

## **The Knowledge, Attitude, and Practice of Caregivers of Children Under 5 Years of Age towards Enterovirus in Taiwan**

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### **Abstract**

Cases of enterovirus infection and enterovirus infection with severe complications occur each year in Taiwan and mainly among children under 5 years of age. According to data collected by the Centers for Disease Control, the case number of enterovirus infection with severe complications showed an increase in the first quarter of 2008. In order to understand caregivers' understanding of enterovirus, the preliminary symptoms of enterovirus infection with severe complications, the seriousness of the disease, confidence in hand-washing, hand-washing behavior, and in seeking medical assistance. This investigation uses telephone interviews through the NIIS. A total of 911 effective questionnaires were completed and with 95% confidence limits, the sampling error  $\pm 3.3\%$ .

61% of the interviewees expressed themselves to be parents of children under 5 years of age and 76% of the interviewees understood the fact that children under 3 years of age contracted with enterovirus infection with severe complications may lead to neurological sequela or even death. 78% of the interviewees have known about the enterovirus warning of this year within the

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last month. The information was mostly received (multiple choice) through the news (69%), followed by other persons (16%), and propaganda ads (15%). 87% of the interviewees could correctly identify one or more symptoms of enterovirus. 70% of them could identify the symptoms of fever and rash or small blisters on hands and feet as symptoms of enterovirus, with 51% knowing that sore throats were one of the symptoms. 79% of the interviewees were able to identify correctly one or more symptoms of enterovirus infection with severe complications. 60% had knowledge that vomiting was one of the symptoms followed by knowing the decrease of activity (55%), drowsiness (53%), and spasms (47%). Over 88% of the interviewees were confident that they remembered to wash their hands each time before holding the child, feeding the child, and after returning home. 74% answered that they washed their hands before coming in contact with the child; however, only 63% washed their hand correctly. After showing enterovirus symptoms, the order in which the caregivers sought medical assistance started with clinics (58%), followed by hospitals (40%). 82% of the interviewees chose pediatrics. 57% of the interviewees chose local hospitals in seeking medical assistance when the child showed suspected enterovirus infection with severe complications.

News reports were the main source of information for the interviewees which is lacking in information of the symptoms of enterovirus infection with severe complications. Caregivers' have changed and become more alert to the preliminary signs and symptoms of enterovirus infection with severe complications. However, there are still 17% who seek medical assistance in clinics. Therefore, primary medical personnel should be continually instructed in order to elevate awareness of the disease. It is recommended that health

facilities continue to promote news reports on how to wash your hands correctly and emphasize the importance of lathering a least 20 seconds and drying your hands.

**Keywords:** Enterovirus, knowledge, attitude, practice, washing hands

## Introduction

In 1998, the most severe epidemic in documented history of enterovirus occurred in Taiwan with a total of 405 reported cases, 78 deaths (91% of the deaths were children under the age of 5) [1-3]. According to surveillance data provided by the Centers for Disease Control (CDC), the fatality rate of enterovirus infection with severe complications between 1998 and 2007 was below 26%. Children under 5 years of age are most at risk of getting enterovirus infection with severe complications and death. They were counted approximately 90% of the total number of enterovirus infection with severe complications [3, 4]. This year (2008) enterovirus infection is starting to become severe with already 60 suspected cases of enterovirus infection with severe complications reported in only the first quarter of the year. Among these 60 cases, 28 are confirmed enterovirus cases, which is much higher than the average number of cases (6 cases) in the last 5 years. In addition, there is 1 death case. Among the confirmed cases, 88% are children under the age of 5 [5, 6].

Enterovirus, aka *Picornaviridae Enterovirus*, is mainly transmitted through fecal-oral transmission [7-9]. Thus, good personal hygiene habits such as often washing hands are the best way to prevent enterovirus infection [10]. According to study estimations, during enterovirus epidemics, if infants/children and parents wash hands often and wear face mask, and cooperate with schools' class suspensions, the risk of being contracted with enterovirus may be reduced 60% -80% [11].

According to past studies, good hygiene education which elevate the knowledge of caregivers can lead to good preventive measure; thus successful reduction of the risk of transmission [12-14]. CDC once promoted the “4-Year Bacillary Dysentery Prevention in Mountainous Districts Campaign” between the years 2001 and 2004. Though education, the aboriginals’ knowledge of personal hygiene improved; thus lowering the average number of cases of Bacillary dysentery in the past 5 years by 84% [15]. This example shows that with good hygiene education in elevating the education of the caregivers will lead to hygienic changes. Therefore, this is a good method in preventing fecal-oral transmission. Thus, this investigation is focused on caregivers of children under 5 years of age in order to recognize their understanding of enterovirus, confidence in washing hands, frequency of washing hands, and situation of seeking medical assistance for future policy planning and preventive campaign references.

