Public health surveillance in the Pacific: using EpiInfo for an information system

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Introduction

Reliable, timely and accurate data collection represents one of the major concerns for health professionals in the Pacific. To improve the effectiveness of public health activities, several strategies have been established within the framework of the Pacific Public Health Surveillance Network, including harmonisation of health indicators, development of relevant computer applications and training. In this field, we prepared teaching materials for a course on "The practice of public health surveillance in the Pacific". It includes the integrated use of ***EpiInfo6*** as a software package allowing for a common, flexible and reliable application for health information systems.

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The aim of the course and materials is to provide a framework for the region to adapt health information systems to specific priorities of disease and health surveillance, with the use of ***EpiInfo6*** as a computerized tool. It will enable the Pacific island countries and territories to provide necessary health information for national levels, and at the same time to address specific regional perspectives.

Training will include several sessions allowing for participation from all the Pacific island countries and territories. The objectives for the first round of training include familiarity with ***EpiInfo6***, the ability to produce records on a patient or on monthly summary reports. The second session will incorporate aggregation and normalisation of surveillance databases and further development of ***EpiInfo6*** applications giving the participants ownership through the design process. The reports produced will include analysis of health indicators and timely disease surveillance data.

Background

Several problems have been identified with the public health surveillance efforts in the Pacific region[1]. The indicators included in the surveillance list are largely determined by international agencies. While there is a reasonable amount of regional collation of surveillance data, the activity is not integrated to provide a comprehensive perspective of regional needs and priorities. Training programs - for quality data collection, their analysis and interpretation - at the national level are often not coordinated between training providers (e.g. universities, aid agencies), and may not address specific regional perspectives.

Furthermore, there is a heavy demand on the countries and territories to provide information on a large number of indicators requested in different formats by each of the agencies. The countries and territories concede that it is difficult to provide quality data with the high level of demands upon them, and that the data are therefore of limited usefulness in local and regional decision-making and action. At the same time the agencies themselves are aware of these limitations and usually tend to publish the data with the appropriate qualifications about the data quality.

To address these public health surveillance problems, the Pacific Public Health Surveillance Network (PPHSN) was created and formally established in Noumea in December 1996 at the "Pacific Island Meeting on Public Health Surveillance", co-sponsored by SPC and WHO[2]. The Public Health Surveillance and Communicable Diseases Control Section

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(PHS&CDC), part of the Community Health Programme (CHP) at the Secretariat of the Pacific Community (SPC) is the focal point of the PPHSN Co-ordinating Body .

The Network has five development strategies :

1. Harmonization of public health surveillance data and development of appropriate surveillance systems, including operational research;
2. Adaptation of training programs in public health surveillance and field epidemiology to local and regional needs.
3. Development of relevant and cost effective computer applications, mainly using ***EpiInfo6***;
4. Promote the use of e-mail, extend it to new clients, new services, and link with other networks; and
5. Publication of timely and accurate health information, including early warning messages on outbreaks of disease, bulletins, articles publicizing the work of the network members, monographs, etc.

Training workshops in public health surveillance

As part of PPHSN activities, the overall objective of this workshops is to reach at a critical mass of health professionals with common abilities (tools and methods) for public health surveillance. To reach this goal through developing local expertise, public health surveillance training should be integrated into medical/paramedical curricula, graduate training in public health, and continuing education.

To first address the option of continuing education, the PHS&CDC section decided to organise two separate week-long training workshops in public health surveillance and related use of ***EpiInfo6*** software over a period of two years, for 4 sub-regional groups of Pacific Island countries and territories (PICTs), according to the language spoken and the geographical situation. Each PICT nominates three participants per country; they should be health professionals working primarily in the area of public health surveillance (doctors, epidemiologists, medical statisticians, nurses, health inspectors or clinicians).

The objectives of the two week-long sessions are to:

- introduce participants to public health surveillance.
- introduce participants to the use of ***EpiInfo6*** software for public health surveillance.

At the end of the first week of training, the participants should be familiar with the concepts of public health surveillance, methodology for selecting communicable diseases and priority health indicators for surveillance, and some of the skills needed to use ***EpiInfo6*** for surveillance. The second week will target advanced use of ***EpiInfo6*** in public health surveillance practices and the further development of surveillance systems.

