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History and Present State of the Infectious Disease Surveillance and Reporting System for Schools in Taiwan

Abstract

According to statistical documentation of the Center for Disease Control of Taiwan (CDC-Taiwan), there were several rather severe outbreaks of infectious diseases, which occurred at various schools in Taiwan over a one-year period beginning in September 1993. Since elementary schools are places of high population density and individuals of lower resistance to disease, if one individual is infected, the outbreak of a disease can easily reach epidemic proportions. For the purpose of effectively detecting the start of infectious disease on school grounds and swiftly arresting or controlling it, CDC-Taiwan launched the "School-based Surveillance System"（SS）and started promoting it among all public elementary schools across the country. So far, 448 schools have signed up to take part in the system, and in February 2004 the SS joined forces with an existing "Student Health Information Administration System" of the Ministry of Education. Then the system took advantage of an Internet online reporting approach to reach a set goal of digitalizing information management as well as speeding up the process of such infectious disease monitoring.

The main disease targets of this SS are those apt to become prevalent on school grounds. The system has so far accumulated in its files relevant data over the past two consecutive years, which enables us to have a preliminary set of incident rate curves of various infectious diseases in established school circumstances. For instance, the incident rate curve of influenza-like illness(ILI) diseases shows that such a rate on school grounds reaches a peak a few weeks after the end of winter school vacation (the 8^{th} to 14^{th} week of the year), which looks quite different from a similar chart for the general public (with a peak located between the 2^{nd} to 5^{th} week) as a survey result by the “Sentinel Physician Surveillance System”（SPS）. Incidentally, the SS is not active during both summer and winter school vacations for obvious reasons, so our SS data were left blank in these two periods. However, as to chickenpox surveillance, results from the two surveillance systems resemble each other fairly closely. Another example is that the incident rate curve of enterovirus among school children established by the SS displayed a maximum prevalent period starting from the 18^{th} to the 20^{th} week (equivalent to late April to early May) of the year, which coincides exactly with the results gathered by the SPS.

Introduction

A stationary school surveillance system adopted in Colorado, USA [1], and relevant Japanese research [2, 3] have both indicated that school-based surveillance can effectively predict the onset of flu outbreaks. And by looking at the variation in school absentee rates, it is possible to appreciate the advent of an outbreak in advance and quickly respond by taking necessary measures to prevent the outbreak from spreading. The results of a South Korean study indicate that school surveillance is a rather simple, flexible, specific, and sensitive kind of infectious disease surveillance and reporting system [4]. Meanwhile, the government of Oman [5], a Persian Gulf State located on the east end of the Arabian Peninsula, systematically collects infectious disease information from their pupils at schools, which effectively reflects the overall picture of infectious disease prevalence for the populace at large for the purpose of their epidemiological analyses. And the data they have gathered are treated as a reference indication for assessment and execution of disease preventive measures. Therefore, being on the alert out for infectious diseases taking place on school grounds may play an important role in avoiding further dissemination of disease to other family members or neighboring communities and preventing larger epidemics. Thus we can see that the establishment of such a diversified school infectious disease surveillance and reporting network, or SS system, provides an excellent alternative monitoring channel. It provides as well, a complementary addition to the existing legal system, that of mainly relying on reports submitted by physicians [6], to increase and further improve the overall efficiency of the infectious disease surveillance and reporting system. In short, a school surveillance and reporting system can spot disease outbreaks in their early stages, so the health authorities can respond swiftly with appropriate preventive measures. Also at the same time, it can be incorporated into the school's health education curriculum in order to achieve our ideal goal of effectively keeping infectious diseases at bay and allowing every school child to have a clean bill of health.

In order to better grasp the trend and direction of activity of infectious diseases, CDC-Taiwan launched a pilot project called “Infectious Disease Surveillance and Reporting System for students in Taiwan” (School-based Surveillance or SS for short) in 2001, in addition to the on-going, already long established “Sentinel Physician Surveillance System” as required by law [7].

The new project from its initiation singled out elementary school pupils to be its reporting subjects due to the following considerations: 1. Elementary school pupils are in general more vulnerable to infections because their disease resistance is lower than members of other age groups. 2. Since elementary school education is compulsory in Taiwan and attendance approaches 100%, the representation of such an age group is unlikely to be better. 3. There is at least one elementary school located within the boundaries or in the vicinity of each and every town or rural area throughout Taiwan, and the vast majority of students live nearby the schools they attend, so whatever happens to them is very highly representative geographically. 4. Elementary school pupils belong to a particular age group, which is most vulnerable to a variety of certain infectious diseases such as influenza, hand-foot-and-mouth disease or herpangina, chickenpox, mumps, diarrhea, scarlet fever, etc. These diseases are prone to deteriorate into large-scale epidemics on school grounds if appropriate intervening measures are not taken quickly. 5. The average family in Taiwan, today usually has only 2 children, and parents are more deeply concerned about the health of their school age children than ever before. 6. If children become infected at school, they would usually bring the disease back into the home and cause secondary transmission to their family members and neighbors [8, 9]. 7. Most elementary schools in Taiwan do have a health center staffed with a school nurse who can readily help pupils with hygiene and health related matters. In comparison, an average junior or senior high school student behaves much more independently and with much less restriction from both family and school; they are also easily influenced by the prevailing liberal social trends; the reliability of their absentee rate is believed to be not nearly as good as that of an elementary pupil [10, 11]. That is why we have not included junior and senior high school students as reporting subjects.