### **Materials and Methods**

This investigation uses Knowledge, Attitude, and Practice (KAP) structure. The investigated variables include demography, knowledge of enterovirus symptoms (enterovirus symptoms, preliminary symptoms of enterovirus infection with severe complications, and the severity of enterovirus), confidence in washing hands, washing hands practice (method and frequency), and practice of seeking medical assistance.

This study conducted telephone surveys of February 19 and 20 of 2008. The focus group of this study is caregivers of children under 5 years of age in the Taiwan region. Sampling is made randomly from the National Immunization Information System (NIIS) for families which have children under the age of 5. According to the population ratio estimated by the Ministry of the Interior of the

25 counties in 2008, the number of sample for each county was distributed. In correlation with the Computer Assisted Telephone Interviewing (CATI) system, telephone numbers were selected. First, 1 official sample set was selected with 9 extra sample sets. If the official set cannot be contacted or are not family numbers (e.g. unused numbers, fax numbers, or other data processing equipment such as recording machines, companies, government facilities, or other facilities), or cannot be contacted after 3 tries (e.g. no answer or busy line); thus unable to become an effective sample, the extra sets are then tried until one effective sample is produced. A total of 5,197 samples were collected with 911 effective ones; thus with 95% confidence limits, the sampling error was  $\pm 3.3\%$ .

## Results

56% of the interviewees were female, whereas 44% were between the ages 30 and 39. 32% (290/911) had education levels of high school, whereas most were housewives (27%, 245/911). 94% of the marital status was married or cohabiting. 61% (557/911) expressed that the main caregivers were the child's parents, followed by family members (29%, 264/911) and 9% (86/911) were child care personnel. In regards to the warning issued by CDC about enterovirus, 78% have received the warning in the recent month and 69% (690/911) of the interviewees received the information through the news (including TV new reports, newspapers, radio news reports, and the internet). Secondly, 16% (145/911) received the information through others (including from medical facilities, health facilities, and friend and family). 15% (137/911) received the information through promotion advertisements (including TV commercials, newspaper ads, radio commercials, and magazines).

In regards to the knowledge of enterovirus, 87% of the interviewees could

correctly recognize one or more enterovirus symptoms. The recognition of the symptoms (multiple choice) is fever (78%), small blisters or rash on hands or feet (70%), and sore throats (51%). 43% were able to recognize all three of the symptoms. 79% of the interviewees could identify one or more of the preliminary symptoms of enterovirus infection with severe complications: continuous vomiting (60%), decrease in activity (55%), drowsiness (53%), and spasms (47%). Only 32% were able to identify all of the preliminary symptoms of enterovirus infection with severe complications. 76% of the interviewees had the knowledge that children under 3 years of age risk neurological sequela or death if contracted with enterovirus infection with severe complications (see Table 1).

In the Attitude section, 89% of the interviewees were confident that they washed their hands before handling or feeding the child. 88% were confident that they washed their hands after returning home. 74% of the interviewees expressed that they usually washed their hands before coming in contact with the child (every time 20%, often 54%). 63% washed their hands correctly (using soap and drying), 24% washed with only water and drying, 8% only used soap, whereas 5% only used water (see Table 2 and 3). In seeking medical assistance when the child showed suspect enterovirus symptoms (such as fever, vomiting, sore throat, mild diarrhea, or boils and rash on hands and feet), 58% choose clinics and 40% chose hospitals. 82% of the interviewees chose to go to pediatrics, 4% internal medicine, 4% Ear Nose and Throat Centre, 2% family medicine, 1% emergency, 1% others, and 3% did not choose. When the child showed suspected preliminary symptoms of enterovirus infection with severe complications (decreased activity, drowsiness, spasms, or continuous vomiting),

36% chose medical centers, 24% chose district hospitals, 21% local hospitals, and 17% chose clinics (see Table 4).

## Discussion

Under the increased emphasis of issuing the warning of enterovirus epidemic by CDC and local health facilities, 13% of the interviewees could not identify any of the enterovirus symptoms. 21% did not know any of the preliminary symptoms of enterovirus infection with severe complications. 24% of the caregivers interviewed did not know the severity of children less than 3 years of age contracted with enterovirus infection with severe complications. Therefore, it is extremely important that the recognition of the symptoms is elevated through more promotion in order to prevent missing the most important stage of the treatment of enterovirus infection with severe complications.

