routinely used standardised terms (Read version 2) in patient records. The practices were distributed across four cities but locations were non-random and only one clinic was located in the central Auckland city (Figure one).

Figure one: GPSURV clinic locations



Read (version 2) terminology incorporates a conceptual hierarchy within its coding system. More specific examples of general concepts use codes that incorporate the parent concept code. For example the code for "viral gastroenteritis", A07y0.00 includes the first two characters of the code for the parent concept "intestinal infectious diseases" A0.00.

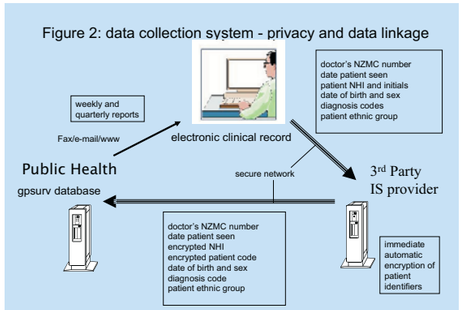
While not ideal, the Read hierarchy can be used to specify syndromes for surveillance. Three acute clinical syndromes and four chronic diseases were chosen for the pilot and doctors were provided with case definitions and recommended codes (table 1). Doctors were advised to record either the specified "parent" code or a more specific instance of the parent term as clinically indicated.

Table 1: GPSURV Acute conditions and definitions

Condition	Read code	Definition
Gastroenteritis	A0.00	>3 loose stools/day or vomiting starting within last 5 days AND Not attributable to any non-infectious cause
Influenza-like-illness	H27.00	Acute URI with abrupt onset and 2 of: fever, chills, headache and myalgia
Skin and subcutaneous tissue infection	M0.00	Any presumptive bacterial skin infection including: superficial involvement – eg folliculitis and deep involvement eg cellulitis

Data were uploaded daily from the clinic via a secure network (figure 2). Patient identifiers were encrypted by an independent third party prior to data transfer to the GPSURV database. Encryption enabled data for matching individuals to be linked while maintaining patient privacy. Record linkage allowed initial visits to be distinguished from follow-up visits using an algorhythm based on between visit intervals. Where the same patient and health problem recurred within less then 8 weeks of a previous visit the consultation was categorised as a "follow-up" visit. All subsequent visits for chronic diseases were categorised as "follow-ups".

Figure 2: data collection system - privacy and data linkage



Denominator populations were defined as "active" patients and were based on counts of unique individuals seen by participating doctors in the previous two years.

Four reports were produced. Doctor-specific reports, comparing illness occurrence at their clinic with general trends, were produced on a weekly and quarterly basis. Reports aggregating data to district level, for general distribution, were produced at the same time intervals. An example of a general weekly report is shown below.

The Auckland Weekly GPSurv Report

Report for week ending: 30/12/2001 Week No: 01 – 52

Acute Illness - Incidence Rates* Last Week

Disease	District				Auckland region
	Central	West	North	South	
Gastroenteritis	0.0	0.0	8.0	57.7	20.3
Influenza Like Illness	0.0	0.0	0.0	0.0	0.0
Skin and Subcutaneous Tissue Infection (under 15 yrs)	0.0	23.3	0.0	263.3	123.1

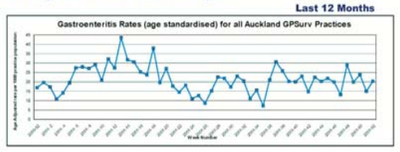
* Cases per yr per 1000 practice population and age standardised (except skin and subcutaneous tissue infection) to total Auckland population.

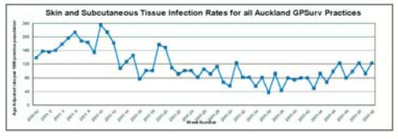
Chronic Illness - Visits per GPSurv Doctor Last Week

Disease	District				Auckland region
	Central	West	North	South	
Asthma (Under 15 yrs)	0.0	0.0	0.3	1.8	0.5
Asthma (15 yrs & over)	0.0	0.7	0.8	1.5	0.7
Chronic Obstructive Pulmonary Disease (40 yrs & over)	0.0	0.0	0.3	1.3	0.4
Congestive Heart Failure (50 yrs & over)	0.0	0.0	0.3	2.0	0.5
Diabetes (30 yrs & over)	0.2	0.2	1.9	1.5	0.9

Weekly Disease Incidence Graphs

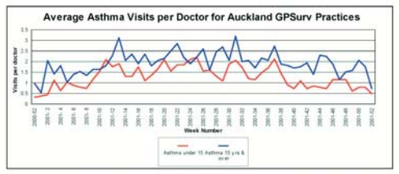
Last 12 Months

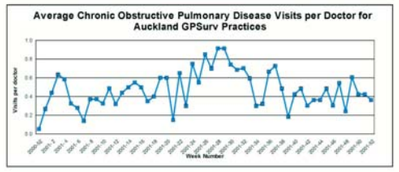




Weekly Prevalence Graphs

Last 12 Months





Evaluation methods

The pilot was evaluated by: conducting surveys of participating doctors before and after the initial 3 month period, by analysing collected data, and by comparing GPSURV data with other datasets. A special extract of patient records was used to collect prescription data and data concerning active patient counts for different time periods.

