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The Program for HIV-infected Case Management and Behavior Changes of the Cases

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Abstract

The Program for HIV-infected Case Management was started in 2007 in Taiwan, providing HIV-infected case management through medical institutes to increase efficacy of medical care and to establish better self-health management techniques. Medical institutes are encouraged to take the responsibility of caring and educating HIV-infected patients. A support network consisting of social affair authorities and the medical systems is also established through the program to support minority groups. The program gradually increases the rate of seeking medical care and practicing safe behavior of HIV-infected cases to prevent transmission of HIV.

Since the plan was started in 2007, a total of 4,672 cases were enrolled at the end of 2008. Among them, 1,402 were new cases reported by case management hospitals in 2007-2008. When compared to follow-up of new cases at outpatient departments, managed cases had higher compliance rates than unmanaged ones, showing that the plan helps in medical compliance.

Through comparison of the record of case management and our database, we found that most cases were started to be managed within one month after being reported (1,003, 21.5%). However, only about 30% of the new cases were managed. Hence, through increasing the numbers of case management hospitals and encouraging them to cover new cases, the number of new cases being managed would increase. The plan would alleviate the psychological impact of HIV infection, establish regular hospital visits and to provide better self-health management techniques earlier to prevent drug resistance and transmission of HIV.

Through regular heath education and consultation, we found significant reduction in sexual and drug addiction behaviors of the cases after we first received the cases, as compared with the follow-up results in the most recent three months. The rate of having a fixed sexual partner rose from 61.1% to 76.6% in sexually active cases. The rate that patients informed their sexual partner also increased

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from 53.1% to 65.6%. Upon behaviors of drug addiction, the rates for using clean injection devices and alternative therapies also increased. As for medical treatment, the rate of regular medical visits increased from 60.9% to 87.6%, and the rate of regular taking of the medication also increased from 31.5% to 51.0%.

Keywords: HIV/AIDS, case management, behavior change

Introduction

Since the first HIV-infected case found in 1984 in Taiwan, up to late August 2009, there has been 18,538 reported cases of HIV infection. Among those cases, 17,826 were Taiwan citizens and 712 were foreigners. A total of 5,895 cases have developed into AIDS and 15,350 cases still survive. Among the infected citizens, 6,618 cases were aged 20-29 years, 6,380 were 30-39, and 2,849 were 40-49. Together, they accounted for 89.2% of all cases, showing that the young and mature adults are the most dominant group having HIV infection [1].

New infected cases for drug addicts peaked in 2005 and accounted for 72.5% of HIV infections. After government intervention, infections among drug-injecting users have decreased significantly. Among new cases in 2008, unsafe sexual behavior accounted for 76.9% of the cases, and sharing needles of illicit drugs accounted for 21.7% of the cases, showing that HIV infections through unsafe sexual behavior have outnumbered drug-injection usage.

According to studies in other countries, individuals with HIV infection usually are depressed, self-reproaching, feel guilty, feel socially isolated, and face many uncertainties physiologically and psychologically. Their quality of life is severely affected [2-3].

Since the introduction of Highly Active Antiretroviral Therapy (HAART) in 1998, survival of HIV infection cases has greatly prolonged. If the cases could not conduct better self-health management techniques, then irregular treatment would cause drug resistance [4]. Since HIV mutates rapidly and AIDS has complex complications, the virus would continue to spread.

In 1992, the USA CDC developed prevention case management (PCM) to prevent transmission of HIV through health education and decreasing dangerous behaviors [5-6]. Studies have also shown that regular health education at outpatient departments can decrease unsafe sexual behaviors [7].

The Taiwan CDC in 2005-2006 started the pilot Payment Program for Behavioral Therapy of HIV-infected Cases. In 2007, the program was expanded into the Pilot Program for Case Managers of HIV-infected cases. A

total of 18 hospitals were included in this program. In 2008, the program was modified to the Program for HIV-infected Case Management. A total of 24 hospitals and 51 case managers were included.