Materials and Methods

Subjects and duration

A preliminary pilot project of the SS was carried out between February and July 2001 at 95 elementary schools in Tainan County and Kaohsiung City. Then in the same months of the following year, another similar but expanded trial was carried out in four geographic sections of Taiwan, namely the northern, central, southern, and eastern areas, with five selected elementary school from each area. In January 2003, the project was expanded again to cover all 25 counties and cities with a total of 134 elementary schools taking part. One month later, every education bureau of the 25 county (or city) governments was asked to recommend at least one voluntary public school from every single town, rural area, or district within its jurisdiction to participate in the project. This resulted in a total of 448 participating schools (which account for about 17% of the grand total across the country). From February 2004 onwards, the SS merged with the "Student Health Information Administration System" of the Ministry of Education and started to take advantage of on-line reporting through the Internet. It was then decided that the data collecting and analyzing period would be designated as the period from September 2002 to June 2004. The reason behind such a decision was that, although there was some data reported from the SS reporting collected prior to September 2002, it was limited to only a few counties and cities. In order to maintain the inclusiveness and consistency of the file, the data collected from February 2001 to June 2002 was not included in our statistics.

Method of surveillance and procedures

The diseases to be reported in the SS include: influenza-like illness, chickenpox, mumps, hand-foot-and-mouth disease or herpangina, diarrhea, and other legally notifiable communicable diseases. From the 51^{st} week of 2002, in response to an outbreak of Dengue fever in the area of Kaohsiung City, Kaohsiung County and Pindong County, schools in Pindong County and City led the country by adding fever surveillance to the existing list for the first time. this was adopted by all other participating schools starting from the 9^{th} week of 2003. The operational procedure was set up, so that whenever a school pupil was suspected of having been infected with any influenza-like illness, chickenpox, mumps, hand-foot-and-mouth disease or herpangina, or other legally notifiable communicable disease, or displayed signs of diarrhea or fever, the pupil's class teacher was required to enter everyday the pupil's cause of illness, record of attendance and requests for sick leave into a weekly registration list for pupils suspected of being infected with communicable diseases. The completed list had to be submitted to the school health center by the end of the work day, every Friday[12]. Should the teacher find a pupil showing signs of possible infection with a legally notifiable disease of the more dangerous first group pathogens or with second group pathogens, the teacher was required to speedily notify the nurse at the school health center, and the latter should report to the local health authority immediately thereafter. With the exception of such rare urgent cases, the school nurse would duly collect the attendance record of every school class; the total number of sick pupils who attended school despite illness and those who took sick leave during that week would be totaled. Such reported information would be gathered and transmitted the following Monday through the Internet or e-mailed to the "Student Health Information Administration System" (Figure 1) of the Ministry of Education. The regional branches of CDC-Taiwan are responsible for conducting a statistical analysis on the weekly school reports of communicable diseases in their respective areas, and arranging for necessary investigations of unusual outbreaks. Then the Disease Surveillance Division of the Center gathers and compiles the regional school infectious disease data into nationwide statistics. This division is also in charge of setting up the SS and assuring the functioning of the system. The Ministry of Education and each Educational Bureau of county or city in Taiwan work together to create a recommendation list of schools participating in the SS and lend a hand in promoting the execution of this surveillance work. The health bureau of each county or city, on the other hand, is expected to assist with outbreak investigations and the implementation of disease preventive measures under the SS.

Results

Among the various diseases monitored by this system, the incident rate of influenza-like illness began climbing after the 49th week of 2002 and reached a peak around the 12th week of the next year. One year later (2004), however, the peak appeared in the 9th week instead (Figure 2). But the incident rate in 2003 was lower than that in the previous year. After the 18th week of 2003, all diseases under the surveillance of this system were on a fast decline. This is likely because between April and July 2003, there were epidemic outbreaks of SARS (severe acute respiratory syndrome) taking place in Taiwan [13, 14], which caused panic among the population. Education and health authorities in Taiwan jointly launched an aggressive informational and educational campaign, urging students not to attend school if feeling unwell and, in particular, if having a fever. They also enforced a strict policy requesting every student to have a temperature measurement before entering the school grounds, and if found to have a fever, the student was required to see a doctor right away. As regards the school incident rates of fever and diarrhea, they normally peak around the time when the school winter vacation has already ended but not too long after the new semester has started (somewhere in between the 8th and 10th week of the year). This is due to the fact that winter happens to be the most favorable season for outbreaks of gastroenteritis and infectious diseases. However, since the SS is not kept active during the school winter vacation, we don't have surveillance data for this particular period.

