A method for active surveillance of selected communicable diseases

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Abstract

In 1991, an initiative was launched in the Western Pacific Region of WHO to eradicate poliomyelitis by the year 2000. Confirmation of eradication requires a certification process, in which specific criteria must be met. A hospital-based surveillance system was developed. It was sensitive enough to detect, at least one case of acute flaccid paralysis (AFP) per 100,000 children under age 15 per year, which is considered the "background rate" of AFP. This system was instituted in 1997 in most countries in the Pacific, and included measles and neonatal tetanus as well as AFP. By mid-1998, 53 hospitals in the Pacific were submitting monthly forms indicating whether or not AFP, suspect measles, or neonatal tetanus had been seen in the preceding month. Compliance was excellent, with over 80% of forms submitted to WHO in 1998, thus meeting the certification standard. In 1999 a proposal was made to expand this method, in selected countries, to encompass most conditions presenting with acute fever plus rash, thus including, for example, cases of rubella and dengue. Important aspects of such surveillance include the capacity to confirm diagnoses in the laboratory, and to take effective public health action. A coordinated laboratory network had been established previously for virological analysis of stool specimens for conditions causing AFP, but laboratory support for other conditions is currently the responsibility of individual hospitals to arrange.

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Introduction

Communicable disease surveillance in the Pacific, and elsewhere, is primarily passive; that is, it depends on the initiative and compliance of front-line health workers in submitting reports of selected communicable diseases to a central authority. The notifiable diseases subject to reporting are typically identified on an official Ministry/ Department of Health list. The reporting itself usually involves either submission of a written form identifying patients with notifiable diseases; or a weekly or monthly tally from patient registers; or, in the case of selected "urgently-notifiable" diseases, a telephone call or other rapid communication to the central authority.

In contrast, an active system of surveillance is distinguished by the regular solicitation of reports, in which someone from a central authority actively pursues the information on a regular basis, rather than waiting passively for the front-line health workers to submit the information.

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Whether passive or active surveillance (or both) is in use, public health benefits accrue only if effective and timely action follows. The incoming information must be analyzed (at least by basic tabulation), interpreted, and acted upon whenever certain action thresholds are reached.

Passive surveillance, while simple, is widely recognized to result in significant under-reporting, and often delayed reporting, of most conditions. This is not necessarily a problem, as long as the system remains stable, functions smoothly, and results in action. For some situations, however, passive surveillance is inadequate, either because of its insensitivity and delay, or because it remains impossible to distinguish between a failure to report and a "zero report".

Fig. 1. Monthly AFP Surveillance Form

GUAM MEMORIAL HOSPITAL – E1
Agana, Guam

_____ 1999

Hospital Coordinator: Tom Knott
National Coordinator: Ronald Balajadia

Since the last time you signed this form, are you aware of any of the following?

Name	Date	Signature	AFP* Yes	AFP* No	Suspected measles Yes	Suspected measles No	Neonatal tetanus Yes	Neonatal tetanus No
Paula Brinkley								
Lucy Cruz								
Robert Leon Guerrero								
Anna Mathew								
Tom Nixt								
Bernard Wolf								

*NOTE: AFP = acute flaccid paralysis in a child < 15 years old, or suspect poliomyelitis at any age.

If a child with AFP is seen, the case should be **reported immediately** to the National Coordinator / Hospital Coordinator for further work-up, without waiting to report on this form.

Give details of all "Yes" responses on reverse side of this form including: name, hospital number, age, sex, residence, history with symptoms and physical exam, and follow-up.

Has the Hospital Coordinator reviewed this month's pediatric inpatient hospital log for possible cases of AFP?	Yes: ___	No: ___
Has the Hospital Coordinator reviewed any other relevant logs or registers this month for possible cases of AFP?	Yes: ___	No: ___
Are there any cases of AFP recorded in these registers, but not reported above?	Yes: ___	No: ___

Hospital Coordinator: Mr Tom Knott Date: / /

National Coordinator: Indicate date this form was received: ___/___/___
Forward copies of forms to WHO at least every 3 months.