As the second week-long session is a continuation of the first one, the countries and territories are requested to commit themselves to sending the same people to both sessions.

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Through their modular aspects, the present training workshops may easily be adapted and used for the medical/paramedical curricula and graduate training in public health, especially in the context of distance education strategy using Internet media. They do not only refer to the 2nd PPHSN strategy listed above (training), but also to the 3rd one (computer applications in ***EpiInfo6***).

Development of an EpiInfo6 application

It was the assignment for a student, on attachment at SPC, and carried out under the supervision of PHS & CDC technical staff.

The goal of the assignment focused on presenting ***EpiInfo6***, a relevant and cost-effective software package, as a training tool that could be easily adapted by any Pacific country or territory to fulfil their unique requirements for data collection.

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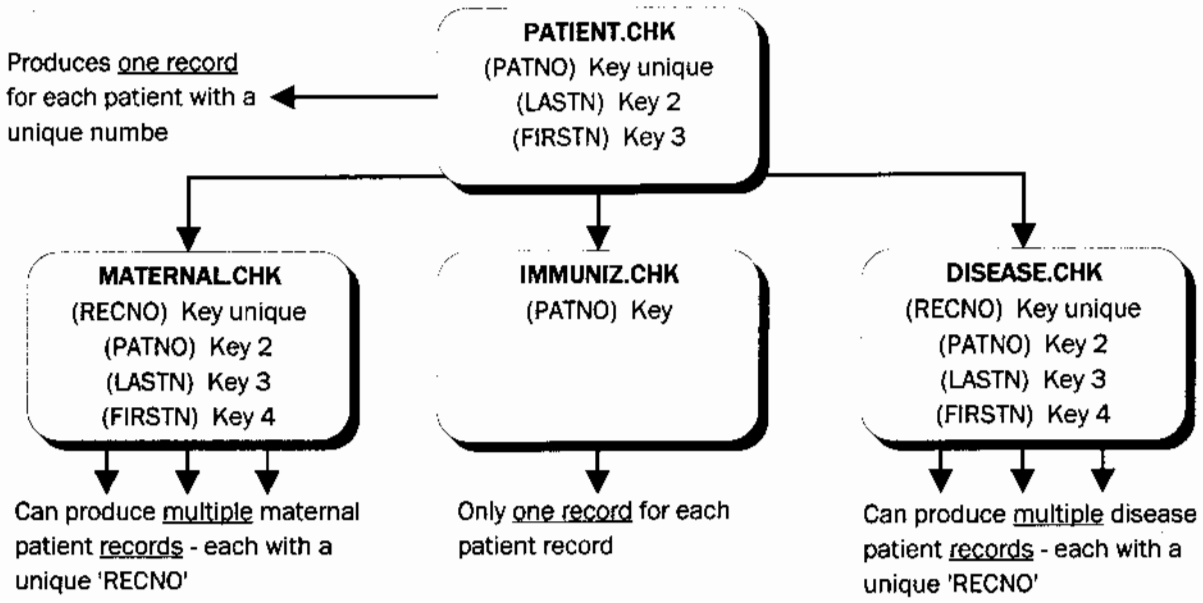
EpiInfo6 was chosen by PPHSN as the computer application for the following reasons:

- It is a freeware and can be either received by disk, CD or downloaded from CDC or other sites through Internet;
- Any DOS based computer system can accommodate the program;
- Many different Pacific health professionals are already using the program, therefore there is some familiarity with the program itself; and
- There is an e-mail based discussion list (run by CDC from USA) where ***EpiInfo6*** users can get help and answers to their ***EpiInfo*** problems.

Figure 1. EpiInfo check files



The Patient Records' check files demonstrates the following features of EpiInfo6: KEY and KEY UNIQUE, RELATE, AUTOSEARCH, SOUNDEX, MUSTENTER, CODEFIELD and CODES, LEGAL and COMMENT LEGAL, RANGE, REPEAT, HIDE / UNHIDE, BEFORE, AUTOJUMP, IF/THEN/ELSE statements.