Other than the influenza monitoring effort in the SS, this Center has also two other sources, i.e. a stationary physician surveillance system and a contract laboratory reporting system (Figure 3). In a period from the 37th week of 2002 to the 25th week of 2004, the trends of the influenza-like infection incidence rate detected by these three separate surveillance systems turned out to be quite similar to one another, though the SS results revealed that the influenza infection period started in the 49th week of 2002, which is one week earlier than that shown by the SPS. The peak of occurrence of influenza-like disease, however, appeared normally around the 3rd to 4th week according to the SPS, while that, based on the SS data, turned out to be several weeks behind. This might be because the first few weeks of the year are in the middle of school winter vacation and thus no surveillance data in the SS were collected, so the peak did not emerge until schools reopened their doors and pupils returned. Incidentally, we have compared the incidence rate of influenza-like infections by geographic distribution and found that pupils residing in eastern Taiwan suffered from influenza-like illness at a much higher rate than their counterparts in any of the other three areas (Figure 4). Taken as a whole, the average incidence of influenza-like infections in the eastern Taiwan area was about 1.8/100, which is much higher than that of the other areas (Table 1). Through the F test, we found that there were significant differences ($P<0.01$) between the variation level of the eastern area incidence of influenza-like infections and that of the other areas. The reasons might include: the number of participating schools (29) being just about one third the number of each of the other three areas, a higher percentage of rural schools are among the surveyed eastern area schools, and those schools are normally quite small in size with just one classroom or two for each grade. What we are postulating is that the bond between teacher and pupil at such small rural schools is much closer and the teacher tends to be more familiar with and care for his or her pupils more solicitously. However, since several false alarms regarding outbreaks occurred, we also sensed that some of the teachers in this area did not quite understand the definition of the various notifiable diseases, which led to over reporting. For instance, teachers were apt to report a case of common cold as an influenza-like illness, which of course would give the false impression that the disease was more prevalent in the area. To avoid such mistakes from recurring, this Center will have to take further appropriate measures in that particular geographic area to improve teachers' comprehension of what a notifiable disease is.

Chickenpox is a highly infectious viral disease. It is transmitted through direct contact and air-borne saliva, and most commonly spreads among children between the ages of two to eight. The infected individuals are mainly children under ten who comprise about 80% of the total. The case number is often higher in the winter and spring seasons. According to separate data of the SS and the SPS (Figure 5), the SS incidence of chickenpox peaks somewhere between the 15th and 18th week every year, while the SPS data shows the 2004 chickenpox peak was located around the 15th to 17th week. The results from the two systems show that the trends are fairly consistent. Comparing the chickenpox incident rate data of 2003 and that of 2004 in both systems, we can see that in 2004 the rate appeared to experience a decreasing trend, which might be related to a higher acceptance rate by parents towards chickenpox vaccination as well as the result of a campaign launched by certain county and city governments to promote free chickenpox vaccine shortly before. In order to enable young children to avoid suffering from severe complications following chickenpox infection, and at the same time to reduce national medical expenses and other social costs such as for patient care, this Center implemented a new policy to promote free chickenpox vaccination across the country beginning on January 1, 2004 [15].

A serious enterovirus epidemic broke out in Taiwan in 1998. After that, enterovirus infection surveillance understandably has become particularly important. From both SPS and SS data (Figure 6), we notice that cases of this infection can occur any time of the year and the trends shown by the two surveillance systems are quite similar, with both having the 18th week to 20th week (April to May) as the main prevalent season. From the data collected over the past several years, we are gratified to find that the incidence of enterovirus infections in Taiwan has been decreasing yearly. However, the variant of the prevalent enterovirus was not always the same. For instance, in 2000 the predominant isolate turned out to be EV-71, but in years 2001 and 2002 they were of Echovirus and Coxsackievirus group A instead. In the current year (2004) we have found most isolates belong to Coxsackievirus group B (Table 2).

Focusing on the topic of the behavioral pattern of elementary school pupils taking sick leave in Taiwan (Figure 8), we have learned that initially, about 54.3% of the pupils would go to school and attend classes in spite of being sick, and only 43.7% would take sick leave and stay home to recuperate. However, since April

2003 when SARS broke out, parents started to rethink these health issues, which led to a major change in their attitudes and behavior towards allowing their children to go to school if not feeling well. Along with the growing SARS epidemic situation thereafter, the portion of the taking-sick-leave pupils increased to a maximum of 68.7%, much higher than those insisting on not missing school no matter what happens. However, after June 2003 when Taiwan was dropped from the WHO travel recommendations list, the two parental attitudes shifted and reverted to the former 50-50 split again. As part of this Center’s endeavors to prepare for the possible return of SARS as well as the imminent winter influenza, we initiated a series of febrile patient treatment principles and procedures and formulated a relevant policy [16], which continued to emphasize the health education policy of recommending that pupils stay at home if not feeling well. Because of that, the taking-sick-leave pupil percentage began to climb once again and became more dominant than before. This upward trend was further assisted by the news about a local incident of the SARS laboratory infection of Lt. Colonel Chan and the SARS outbreaks occurring in Beijing and Anhui in Mainland China. By the 25th week of 2004, as high as 68% of school pupils would take sick leave when ill. This upward trend may also be related to the campaign mounted jointly by the Ministry of Education and this Center to encourage sick students not to attend school, but remain at home; this campaign gradually had an effect on the parents decisions regarding whether to allow their children to miss school due to sickness.