Before and after surveys asked doctors to estimate proportions of patient visits for which they recorded a standardised term (as opposed to free text) by disease and consultation type (i.e. initial and follow-up). The follow-up survey also asked doctors to rate the usefulness of feedback reports.

Completion of data collection was also assessed by comparing medicines prescription data with consultation data. Prescription data were used to estimate the prevalence of patients with diabetes mellitus and asthma for each participating doctor. These data were then compared with prevalence estimates based on consultation data.

The appropriateness of the 8 week between-consecutive-visit interval, for identifying new illness episodes for the same health problem, was evaluated by examining the distribution of between visit intervals for matching patient records.

The impact of counting "active" patients for different time periods was assessed by collecting the total number of individuals seen at the clinic over 6, 12, 18 and 24 month time periods.

Results

Self-reported coding compliance

Twenty-two doctors completed a survey after three months of participation. Seventeen of these doctors had previously returned a baseline survey. Both surveys showed variation in the degree to which doctors reported using standardised terms, according to health problem and type of consultation. Self-reported coding compliance was arbitrarily defined as recording codes for 90% or more of patient visits. In general compliance, reported for the three month pilot, was better for chronic diseases than acute syndromes. Of the acute syndromes skin and subcutaneous tissue infection had the greatest compliance (71% of doctors) while influenza-like illness had the least (48% of participants). In contrast 95% of participating doctors reported compliance with code recording for first visits associated with diabetes. Follow-up visits were less likely to have codes recorded for both acute and chronic conditions.

Comparison of self-reported compliance with baseline compliance showed a mixed picture with increases, no change, and decreases in coding all reported. The number of participants was too small to test any trends statistically. However, there were more doctors reporting increases in compliance than decreases for all acute conditions.

Chronic disease prevalence

Comparison of prescription based prevalence estimates with consultation data showed the ratio of these two prevalence estimates varied by doctor. For asthma, the ratio of consultation to prescription based counts varied from 12% to 132% and for diabetes the ratio varied from 0 to 200%. The overall consultation data based estimate of asthma prevalence was 52% of that obtained from analysing prescriptions data and 84% for diabetes.

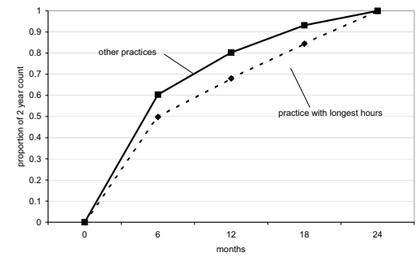
Definition of follow-up visits

Analysis of pairs of consecutive encounters (for acute conditions) showed most "follow-up" visits were for skin infections. Of these 82% occurred with 14 days of the previous matching encounter. Only three matching visits for any acute condition were recorded more than 8 weeks after the previous encounter although only 3 months of data were analysed for matching pairs.

Denominator populations

The size of the active patient population increased with the period of observation as would be expected. The relationship between count and time period was non-linear and the rate of increase reduced with increasing count duration. The most marked reduction occurred at 6 months when the active patient count was 60% of the count based on a 24 month period. The slope of the curve was increased in clinics with longer opening hours suggesting these clinics serve less stable populations.

Figure 3: Active patient counts by period of observation



Feedback reports

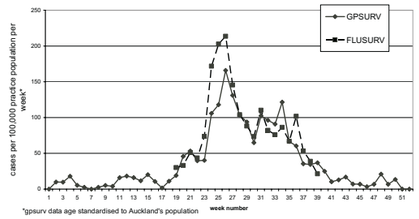
Survey respondents were asked to rate the four reports produced. Reports were scored according to usefulness, interest, frequency read and impact on data quality. Quarterly doctor-specific reports were more useful, more interesting and more likely to be read (100%) than weekly individual doctor reports (36%). While generally not read each week the weekly reports did however serve to remind some doctors (32%) of the need to record Read codes and to detect problems with data collection or transmission. General distribution weekly reports were regarded by participating doctors as being more useful and relevant to public health than for their own clinics. Of those who read the general quarterly report (19), 17 found it interesting.

External validation

Weekly influenza incidence rates were compared with rates as measured by a separate surveillance system. FLUSURV collects data from another network of volunteer GPs using a manual data recording system. Participants in FLUSURV clinics are asked to keep a manual tally of patients meeting the WHO case criteria for influenza-like illness. Each week clinics are phoned by a public health clerical staff member to obtain data. Denominator data are based on doctor estimates of total patient population numbers. Only one clinic participated in both systems.

The result of this comparison is illustrated in figure two below. Despite being collected from a different network of clinics, incidence trends are surprisingly close. The incidence rates from GPSURV were age standardised which is likely to have reduced measured rates slightly.

Figure 2: Auckland Influenza-Like-Illness Incidence as measured by two surveillance systems (2001)



Conclusion

This study set out to examine the validity of measures of disease occurrence based on the collection and analysis of clinical data routinely recorded by a network of volunteer family physicians. The surveillance system was specifically designed to deal with problems inherent in primary care epidemiology.

The evaluation suggests that despite participant variability in data recording, and problems in defining denominator populations, the incidence of acute syndromes may be monitored successfully using data from selected general practice clinics. The sensitivity of this method will however be dependent on the frequency of the condition under surveillance and both temporal and spatial resolutions are limited by incomplete data capture. The provision of feedback reports appears to have a small but positive impact on data quality.

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