Another advantage is ***EpiInfo6***'s ability to now be able to import and mainly export different formats of data allowing the flexibility to have data either incorporated into ***EpiInfo6*** or translated from/to data on other programs.

In order to design an effective training tool with the use of ***EpiInfo6***, there was a requirement for the student to develop a deeper understanding of disease surveillance and health indicators needed for such a diverse population as exists in the Pacific. Reviewing the proposals and strategies outlined by PPHSN, by surveillance reports from many Pacific communities and by SPC documentation and guidelines for disease surveillance, a base of information on many features already incorporated in existing reporting systems of disease surveillance throughout the Pacific communities came to light.

One major challenge that existed was the diversity of not just the populations, but the diversity of computer skills, systematic data collection and methodology applied to different skill levels. Presenting a training tool that suited novice, intermittent and knowledgeable users required an approach to interfacing a system that captured the interest and understanding of such a diverse group.

An opportunity arose for a field trip to Honiara, in the Solomon Islands, where a group of Malaria Controllers were being trained on an ***EpiInfo6*** application designed for them to capture and use data in an electronic format rather than their existing paper-based reporting system. The trip provided the student with exposure to two major aspects that assisted in the further development of the training program; it provided the opportunity to assist in training of the Malaria Controllers, giving the student hands-on experience of the acceptance of computer systems, and the enthusiasm in which they approached technology, and to visit clinics, hospitals and the Ministry of Health to better familiarize with the way in which data was collected, processed and used within the Solomon Islands. This became a crucial turning point in student's understanding of how data is acquired and utilized, and enabled the student to visualize a training tool in which pertinent, realistic and obtainable data could be collected, allowing for an analysis of the data to be relevant to the trainees.

The program presented itself as challenging for the student, a novice ***EpiInfo6*** user, and required some difficult programming techniques. This in turn presented a situation in which the need for a complete documentation package for the training was apparent, since the goal was to design an application which the trainees could use as-programmed by portion, or re-develop themselves to adapt to their own needs. The documentation package includes all the programming, accompanied by explanations of what it accomplishes and what errors may occur if there are changes made to the programming commands.

The Health Indicators and Disease Surveillance (HIDS)

EpiInfo6 training application has been designed as a database system, incorporating data which can be captured on a patient and individual or monthly and aggregated basis.

Patient Records (consisting of the files: Patient questionnaire, Maternal questionnaire, Immunization questionnaire and Disease questionnaire, all with an associated check file) have been developed to build a database of patient records which are uniquely identified by ***EpiInfo6*** for each new patient entered. The Maternal, Immunization and Disease records are joined as separate tables by the unique identifier, using the Relate commands.

The different features of the check files[2] have been used and re-used in different locations of the program to provide the trainees with exposure in the use of the programming techniques.

Patient data has been incorporated to allow the trainees to experience how the commands react to each other and how individual data can be collected to produce results for reporting on Communicable Disease Surveillance (through the Disease file) Maternal/pregnancy indicators (through the Maternal file) and Immunization rates (through the Immunization file). All data collected is used for the final reporting schemes in order for the trainees to develop an understanding in how the data collected can be used to produce reports or statistics needed for their community. The patient records have been designed to collect data from clinics, regrouping the clinics by district.

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The monthly data reporting questionnaire is designed for the collection of aggregated data from individual clinics on a monthly basis. The questionnaire covers disease surveillance, immunization, maternal care, births and deaths for each reporting clinic. The introduction to aggregated data is featured in the reporting segment and the goal focuses on models of reporting forms used presently by the communities. As examples, and similarly to the individual Patient Records, the data that is represented incorporates suspected diseases that can be assessed in a health clinic and trigger a public health (re)action; it does not include confirmation of diseases through further lab tests; immunization data allow the calculation of the immunization coverage for the routinely-used vaccines; maternal care data target the antenatal and postnatal coverage, and an attempt has been made to capture data for the age of the birth mother to provide health indicators on teenage pregnancies. Birth data includes the number of live and still births and mortality data include all and pregnancy-related deaths.