In an analysis of student sick leave patterns in northern, central, southern, and eastern Taiwan, we found that after the advent of SARS, the northern, central, and southern areas displayed a pattern dominated by the will-take-sick-leave students, while in the eastern area the take-no-sick-leave students were predominant. According to a survey [17] conducted by the Hsinchu Normal College in cooperation with the Council of Indigenous People, Executive Yuan, among elementary school pupils of indigenous origin, or aboriginals, the ratio of those coming from low-income, single parent families and being raised by grandparents is 2 to 5 times the national average. Therefore, it is reasonable to assume that in eastern Taiwan, there are more rural area schools, parents are economically less well off, social support resources are less abundant, plus single parent families and grandparent raising children instead of parents are all in higher proportion than in other areas. These economic and social factors are all possible contributors to the phenomena of the pupils preferring to go to school rather than taking sick leave when feeling ill.

Analyzing the SS data over the past two years, we have realized that in general the incidence of infection decreases as pupils get older, i.e. the rate is the highest for kindergarten age children and lowest for sixth graders. The sex of the students apparently plays no role in the incidence rate.

In year 2004 we conducted a questionnaire survey. As a result, about 67.6% of those schools which responded to the questionnaire also took part in a follow-up educational training course held by this Center, and as high as 85.4% of those having taken the course judged the course content to be satisfactory. As to the convenience of the reporting process, 73.3% of those having filled out a questionnaire thought the paper version of reporting is already sufficiently convenient, and 70.9% expressed strong willingness to cooperate with this Center on the SS issue. The major suggestions made by those filling out questionnaires were: changing from paper reporting to Internet reporting, the willingness on the teachers' part needing reinforcement, and the work load of school nurses being too heavy.

Discussion

Ideal detection and prevention of infectious disease epidemics occurring in schools should rely on being able to firmly grasp the variation of school disease morphology on a regular basis and being highly alert to any disease outbreaks, coupled with a preventive awareness, so that no outbreaks would be allowed to reach epidemic proportions on school grounds. This Center has a variety of efficient infectious disease surveillance and reporting systems that consist of a legally notifiable communicable disease surveillance and reporting system, the SPS, a contract laboratory surveillance and reporting system, an infectious syndrome surveillance and reporting system, the SS, and a national infectious disease surveillance and reporting hotline. Those systems are mainly staffed and run by health workers, while the establishment of the SS is somewhat an exception. It monitors infectious disease outbreaks from various perspectives by people in other walks of life and assesses the latent dangers of disease spread in schools, the community, and among family members. Our objective is to nurture an active, caring attitude by school nurses and class counselors through the promotion of the SS of this Center. In the event that any school child develops an unusual infection or ailment or any indication of the occurrence of a cluster event, the system will notify this Center immediately. For example, there were 16 cases of unusual infectious diseases reported by school nurses alone in 2003, which enabled this Center to take timely preventive measures to avoid the spread of the feared disease. Furthermore, by comparing data collected through the SS and through the SPS, we find their tendencies match each other quite satisfactorily. Therefore, the SS data can be used as one important epidemic index.

Geographically, the coverage of the SPS by this Center is about 70-80% of all counties and cities across the country, while the SS representation through public elementary schools would cover 100% of the country. There is no doubt that the latter has better coverage. The analysis of disease incident rates in the four areas of Taiwan reveals that the rates of some diseases such as influenza-like illness, mumps, chickenpox, and diarrhea are apparently higher in the eastern area than that elsewhere, plus there is a lot of trend fluctuation. Moreover, as far as the sick leave situation is concerned, pupils are much more likely to go to school in spite of feeling sick in the eastern area. Other characteristics of the eastern area schools include a higher percentage (27.6%) of rural area schools, the condition of children raised by grandparents instead of parents being more serious, and the number of monitoring points being only one third of that in all other areas. It shows that the extent of urbanization and differences in population structure indeed affect the outcome of data analyses.