The goals of the program, in addition to increasing the efficacy of medical care, were to provide case management service for HIV-infected cases and to establish better self-health management techniques for infected cases. Hospitals were encouraged to carry the responsibility of health caring, education and consultation for infected patients. The program was also used to connect social affair authorities and the medical system to provide support and care for the minorities, in order to increase medical compliance and safe behaviors to prevent spreading of HIV.

In the program, the case managers, through receiving cases and regular follow-up every three months, provide health, psychological, social support and consultation to HIV-infected cases. They assist the cases to better self-health management techniques and establish social supportive networks (medical resources, non-governmental organizations, social affair supports, and commerce resources, etc.) for the cases.

Materials and Methods

1. Subjects: 4,672 cases taken in between 2007 and 2008 for the first time were included.
2. Data resources: the data were from the Chronic Communicable Disease Management-AIDS and Hansen's Diseases Subsystem of the Taiwan CDC and applications for AIDS-related medical expenses of the Bureau of National Health Insurance.
3. Aims of the study
   a. understanding profiles and medical care of the subjects
   b. understanding behavioral changes of the subjects

Results

1. Analysis of the cases

a. Case enrollment

Between 2007 and 2008, 4,672 cases were first enrolled. Among those cases, 2,585 (55.3%) were enrolled in 2007 and 2087 (44.7%) in 2008. As to new cases diagnosed and enrolled in the same year, 580 of them were in 2007, and 712 in 2008 (Table 1); 1,402 cases were new cases reported by case management hospitals in 2007-2008.

Table 1. First enrollment of cases by year (N = 4,672)

	Case number	%
Year of enrollment		
2007	2,585	55.3
2008	2,087	44.7
New cases reported and enrolled in the same year		
2007	580	44.9
2008	712	55.1

b. Intervals between case enrollment and report

As to the intervals between case enrollment and report, most cases were enrolled in one month after being reported (1,003 cases, 21.5%), followed by more than five years (845 cases, 18.1%), 2-3 years (770 cases, 16.5%), and 1-2 years (765 cases, 16.4%) (Table 2).

Table 2. Intervals between case enrollment and report (N = 4,672)

Intervals between case enrollment and report	Case number	%
Within a month	1,003	21.5
One month ~ half year	352	7.5
Half year ~ one year	266	5.7
1 ~ 2 years	765	16.4
2 ~ 3 years	770	16.5
3 ~ 4 years	464	9.9
4 ~ 5 years	207	4.4
More than 5 years	845	18.1

c. Medical care of enrolled vs. unenrolled cases

In 2007, there were 1,870 cases reported which survived for more than a year. Among them, 1,144 cases had risky sexual behaviors and 710 had drug addictions. Since cases having drug addiction usually stopped medical care due to incarceration, we only analyzed cases having risky sexual behavior. Comparing the medical care within one year after the cases first reported in 2007, enrolled cases had higher compliance rates; 79.3% of them had medical visits more than 4 times, more than 20% higher than unenrolled cases (55.2%) (Table 3).

Table 3. Medical care of new reported cases within one year of being reported in 2007 (N = 1,870)

Medical care of new reported cases within one year of being reported	New cases in 2007 who survived for more than a year (sexual behavior as the risk factor)			
	Enrolled in 2007		Unenrolled (up to 2009/6/30)	
	Cases	%	Cases	%
0 appointment	2	0.4	118	23.2
1 appointment	19	3.9	46	9.0
2 appointments	34	7.0	33	6.5
3 appointments	45	9.3	31	6.1
4 or more appointments	383	79.3	281	55.2
Total	483	100	509	100

As to basic profiles, 4,237 cases (90.7%) were male and 435 (9.3%) were female; 90% of the cases were between 20-49; 1,406 (30.1%) of cases had high school education; 3,443 (73.7%) of the cases were single; and 1,226 (26.2%) of the cases were unemployed.

As to the risk factors of first-time enrolled cases, homosexual behavior consisted 39.7% (1,853 cases), followed by injecting drug user behavior (29.4%, 1,371 cases) and heterosexual behaviors (23.1%, 1,079 cases).