From the data produced in both the patient and monthly reports, a series of health indicators can be examined. These indicators are summarized through the reporting functions of ***EpiInfo6*** which have been incorporated in the HIDS program, and are a direct result of the chosen data collection methodology. They are viewed as accurately attainable data and can show the trainees the possibilities that exist in capturing the data and being able to analyze and apply it to the final reporting system, producing disease surveillance and health indicator reports for further examination.

EpiInfo6 does present itself with some stability issues, especially in a database design. The program itself, although able to achieve this design, may not be stable if there is large data storage capability incorporated. A suggestion would be to capture the data through the questionnaire files in ***EpiInfo6***, then provide for storage in other programs such as EXCEL, ACCESS or SPSS to provide a more stable, secure and efficient data storage and retrieval system. The program does however offer many functions, through the MENU system, to customize the screens, add in pop-up lists, validate functions and present error messages, all of which can be suited to the needs of the users. The functions that have been used in the HIDS program through the menu file are all documented and possible errors are outlined. This should enable trainees with the ability to customize their own programs, a key to providing a sense of ownership to the program, which in turn should facilitate the successful incorporation of this technology into their health care systems.

The workshops

The workshops starts with a discussion on the 'surveillance wheel', i.e., for selected health conditions or diseases, recording, reporting, data analysis and storage, interpretation, information dissemination, decision-making and public health action(s).

After the participants have shared their different experiences with surveillance:

- a selection methodology for the identification of communicable diseases and health indicators to be under surveillance is developed by the participants; it is based on the 'PacSel' selection methodology already used in some of the PICTs and developed by PHS & CDC together with some members of the Pacific Public Health Surveillance Working Group (former name of the PPHSN Coordinating Body); this methodology was built up from the Canadian and USA's similar experiences[3];

- then an operational plan for surveillance is developed for some specific communicable diseases/health conditions (like fever of unknown origin or febrile syndromes), addressing all the steps of surveillance (i.e. identified on the 'wheel');
- data interpretation is focused by an exercise on communicable diseases secular trends, using historical data presented mainly on graphs without naming the diseases; the materials come from EPIET[3], and from SPC database.

The workshop is run as much as much as possible as group work, fostering interaction between the participants. All exercises are laid out as steps in surveillance development in a realistic public health framework, including the ***EpiInfo6*** exercises. They have been designed keeping in mind the purpose of surveillance.

One key point of this assistance will be to have a pool of *EpiInfo6* experts who know as well the HIDS application used as a training and reference tool for the development of locally tailored *EpiInfo6* applications in the PICTs.

The part of the workshop on ***EpiInfo6*** takes approximately half of the time and mainly consists of exercises. During the first week of the training, a guided introduction to ***EpiInfo6*** is respectively followed by the creation of a data entry form for routine surveillance of communicable diseases, the presentation of the ***EpiInfo6*** training application HIDS (described above), sessions on a data entry, "Check" command in ***EpiInfo6***, data analysis and basic programming for data analysis and the "Menu" design possibilities with ***EpiInfo6***. A preliminary introduction to computer science, based on a training module designed by SPC Information Technology Section, is also foreseen for those participants who never have touched a computer.

During the second week, participants will be trained in data aggregation and the use of aggregated data, normalisation of surveillance databases, as well as in the programming of reports and the development of applications using HIDS and ***EpiGlue***.

Future perspectives

The second training session will allow SPC's PHS & CDC to have a feedback about the impact of the training on participants activities. According to what has been achieved or is planned to be done in-country, an assistance will be provided by SPC and the PPHSN.

One key point of this assistance will be to have a pool of ***EpiInfo6*** experts who know as well the HIDS application used as a training and reference tool for the development of locally tailored ***EpiInfo6*** applications in the PICTs. Some potential members of this pool of people have been already contacted, and were quite enthusiastic about the concept.

EpiInfo6/HIDS discussion list similar to the one run by CDC, but focusing the Pacific and having people with a similar reference background (the actual training workshops) hooked up.

The feedback from the participants and the evaluation of the training materials during the workshops provides an opportunity to improve these materials and the way the workshops are run, preparing the way for adapting them and incorporating them into medical/paramedical curricula and postgraduate training, within the framework of the regional training development in public health surveillance[4]. This framework is now being discussed with the Fiji School of Medicine and other training institutions of the Pacific region.

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