Factors to consider for future development and success

A few final words about this SS system: we have come a long way since its initiation. In the beginning, we used paper forms and fax machines to report disease incidents. Later on we joined forces with the "Student Health Information Administration System" of the Ministry of Education and adopted the Internet reporting approach. It was actually an answer to the digitalization trend and opinions expressed by school nurses to ease the impact this new system produced. Now, after a few years of diligent work, this Center has established and maintained a good, responsive, collaborative relation with those participating schools. Due to improved alertness of school nurses to infectious disease outbreaks on school grounds, by the end of this June, we had 10 schools, which on their own initiated the reporting of infectious disease cluster incidents. Most of them were just events involving fever clusters. After a joint effort made by this Center and other health units, including an epidemiological investigation and followed by timely, appropriate preventative measures, it was fortunate that none of the outbreaks spread on the school grounds. In order to further improve the effectiveness of the SS system, this Center has formulated a "Recommended Reporting Standards of Infectious Disease Incidents Occurring on School Grounds," which focuses on cluster incidents of respiratory and intestinal infections, and abnormal group absences among school pupils caused by infectious diseases. This new addition of the system will be put on trial in September 2004 at participating elementary schools to set up a reporting standard procedure for school cluster events. Considering the fact that most schools have no school physicians on their staff, in order to compensate for the obvious lack of medical expertise of school nurses and teachers, and enhance the medical resources of schools, we are considering a scheme of encouraging stationary physicians to *foster* schools. The reasoning behind this idea is that those enthusiastic stationary physicians of this Center reside in about 80% of the towns and rural areas throughout the country. Should they be invited to give health education lectures at nearby schools, or even help out with some disease prevention tasks such as specimen collection, it may well be an effective means of improving the sensitivity of the SS system. In the meantime, in order to reinforce the mechanism of mutual communication between this Center and reporting schools, starting in April 2004, this Center has issued a weekly publication "School Surveillance Weekly," which is sent to participating schools and relevant administrative offices in the form of e-mails. The Center also holds regular educational training courses to improve school nurses' knowledge about infectious diseases and enhance their cooperativeness with reporting efforts.

The success of this SS system hinges on several factors: 1. Support of the school principal; some teachers and section chiefs are not very keen on rendering a helping hand to the system; if the principal does not fully support this, the school nurse will often face difficulties during information collection. 2. Teachers' willingness to collaborate, some teachers think their main task is nothing more than educating, and they may regard reporting pupils' health problems as unimportant and unnecessary, so they may not do it with needed accuracy, resulting in inaccurate pupil disease information. 3. Parents' willingness to cooperate; it is quite possible that parents are too busy attending to their own careers, or the child is being cared for by the grandparents instead, who are not capable of describing exactly the symptoms of a sick child. Worse than that, worried about being stigmatized, the concerned parents may choose to conceal the truth. 4. Work load of the school nurse; since besides routine health examination duties, the school nurse sometime needs to perform other chores as well. Particularly in the case of some counties and cities that hire school nurses through package deals; these nurses are kept very busy during their working hours. Under such circumstances, their willingness to take part in the SS system is very doubtful to say the least. Also, some school nurses have difficulties with the computer, and the online reporting method understandably distresses them.

Because data collected by the SS system is derived from reports submitted by teachers, school nurses, or physicians, based on their observations of the sick pupil's symptoms (there is a detailed reporting definition for each disease), we have to admit that this information source seems to be somewhat lacking in accuracy when compared with the SPS system. However, according to the surveillance pyramid theory and relevant literature, although the SS system is somewhat lower in its diagnostic reliability, both its mass coverage and personal coordination are much higher than those of the SPS system. Therefore it is still worthwhile to refer to the SS data. In the future, what we have tentatively planned will be not only actively strengthening the lateral communicating mechanism between health and education organizations, but also using incentive approaches to encourage teachers and school nurses, and seek more schools willing to join the system. Hopefully, these moves will raise the system's representative quality and stability, and result in an integral and multi-faceted School Infectious Disease Surveillance and Reporting System.

Acknowledgement

We are very grateful to the Ministry of Education, all Education Bureaus of the counties and cities in Taiwan, the First, the Third, the Fourth, and the Sixth Branch of CDC-Taiwan, and the 448 elementary schools that are participating in this system for the cooperation and assistance we have received from them, and we want to thank Wan Fong Elementary School of Taichung County in particular for its development of an Internet edition of the School Infectious Disease Surveillance and Reporting System.