2. Behavior change

Among the 4,672 cases, we reviewed 4,045 cases who had made subsequent visit before 2009.

a. Sexual behavior

As to changes in sexual behavior among the cases, the rate of having a fixed partner increased from 61.1% in their first visit to 76. 6% in the return visits in the past three months. The rate of informing sexual partner about HIV infection increased from 53.1% to 65.6% (Table 4).

Table 4. Sexual behavior changes of the cases

	First enrollment Sexual behavior in the past 6 months (n=1,954)		Follow-up Sexual behavior in the past 3 months (n=1,092)	
	Cases	%	Cases	%
Fixed sexual partner?				
No	756	38.7	253	23.2
Yes	1,193	61.1	836	76.6
Unknown	5	0.3	3	0.3
Informing sexual partner about HIV infection?				
No	885	45.3	361	33.1
Yes	1,038	53.1	716	65.6
Unknown	31	1.6	15	1.4

b. Drug addiction behavior

As to drug addiction behavior changes of illicit drug users, the rate of joining a

Needle-syringe program has increased from 28.2% in their first enrollment to 32.6% in the past three months. The rate of joining Drug substitution treatment has also increased from 71.3% to 82.4% (Table 5).

Table 5. Drug addiction behavior of cases that have used illicit drugs

	First enrollment Used illicit drugs in the past 6 months（n=7,55）		Follow-up Used illicit drugs in the past 3 months（n=426）	
	Cases	%	Cases	%
Joined Needle-syringe program?				
No	443	58.7	258	60.6
Yes	213	28.2	139	32.6
Unknown	99	13.1	29	6.8
Jointed Drug substitution treatment?				
No	123	16.3	49	11.5
Yes	538	71.3	351	82.4
Unknown	94	12.5	26	6.1

c. Medical compliance

As to medical compliance, regular medical visits increased from 60.9% since their first enrollment to 87.6% in the past three months. Medication compliance also increased from 31.5% to 51.0% (Table 6).

Table 6. Medical and medication compliance of the cases

	First enrollment（n=4,045）		Follow-up in the past 3 months（n=4,045）	
	Cases	%	Cases	%
Medical compliance				
Uncooperative	83	2.1	107	2.7
Doctor shopping	15	0.4	11	0.3
Once in a while	372	9.2	361	8.9
Regular follow-up	2,463	60.9	3,545	87.6
First time visit	1,108	27.4		0
Unknown	4	0.1	21	0.5
Compliance to HAART				
Regular medication	1,274	31.5	2,061	51.0
Forget sometimes	490	12.1	190	4.7
Don’t care	96	2.4	65	1.6
Refuse medication	46	1.1	51	1.3
Haven’t started	2,102	52.0	1,649	40.8
Unknown	37	0.9	29	0.7

Discussion

According to the above results and findings during execution of the program, we had the following discussions:

1. As to medical visits of newly reported cases in 2007 within one year of being reported, 23.2% of unenrolled cases had not had medical visits. Among enrolled cases, only 0.4% had no medical visits, showing that the program did help on medical compliance. In the future, enrolling newly reported cases would help on their medical compliance.
2. We found that 4% of newly enrolled cases reported in 2007 had less than two medical visits. In the future, we recommend continuing to understand the causes of poor medical compliance among the cases. We may also strengthen the ability of relationship building of case managers through education to minimize loss of the cases.
3. The age distribution of newly enrolled cases is similar to that of all the infected cases in Taiwan. However, the rate of enrolled cases between aged 20 and 29 was lower than that of all the infected cases. Through enrollment and health education of the program, we could help them to establish regular medical visits and self-health care techniques as early as possible, avoiding drug resistance and risky behavior.
4. Although 1,003 (21.5%) newly reported cases were enrolled within a month, among the 1,934 newly reported cases in 2007 and 1,750 cases in 2008, only 1,402 cases were reported by the case managing hospitals. Through increasing the numbers of the case managing hospitals and encouraging

hospitals to manage newly infected cases, we may increase enrollment of newly reported cases to the program to help them reduce the overall physiological as well as the psychological impacts of HIV infection.