The eradication of poliomyelitis: the role of acute flaccid paralysis surveillance

The Western Pacific Region (WPR) of WHO, which includes the Pacific islands and much of Asia, declared its intention in 1991 to eradicate poliomyelitis by the year 2000. In the Americas, polio was eradicated, and certified as such, by 1994. The WPR is expected to be the second of WHO's six regions to achieve this status, a further milestone on the way to the very significant goal of global polio eradication. Only one other disease – smallpox – has ever been globally eradicated.

In order to take a public health step of such magnitude, it will be crucial to be certain that the poliovirus is indeed eradicated from the world. It would be a public health disaster to stop polio immunization worldwide, only to discover that poliovirus still threatened the human population. Therefore, a Global Certification Commission on Poliomyelitis Eradication determined that, if every country in the world could demonstrate compliance with a stringent set of certification criteria, the Commission could safely certify that poliovirus is gone. These criteria include, importantly, a comprehensive surveillance system in which there is a high degree of confidence that acute paralytic poliomyelitis would not be missed should it occur.

Fortunately the most outstanding clinical feature of polio, acute flaccid paralysis (AFP), is seen in only a few other conditions, and these occur at a known background rate in children throughout the world (approximately one case of AFP per 100,000 children under age 15 per year). Therefore, if a surveillance system is sensitive enough to pick up this background rate of AFP, and investigations are done to demonstrate that polio is not the cause of the AFP, this would satisfy the surveillance criteria.

Existing passive systems were clearly inadequate to accomplish this. In the first place, AFP is not normally considered a notifiable disease. Even if it were, the failure to report AFP (i.e., a surveillance failure) could not be distinguished, under current passive systems, from an actual "zero report". AFP is an uncommon condition, and the surveillance system must be very sensitive, able to pick up almost every case. This was very unlikely using the existing passive systems in the Pacific, even if AFP were universally accepted as a notifiable disease.

Hospital-based active surveillance for AFP

The solution was to institute a system of active surveillance, focused on key hospital-based paediatric clinicians. The focus on the hospital was accepted because there seem to be very few situations in the Pacific in which a child with acute onset of unexplained paralysis (a dramatic and alarming condition) would fail to be admitted to a hospital, or at least to come to the attention of the hospital-based paediatric clinicians. The focus is on children, although suspect polio at any age must be reported. In fact, many of the "key paediatric clinicians" are general clinicians, and see adults as well as children.

Active surveillance is accomplished by naming a hospital coordinator, who ensures that each key clinician signs a form every month verifying that no cases of AFP have been seen (see Figure 1). This also constitutes "zero reporting". If a case of AFP is seen, the hospital coordinators and the key clinicians know that they must investigate immediately; most importantly by collecting and sending two stool specimens for analysis. The monthly forms accumulate, and become the documentary evidence that (1) the expected background AFP does occur in the Pacific; and (2) none of this is poliomyelitis. Principal features of this surveillance system are that it involves only selected clinicians, and their time commitment is a "minute a month", required to sign the form.

The goal of any sentinel surveillance is to have high-quality, complete, and timely surveillance at selected sites ..., thus losing comprehensiveness but gaining quality.

Hospital-based active surveillance has been in place in the Pacific for more than a year, and now involves 53 major hospitals and about 180 key clinicians in 20 Pacific island countries and areas. The response is very gratifying, with about 85% of the monthly forms (excluding Fiji) forwarded through the reporting chain to WHO in 1998. Since the beginning of 1997, AFP reporting and investigation has approached the levels required for certification.

Inclusion of measles and neonatal tetanus in hospital-based surveillance

From the beginning, this active surveillance included suspect measles and neonatal tetanus, as these two vaccine-preventable conditions are also targeted for eventual elimination or eradication. However, it was recognized that the sensitivity (or coverage) of this surveillance system would be less than that for AFP, especially in the case of measles, since many non-hospital measles cases will fail to come to the attention of the hospital-based key clinicians. Hospital surveillance may provide comprehensive coverage for AFP, but will miss measles seen at peripheral health facilities. For this reason, this same surveillance system may be considered a "sentinel" system for measles. The goal of any sentinel surveillance is to have high-quality, complete, and timely surveillance at selected sites (in this case, 53 hospitals), thus losing comprehensiveness but gaining quality. Sentinel surveillance can still be effective in outbreak identification, but it must be accepted that many individual cases will be missed. To find these cases, however, measles still remains on the notifiable disease lists in all countries via comprehensive passive surveillance.