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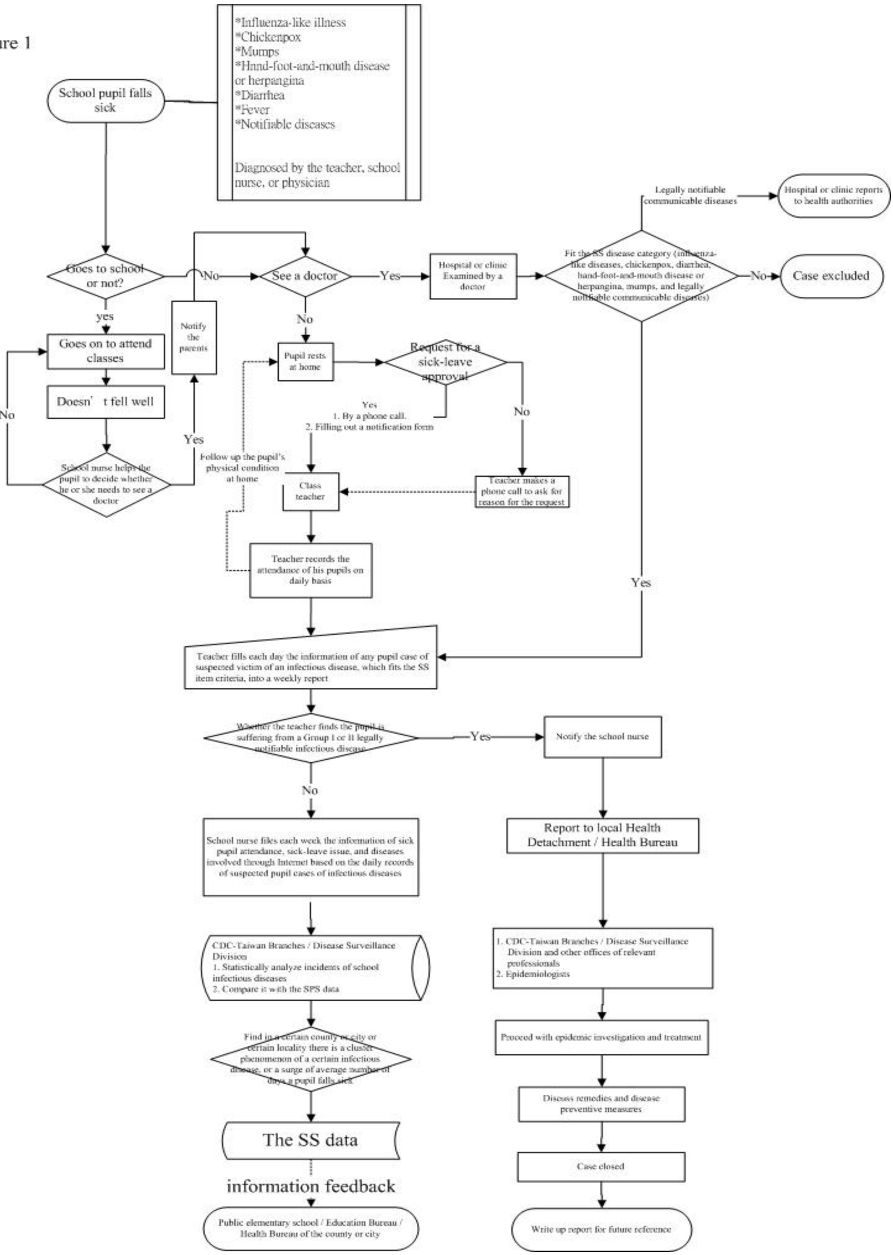
Figure 1



*Influenza-like illness
*Chickenpox
*Mumps
*Hand-foot-and-mouth disease or herpangina
*Diarrhea
*Fever
*Notifiable diseases
Diagnosed by the teacher, school nurse, or physician
School pupil falls sick
Goes to school or not?
yes
No
Goes on to attend classes
Doesn't fell well
School nurse helps the pupil to decide whether he or she needs to see a doctor
No
Yes
Notify the parents
See a doctor
Yes
No
Hospital or clinic Examined by a doctor
Fit the SS disease category (influenza-like diseases, chickenpox, diarrhea, hand-foot-and-mouth disease or herpangina, mumps, and legally notifiable communicable diseases)
Legally notifiable communicable diseases
Hospital or clinic reports to health authorities
No
Case excluded
Pupil rests at home
Request for a sick-leave approval
Yes
1. By a phone call.
2. Filling out a notification form
No
Follow up the pupil's physical condition at home
Class teacher
Teacher makes a phone call to ask for reason for the request
Teacher records the attendance of his pupils on daily basis
Yes
Teacher fills each day the information of any pupil case of suspected victim of an infectious disease, which fits the SS item criteria, into a weekly report
Whether the teacher finds the pupil is suffering from a Group I or II legally notifiable infectious disease
Yes
Notify the school nurse
No
School nurse files each week the information of sick pupil attendance, sick-leave issue, and diseases involved through Internet based on the daily records of suspected pupil cases of infectious diseases
Report to local Health Detachment / Health Bureau
CDC-Taiwan Branches / Disease Surveillance Division
1. Statistically analyze incidents of school infectious diseases
2. Compare it with the SPS data
1. CDC-Taiwan Branches / Disease Surveillance Division and other offices of relevant professionals
2. Epidemiologists
Find in a certain county or city or certain locality there is a cluster phenomenon of a certain infectious disease, or a surge of average number of days a pupil falls sick
Proceed with epidemic investigation and treatment
Discuss remedies and disease preventive measures
The SS data
Case closed
information feedback
Public elementary school / Education Bureau / Health Bureau of the county or city
Write up report for future reference

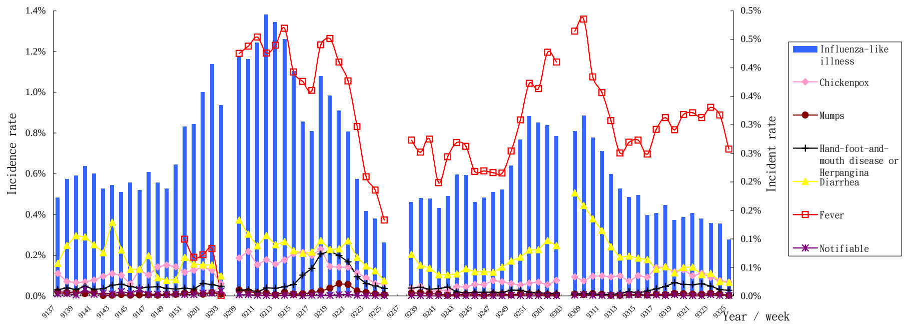


Figure 2. Weekly Incident Rates of Various Diseases from the SS in a Period between the 37th Week of 2002 to the 25th Week of 2004.