5. Through regular health education, sexual and addictive behaviors had decreased among the cases. The rate of having fixed sexual partners increased from 61.1% to 76.6%. The rate of informing sexual partners had also increased from 53.1% to 65.6%. As to drug addiction behaviors, cases participating in the Needle-syringe program and Drug substitution treatment had also increased. The rate of regular medical visits increased from 60.9% to 87.6%, and the rate of taking regular HAART increased from 31.5% to 51.0%.

Conclusions

The program of HIV-infected Case Management helps on both disease prevention and increasing the quality of medical care. Case management helps in reducing psychological impacts and establishing regular medical visits to reduce drug resistance. Through regular health education, safe behaviors are strengthened and better self health management techniques continued to prevent spreading of HIV.

In addition to case management, the program also screens contacts of the cases. Through the screening process, health education is provided to the high risk groups to reduce their risky behaviors. In the 2009 program, hospitals are encouraged to enter their respective communities to provide appropriate screening services to the high risk groups. To extend the coverage of the program, screening and health education are also carried out in the campus to gay organizations.

The program of HIV-infected Case Management is still under development in Taiwan. In addition to modify the program to provide more appropriate service, continuing education, training, supervision and support systems could strengthen case managers, our front line practitioners, the ability of self-awareness and using social resources to provide better health consultation and social support for cases.

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Report of First Guillain-Barré Syndrome Case Meeting the Brighton Collaboration Definition in Taiwan

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Abstract

Taiwan CDC has mobilized public health and medical resources in the preparedness and implementation of influenza A (H1N1) 2009 vaccination campaign, beginning November 1, 2009. During the campaign, close monitoring of adverse events following immunization is an essential part for ensuring vaccine safety. Neurological adverse events, in particular Guillain-Barré syndrome (GBS), have been one of the adverse events of specific interest because of the unique pathophysiological characteristics and historical experiences with influenza vaccines.

This report describes the first GBS case meeting the Brighton Collaboration definition in a patient who became sick after receiving the influenza A (H1N1) 2009 vaccine in Taiwan and discusses the application of case definition formulated by the Brighton Collaboration for monitoring GBS as an adverse event following immunization.

Keywords: influenza A (H1N1) 2009 vaccine, vaccine adverse event, Guillain-Barré syndrome

Introduction

Guillain-Barré syndrome (GBS) is an acute peripheral neuropathy and has become the leading cause of acute flaccid paralysis in developed countries. Symptoms of GBS include variable degrees of weakness in the limbs, and abnormality in the sensory and autonomic nervous system. GBS can be further classified into several subtypes based on the component of peripheral nerves involved, including Fisher syndrome (FS), acute inflammatory demyelinating polyradiculoneuropathy (AIDP), acute motor axonal neuropathy (AMAN), and acute motor and sensory neuropathy (AMSAN). The incidence rate of GBS increases with age and annual incidence ranges from 1 to 4 cases per 100,000 populations in different countries [1, 2]. It is now believed that the pathophysiologic mechanism of GBS is due to the attack of autoantibodies on the peripheral nerves. These autoantibodies come from immune response elicited by a variety of stimuli, especially viral or bacterial

infections. It is estimated that about two-thirds of people who develop GBS reported a history of infection several days or weeks before onset of the symptoms. Among these, *Campylobacter jejuni* infection is the most frequently reported infection, although infection with influenza virus, *Mycoplasma pneumoniae*, Epstein-Barr virus, and cytomegalovirus have also been implicated in the occurrence of GBS [3].

Between October and December 1976, more than 45 millions people received swine influenza vaccine against the A/New Jersey/1976 virus in the United States; more than 500 cases of GBS following the vaccination were reported. The mass vaccination program was, therefore, terminated when a cohort study found that the risk of GBS in people receiving swine influenza virus was 6-8 folds higher than those unvaccinated during the period of 6-8 weeks after vaccination [4]. This is how all the studies focusing on the relationship between GBS and influenza vaccination initiated. However, except the epidemiologic association obtained from the large-scale study, the pathogenic mechanism of the 1976 swine influenza vaccine in GBS is still ambiguous. Moreover, no consistent conclusion has been reached among epidemiologic studies exploring the association of seasonal influenza vaccines and GBS occurrence [5-7]. In order to provide a globally consensus case definition for adverse events following immunization and to enhance the comparability of data from different monitoring programs, experts in epidemiology, public health, pharmacy, and medicine from all over the world have set up a non-profit organization, the Brighton Collaboration, in 2000 [8]. This organization has formulated a set of case definition to monitor adverse events following immunization in recent years and the definitions have gradually been adopted by most researchers for purposes of clinical trials and post-marketing safety monitoring [9].