According to a survey done by CDC in 2006 regarding the results of the public education of enterovirus in the past decade, already 98% of the elementary students below (and including) second grade know that washing hands is the best preventive measure against enterovirus infection. 92% express that they have the habit of washing their hands before meals, after going to the toilet, before feeding children, and after handling the excrement of young children [16]. According to the health investigation results of 2005, 52% of children less than 12 years of age wash their hands before meals and 84% wash their hands after using the toilet [17]. This investigation shows that 74% of caregivers in care of children below 5 years old wash their hands before handling the children. However, according to a study made in Korea that directly observed hand-washing practices, only 63% of the subjects truly washed their hands after using the toilet, despite the fact that 78% of the subjects (14 years and older) knew that washing hands can

prevent infectious diseases and 94% of the subjects expressed that they washed their hands after using the toilet [18]. This shows that there is still quite a difference between answering “yes” to washing hands after using the toilet and whether they truly washed their hands or not. Further investigation needs to be conducted in order to further understand the true situation of practice of washing hands in Taiwan.

This investigation has also discovered that 71% of the caregivers use soap correctly, which is lower than the 99% of those adolescents in a survey conducted in Turkey [19], yet much higher than the 28% of subjects who used soap in the previously mentioned Korean study. This shows that although the concept of washing hands is rooted in Taiwan, the actual practice still needs more promotion in truly washing hands and washing correctly - Wet, Rub, Rinse, Clean, Wipe, and Dry.

When a child shows suspected symptoms of enterovirus the main facility that caregivers sought medical assistance are clinics. However, when the symptoms were suspected enterovirus infection with severe complications, the main facility sought was hospitals. This shows that caregivers will choose facilities according to the severity of the symptoms. Noticeably, 17% of the interviewees still take the child to clinics despite the suspected symptoms were enterovirus infection with severe complications. This shows that the primary medical personnel are extremely important in regards to their alertness and attitude towards enterovirus and are critical in preventing the disease. This also shows that further promotion of sending suspected enterovirus infection with severe complications cases to hospital is needed.

In order to elevate public awareness, CDC issued a new letter regarding the



enterovirus epidemic this year. An average of 6.4 printed media reports can be seen between January and March regarding enterovirus. This is much higher than the CDC new letters issued last year (2.5 reports). This shows that the media has started to elevate the concern for the enterovirus epidemic. However, the contents of most of the reports were the number of enterovirus cases and individual case details, with less promotion of the correct preventive concepts and measures. Therefore, CDC has added TV commercials, radio commercial, newspaper and magazine ads, government community service commercials, bus ads, internet ads, fliers, and other health education promotions during the period from January to March in order to relay the correct preventive concepts. According to the above, press conferences and new letters are used to elevate the public awareness and with commercial promotions and tour activities, successful public education of enterovirus can be achieved during the disease alert time period.

In addition, this investigation uses telephone numbers from NIIS in order to reach the target group, with approximately 80% successful reach rate. This effective channel can be considered in future health marketing and health communication.

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Table 1. Statistics of Correct Identification of Enterovirus Symptoms

		Correct identification of enterovirus symptoms (3 categories)			Correct identification of preliminary symptoms of enterovirus infection with severe complications (4 categories)			Understanding of enterovirus infection with severe complications occurrence among children under 3 years of age		
	n	3 cat.	1-2 cat.	0 cat.	4 cat.	1-3 cat.	0 cat.	True	False	Don't know
Gender	911	43%	44%	13%	32%	47%	21%	76%	8%	15%
Male	397	37%	47%	16%	26%	48%	26%	75%	8%	17%
Female	514	47%	43%	10%	37%	46%	17%	77%	9%	14%
Age	886	43%	44%	13%	33%	47%	21%	77%	8%	15%
20-29 age	118	42%	48%	9%	33%	55%	12%	76%	12%	11%
30-39 age	405	51%	43%	5%	40%	46%	14%	82%	9%	10%
40-49 age	127	47%	43%	10%	39%	39%	22%	72%	9%	20%
50-59 age	116	29%	46%	25%	16%	49%	35%	70%	5%	25%
60 and above	120	26%	43%	31%	14%	51%	35%	69%	6%	24%
Education level	902	43%	45%	13%	32%	47%	21%	76%	8%	15%
Below elementary	124	19%	37%	44%	9%	44%	48%	62%	6%	32%
Junior/High	389	41%	47%	13%	30%	49%	21%	74%	10%	16%
Above Institutes	389	52%	44%	3%	42%	47%	12%	83%	7%	10%
Marital Status	910	43%	45%	13%	32%	47%	21%	76%	8%	15%
Married	857	43%	44%	13%	33%	47%	20%	77%	8%	16%
Unmarried	53	40%	45%	15%	19%	49%	32%	72%	17%	13%
Residential area	910	42%	45%	13%	32%	47%	21%	76%	8%	15%
Northern	408	41%	47%	13%	36%	46%	19%	80%	7%	13%
Middle	238	41%	46%	13%	29%	47%	24%	73%	9%	18%
Southern	242	45%	41%	14%	28%	50%	21%	73%	10%	17%
Eastern	22	64%	27%	9%	41%	36%	23%	86%	0%	14%
Occupation	907	42%	45%	13%	32%	47%	21%	76%	8%	15%
White collar	323	49%	44%	7%	37%	48%	14%	81%	8%	11%
Blue collar	256	42%	41%	18%	30%	46%	24%	74%	8%	18%
Unemployed	328	37%	48%	15%	28%	47%	25%	73%	9%	18%
n	911	43%	44%	13%	32%	47%	21%	76%	8%	15%