Remarks:

1. Incidence rate (%) = (no. of sick pupils / total no. of pupils registered for that week) x 100
2. There were 134 public elementary schools with their affiliate kindergartens took part in the SS in 2002, and 448 such schools with affiliate kindergartens took part in the SS in 2003.
3. Starting from the 51st week of 2002 Pingdong County and City had a trial to add the "fever" item to the list, and the country adopted the idea in the 9th week of 2003/

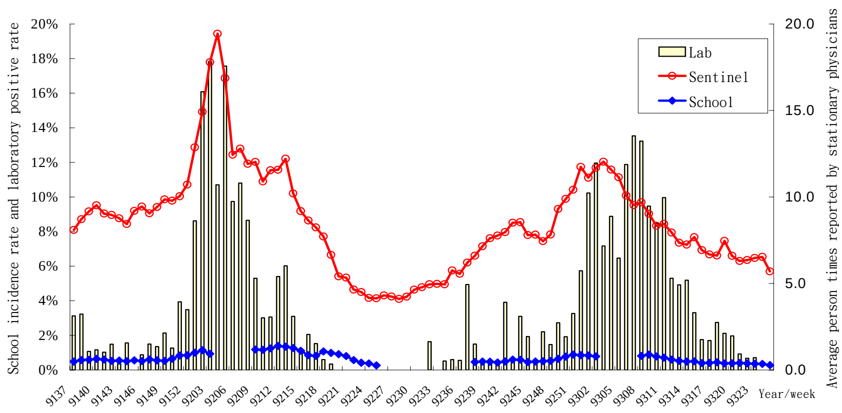


Figure 3. A Comparison among Influenza Incidence Rates on School Grounds in Taiwan Region, Average Influenza Patient Times (5-25 years old) Reported by Stationary Physicians, and Influenza Positive Specimen Rate Reported by Contract Laboratories (from the 37th Week of 2002 to the 25th Week of 2004.

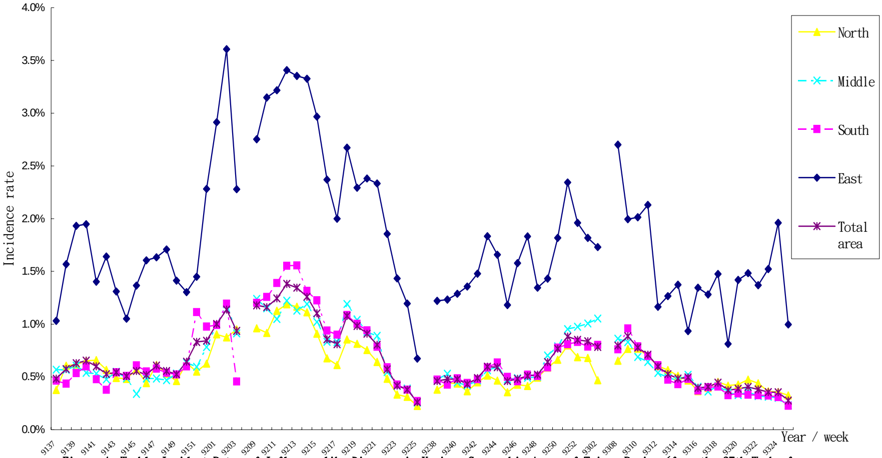


Figure 4. Weekly Incident Rates of Influenza-like Diseases in Various Geographic Areas of Taiwan Region (from the 37th Week of 2002 to the 25th Week of 2004)

Remarks:
1. Incidence rate (%) = (no. of sick pupils / total no. of pupils registered for that week) x 100
2. There were 134 public elementary schools with their affiliate kindergartens took part in the SS in 2002, and 448 such schools with affiliate kindergartens took part in the SS in 2003.

Table 1 Comparison between the Influenza-like Disease Incident Rates in the Eastern Area of Taiwan Region and Those in Other Areas.

Area	Average rate (%)	Variant	F test	P value
Eastern area (27.6%*)	1.8194	0.4610	-	-
Northern area (6.0%*)	0.5970	0.0476	9.6743	P<0.001
Central area (3.4%*)	0.6540	0.0778	5.9272	P<0.001
Southern area (6.9%*)	0.6705	0.1019	4.5215	P<0.001

*Percentage of mountainous rural area school counts in the area.