Taiwan CDC created both passive and active surveillance to monitor adverse events following receipt of influenza A (H1N1) 2009 vaccine (H1N1 vaccine) in Taiwan. For passive surveillance, the public and physicians were encouraged to report any adverse events, which occurred following H1N1 vaccination to local health units, regardless of causality. As for active surveillance, a linkage of H1N1 vaccination records and specific diagnostic codes in the National Health Insurance database was conducted to examine whether the observed number of neurological (including GBS), cardiovascular, cerebrovascular, allergic disorders, spontaneous abortion, and stillbirth is higher than the expected calculated from the comparison group. For adverse events of specific interest (such as GBS, central nervous system demyelinating disease, seizure, encephalitis/myelitis, Bell's palsy, anaphylaxis, and vasculitis), medical records were reviewed to verify the diagnosis.

On January 5, 2010, Taiwan CDC received a death report occurring after receipt of H1N1 vaccine, in which a diagnosis of GBS was noted in medical records. This report summarizes the investigation of the GBS report and describes the use of Brighton Collaboration case definition to confirm the diagnosis of GBS as an adverse event following immunization.

Case report

The patient was a 54-year-old male with histories of diabetes mellitus, end-stage renal disease, hypertension, and coronary artery disease, and had received regular hemodialysis since August 2009. He received H1N1 vaccine on November 18, 2009 as a priority group with critical illness; no adverse events occurred on date of vaccination.

Two days after vaccination, the patient complained of knee pain, low back pain, and leg weakness. He was hospitalized from November 24 to December 15, 2009 due to fever and these complaints. During hospitalization, he received antibiotic treatment for methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia of unknown origin. To evaluate his neurological symptoms, the patient underwent spine magnetic resonance imaging (MRI), and results indicated herniated intervertebral disks between the third and fourth, and the fourth and fifth lumbar vertebrae, respectively, and a suspected hemangioma between the eighth and eleventh thoracic vertebrae. Neurologist, orthopedic and neurological surgeon were consulted. On November 30, neurological examinations performed by the consulting neurologist on muscle power and deep tendon reflex were all normal. After the above consultations, the patient was diagnosed as intervertebral disk herniation of lumbar vertebra and myofascial pain. Since patient's condition improved after antibiotic treatment, and the herniated disks were not yet indicated for surgery, he was discharged under stable clinical condition.

The patient returned to the clinic on December 21, 2009 with a chief complaint of low back pain. On December 24, 2009, he was hospitalized again because of fever, and arteriovenous fistula infection of the left forearm with subcutaneous abscess and MRSA sepsis. Neurologists were consulted on the next day of admission because he also complained of general weakness (especially lower limbs). The neurological examination on December 25, 2009 showed grade 3 to 4 muscle powers of upper limbs, grade 3 muscle power of lower limbs (normal muscle power is graded 5), and absent deep tendon reflex in four limbs; however, bilateral Babinski reflexes were plantar. Electrophysiologic studies on December 30, 2009 recorded that 1) absent sensory action potential (SAP) amplitude of median, ulnar, superficial peroneal and sural nerves on both sides; 2) decreased compound motor action potential (CMAP) amplitude of median and tibial nerves on both sides and ulnar nerve on the right side; 3) absent CMAP amplitude of ulnar nerve on the left side and peroneal nerves on both sides; 4) absent F-wave amplitude by stimulating bilateral median, peroneal nerves and left ulnar nerve; 5) prolonged F-wave latencies by stimulating bilateral tibial nerves and right ulnar nerve; and 6) absent H-reflex by stimulating tibial nerves on both sides. These findings suggested demyelinating sensory and motor polyneuropathy, which is compatible with GBS

The patient's neurological symptoms were stationary during hospitalization. He was able to walk shortly under the help of families, but muscle power and deep tendon reflexes remained abnormal. Since the interval between the GBS diagnosis and symptom onset has been more than one

month, the patient received supportive rehabilitation only. Neither cerebrospinal fluid examination nor plasmapheresis was performed. Results of blood electrolyte studies, including sodium, potassium, calcium, and phosphate, were within normal range during hospitalization.