Rash + fever surveillance: expansion of hospital-based active surveillance

The success of this active surveillance system has prompted consideration of its expansion. However in addition to operational concerns, expansion of surveillance is hindered by two things: (1) inadequate public health laboratory support; and (2) inadequate public health response to case reports. In the case of AFP, both of these are well addressed. The action steps are well-defined; and a stable and workable laboratory network has been established throughout the Western Pacific Region for stool investigation for poliovirus and other viruses. For measles however, laboratory support is currently left to individual hospitals or ministries of health to arrange.

Measles is characterized by the acute onset of rash and fever. Several other conditions result in rash and fever and, in the individual case, may be difficult to distinguish from one another. The range of conditions, and their frequency of occurrence, is incompletely understood in the Pacific but they include, importantly, dengue (with rash in a minority of cases) and rubella. Another common condition, chickenpox, is relatively distinct given the prominent vesicular nature of the rash.

Given the success of hospital-based active surveillance, and the current inclusion of measles, it is now proposed that this same system be expanded, where acceptable and appropriate, to all acute rash + fever (R+F) illnesses (excluding chickenpox). The goal would be to provide, through this sentinel network, additional reporting, improved laboratory support, and more effective public health action. Building on the protocols already established for AFP and measles in the current hospital-based active surveillance, methods, supplies, and channels for rapid diagnosis of key R+F illnesses would be encouraged and supported in the Pacific, with back-up support from Pacific rim country laboratories. The surveillance aspects would be closely linked to the existing sources of support

for public health action in the Pacific: PACNET, WPHNet, the Pacific Regional Vector-Borne Diseases Project, and the resources of regional support agencies including WHO and SPC.

Active surveillance as one surveillance option

This hospital-based active surveillance is intended to supplement, not replace, existing passive surveillance. That is, notifiable disease reporting of measles, dengue, rubella, etc, would continue in each country through the system currently in place; but in addition, this sentinel network of about 180 clinicians would provide "zero reporting" for acute R+F. As experience is gained it may prove the case that a particular condition, like AFP, can be completely handled by such active surveillance, in which case routine passive surveillance for that condition in a given country could cease. Alternatively it may be seen that, for a particular condition, active surveillance fails to supplement the current passive surveillance. Or passive surveillance itself may change, for example to focus on syndromes such as fever, rather than specific conditions; or to better incorporate laboratory-based reporting of selected conditions. Should active surveillance continue to prove workable, it could be expanded to include other conditions, or perhaps other surveillance sites or key clinicians. In general, this may be viewed as an incremental process, drawing on the range of surveillance options available, mixing them in the optimal way to include the diseases of highest priority, and tailoring the mix to the individual country situation.

This proposed expansion is not necessarily meant for every hospital in every country. There is no point in interfering with a well-functioning surveillance system for important rash/ fever cases where such a system exists. Instead it is proposed that a few self-selected hospitals incorporate R+F surveillance, with its laboratory and public health support, on a trial basis. A draft protocol has already been developed for this purpose. Should this prove workable and effective, other hospitals may then wish to adopt R+F surveillance, and perhaps even to expand active surveillance to include other conditions. At the same time, this initiative may contribute to the further development of a public health laboratory network in the Pacific.

Conclusion

A public health surveillance system in any country must consist of the optimum mix, for that country, of the options available. These may include passive surveillance involving all clinical health care workers, laboratory-based surveillance, programme-specific disease reporting (e.g. tuberculosis), inpatient and mortality data, sentinel surveillance, and periodic surveys.

Hospital-based active surveillance is now an established and proven surveillance mechanism for AFP (to verify poliomyelitis eradication), and appears useful for measles and neonatal tetanus as well. This deserves consideration for expansion to include other diseases or syndromes. Replacing measles with more generic rash + fever surveillance is proposed as a next step.

In any country, the goal must be to obtain the maximum amount of useful surveillance data while imposing the minimum burden on data providers. In many countries, this may involve shifting some of the surveillance burden away from front-line health workers now faced with many passive reporting requirements in addition to the clinical case loads they bear. The challenge lies in finding the optimum mix for each country among the options available. Hospital-based active surveillance should be considered among these options.

References

Available from the author on request.

Clinician: Learns less and less about more and more until he knows nothing about everything.

Researcher: Learns more and more about less and less until he knows everything about nothing.

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