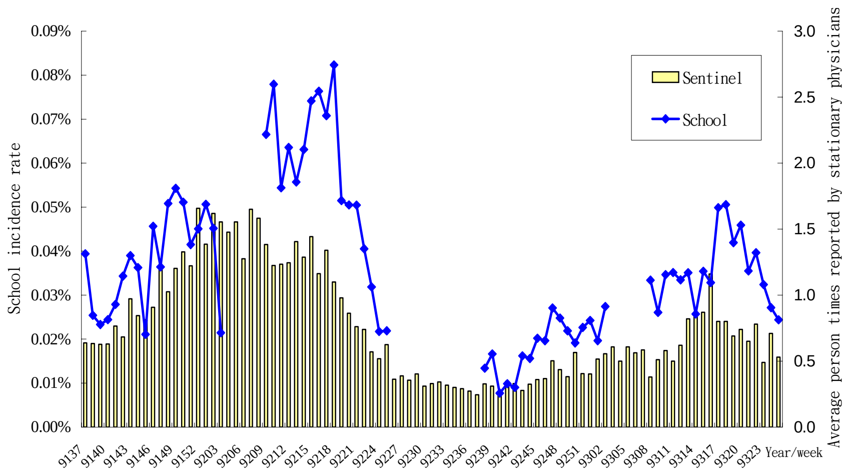


Figure 5. A Comparison between Chickenpox Incident Rates on School Grounds in Taiwan Region and Those Average Patient Times Reported by Stationary Physicians (from the 37th Week of 2002 to the25th Week of 2004)

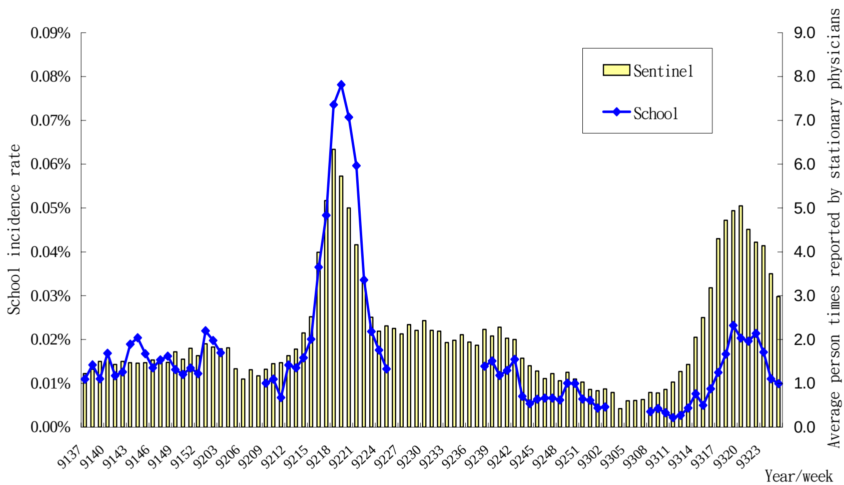


Figure 6. A Comparison between Enterovirus Incident Rates on School Grounds in Taiwan Region and Those Average Patient Times Reported by Stationary Physicians (from the 37th Week of 2002 to the25th Week of 2004)

Table 2 Yearly Positive Rates of Various Enterovirus Isolates Found by Contract Laboratories in Taiwan Region (2000-2004)

Year (month)	2000(1-12)	2001(1-12)	2002(1-12)	2003(1-12)	2004(1-6)
CA(%)	1.54%	1.64%	2.04%	4.97%	0.41%
CB(%)	1.13%	0.28%	1.32%	0.65%	2.76%
Echo(%)	1.15%	2.98%	1.35%	2.02%	0.29%
EV71(%)	1.89%	1.97%	1.17%	0.53%	0.46%

Remarks:：CA：Coxsackievirus group A
CB：Coxsackievirus group B
Echo：Echovirus
EV71：Enterovirus 71

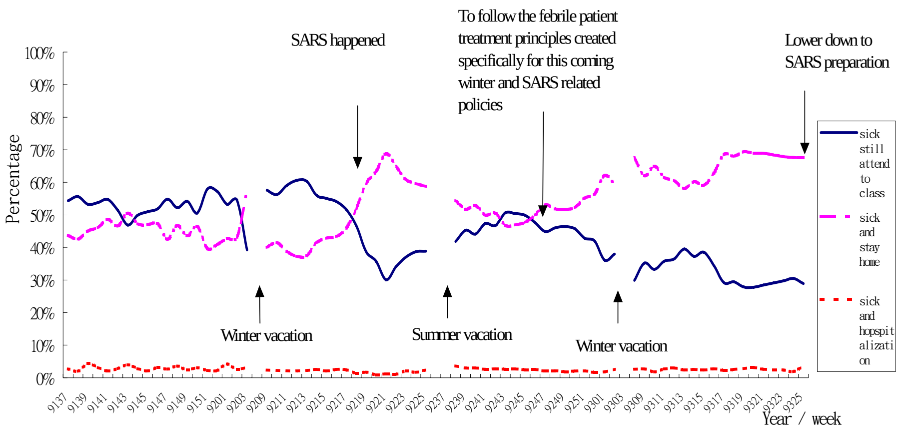


Figure 8. Weekly School Attendance Record of Sick Pupils by the SS (from the 37th Week of 2002 to the25th Week of 2004)

Remarks:
1. Attendance percentage when sick = (no. of sick days taking leave / total no. of days falling sick) x 100
2. There were 134 public elementary schools with their affiliate kindergartens took part in the SS in 2002, and 448 such schools with affiliate kindergartens took part in the SS in 2003.
3. In the 17th week of 2003, Taipei Hoping Hospital was sealed because of SARS outbreaks, which caused panic in the society, and schools were suspended due to this.