The patient received antibiotic treatment for MRSA sepsis from December 24, 2009 through January 2, 2010. On January 3, 2010, he suddenly developed loss of consciousness, apnea, and shock and was transferred to intensive care unit for further treatment after resuscitation. Since the conditions were not improved in the intensive care unit, the patient was discharged at the request of his families on December 3, 2010 and expired on the same night. The discharge diagnoses were sudden death, GBS, arteriovenous fistula infection and subcutaneous abscess on the left forearm, and MRSA bacteremia.

Brighton Collaboration case definitions for GBS as an adverse event following immunization

The Brighton Collaboration established a GBS working group in 2005 and published the standardized case definition and guideline for data collection of GBS following immunization [9]. This guideline has three parts, background information of GBS, clinical case definition, and guidelines for data collection, analysis, and presentation of GBS as an adverse event following immunization. The purposes of this case definition are not to aid in clinical diagnosis or treatment but to provide sensitive and specific criteria in evaluating any GBS that occurs following immunization, and to increase data comparability of the subsequent analysis. In addition, the case definition does not imply a causal relationship between GBS and vaccination. A higher level of diagnostic certainty does not imply stronger causal relationship between GBS and the vaccine. In other words, when the clinical presentations of a patient meet the case definition of GBS following immunization, it merely means that the event is a confirmed GBS by international standard criteria. It does not indicate that the GBS is caused by the vaccine.

Similar to other case definitions for adverse events following immunization developed by Brighton Collaboration, the diagnostic certainty of GBS is classified into 4 levels (level 1-4) (Table). The strength of diagnostic certainty for GBS case is in descending order from level 1 to level 3, while level 4 represents that the case is considered a reported but not confirmed case. In order to monitor the occurrence of GBS after H1N1 vaccination, the World Health Organization (WHO) in cooperation with developed countries in Europe and America has established an international GBS registration and a standardized investigation form was used to collect information on disease course and medical services received for each GBS case in participating countries, regardless of H1N1 vaccination status. Different items in the form have preferred data sources, including progress notes, consultation records, and discharge summary. For example, information on neurological examination had better obtain from neurologist consultation records, progress notes, or rehabilitation notes, to assure the reliability of collected data.

Table. Brighton Collaboration clinical case definitions: Guillain-Barré syndrome

Items of criteria for diagnosis
(A) Bilateral AND symmetric flaccid weakness of the limbs
(B) Decreased or absent deep tendon reflexes in weak limbs
(C) Monophasic illness pattern AND interval from onset and occurrence of weakness nadir between 12 hours and 28 days AND subsequent clinical plateau
(D) Electrophysiologic findings consistent with GBS
(E) Presence of cytoalbuminologic dissociation (elevation of CSF protein level above laboratory normal value and count of white blood cell less than 50 cells /ul)。
(F) Absence of an identified alternative diagnosis for weakness
Level of diagnostic certainty
Level 1: meet all of the criteria from item (A) to (F)
Level 2: meet the criteria of item (A), (B), (C), (F), and either (D) or (E)
Level 3: meet the criteria of item (A), (B), (C), and (F)
Level 4: all reported cases not meet items of criteria for level 3

To fill out this form, the investigator first needs to make sure that GBS diagnosis has really been made in the medical records and then needs to make sure that alternative diagnoses have been excluded. Common differential diagnoses for GBS include electrolyte abnormality (such as hypermagnesemia, hypophosphatemia, and myopathy caused by abnormal potassium concentration), drug-induced neuropathy, critical illness neuropathy or myopathy, and vasculitis. Information on neurological examination should be recorded in the following order: muscle power in both the upper and lower limbs, deep tendon reflexes in both the upper and lower limbs, and neurological symptoms. The guideline emphasized that the most severe condition occurred during the disease course must be recorded. Because the time interval between disease onset and the nadir of neurological symptoms is important to differentiate between GBS and other demyelinating peripheral neuropathy, the investigation form has provided methods for determining the date of disease onset. The methods are as follows: if medical records have specified the date of onset, then the date would be the onset date to be filled on the form; if the medical records just wrote the disease occurred “1-2 weeks,” “several weeks,” or “several months,” before the diagnosis is made instead of specifying the date of onset, then “1-2 weeks,” “several weeks,” or “several months,” is defined as 11, 21, and 120 days, respectively. This guideline emphasizes that the nadir of neurological symptoms should be concluded after the patient has been observed for at least 28 days from the disease onset. Finally, the results on relevant examination, including cerebrospinal fluid, electrophysiological, and imaging studies, should be recorded. The neurophysiological criterium of GBS is considered met if presence of any of the following abnormal findings in electrophysiological studies: decreased motor action potentials, prolonged F-wave latencies, prolonged distal motor latencies, or decreased motor nerve conduction velocity.

Discussion

Accurate diagnosis of neurological adverse events following immunization requires vigilance of primary care physicians and clinical experience of neurologists. Moreover, because impaired neurological function often deeply affects patients' daily life and the duration and extent of recovery from impairment is unpredictable, once neurological adverse events occur following immunization, it is very likely to decrease public's willingness to receive vaccination. Therefore, how the diagnosis of these cases can be confirmed in the shortest time period and how to use the surveillance data to clarify causality between the adverse event and the vaccine will be the most important task during the campaign period.

In order to monitor the safety of H1N1 vaccine, reports of adverse events following immunization were collected by the Central Epidemic Command Center on daily basis. On receiving any report with a GBS diagnosis, medical officers in the Branch of Taiwan CDC will first visit the hospital, review medical records, and discuss with attendant physician and neurologists for detail histories and clinical courses of the disease. The medical officer will then determine the level of diagnostic certainty based on information collected by the standardized investigation form, which will subsequently become the basis for later data analysis.

The case-patient presented neurological symptoms on November 20, 2009 after receiving H1N1 vaccine. Neurological examination indicated that the patient had bilateral flaccid weakness of limbs (meeting criteria A in Table) and decreased deep tendon reflexes in upper and lower limbs (meeting criteria B in Table). In addition, the patient's symptoms reached nadir before he was hospitalized on December 24, 2009 (within 28 days after the date of disease onset) (meeting criteria C in Table), and electrophysiological findings, such as decreased or absent action potentials and prolonged F-wave latencies, was consistent with GBS (meeting criteria D in Table). Findings from spine MRIs, such as intervertebral disk herniation and suspected thoracic vertebral hemangioma, can not fully explain the weakness simultaneously occurring in upper and lower limbs, and blood electrolyte levels, including sodium, potassium, calcium, and phosphate, are all within normal range; therefore, other differential diagnoses can be preliminarily excluded (meeting criteria F in Table). However, the patient did not undergo cerebrospinal fluid examination (not meeting criteria E in Table). In summary, diagnostic certainty of GBS as an adverse event following immunization in this patient was considered level 2. It merely means that according to international standard criteria, the event is a confirmed GBS following immunization. It does not indicate that the GBS is caused by the vaccine, or imply a causal relationship between GBS and vaccination.

Conclusion

As the incidence of vaccine-preventable diseases has largely decreased, the occurrence of adverse events following immunization will attract more attention from the public.

The surveillance system for adverse events following receipt of H1N1 vaccine in Taiwan was established according to international standards, and surveillance summary was made available to the public on a weekly basis [10]. Because serious adverse event rarely occurs, a standard case definition and guideline for data collection, analysis, and presentation of adverse event following immunization will increase data comparability from different countries, which provide opportunities for integrating data from different sources for analysis. The internationally collaborative efforts will continue to contribute on vaccine safety, and, therefore, protect the public better.

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