Table 2. Statistics of Confidence and Correctness of Washing Hands

	n	Wash hands before holding or feeding child			Wash hands after returning home			Method of washing hands		
		Confident	Neutral/ No comment	Unconfi- dent	Confident	Neutral/ No comment	Unconfi- dent	Correct	Incorrect	Don't know
Gender	911	89%	3%	8%	88%	4%	9%	63%	37%	1%
Male	397	86%	5%	9%	83%	5%	12%	56%	43%	1%
Female	514	90%	3%	7%	91%	3%	6%	67%	32%	1%
Age	886	88%	3%	8%	88%	4%	9%	62%	37%	1%
20-29 age	118	85%	5%	10%	86%	1%	13%	68%	32%	0%
30-39 age	405	88%	2%	10%	88%	3%	9%	62%	37%	1%
40-49 age	127	90%	2%	8%	85%	3%	12%	61%	39%	0%
50-59 age	116	92%	4%	3%	90%	7%	3%	66%	34%	0%
60 and above	120	89%	7%	4%	88%	6%	6%	58%	41%	2%
Education level	902	88%	4%	8%	88%	4%	9%	63%	37%	1%
Below elementary	124	89%	6%	5%	84%	9%	7%	58%	40%	2%
Junior/High	389	87%	3%	10%	85%	5%	10%	63%	36%	1%
Above Institutes	389	90%	2%	8%	92%	1%	7%	64%	35%	1%
Marital Status	910	89%	3%	8%	88%	4%	9%	63%	37%	1%
Married	857	89%	4%	8%	88%	4%	8%	63%	36%	1%
Unmarried	53	85%	0%	15%	79%	2%	19%	55%	43%	2%
Residential area	910	89%	3%	8%	88%	4%	9%	63%	37%	1%
Northern	408	89%	3%	9%	88%	3%	9%	65%	34%	0%
Middle	238	88%	4%	8%	86%	5%	9%	58%	41%	1%
Southern	242	89%	4%	7%	88%	2%	9%	62%	36%	1%
Eastern	22	91%	5%	5%	86%	9%	5%	68%	32%	0%
Occupation	907	89%	3%	8%	88%	4%	8%	63%	37%	1%
White collar	323	88%	3%	9%	88%	2%	10%	62%	37%	1%
Blue collar	256	84%	4%	11%	83%	6%	11%	60%	39%	1%
Unemployed	328	92%	3%	5%	91%	4%	5%	66%	34%	1%
n	911	89%	3%	8%	88%	4%	9%	63%	37%	1%

**Table 3. Statistics of Attitude and Practice of Washing Hands (n=911)**

Attitude and practice of washing hands	n	%
Confidence in washing hands		
Wash hands before holding or feeding child		
Confident	807	89
Neutral/ No comment	31	3
Unconfident	73	8
Wash hands after returning home		
Confident	799	88
Neutral/ No comment	34	4
Unconfident	78	9
Wash hands method		
Method of washing hands		
Use soap and dry hands	570	63
Use water and dry hands	218	24
Use soap	71	8
Use water	45	5
Don't know / Refuse to answer	7	1
Frequency of hand washing before touching child		
Every Time	183	20
Often	487	54
Rarely	188	21
Do not wash hands	36	4
Don't know / Refuse to answer	17	2

**Table 4. Behavior in Seeking Medical Assistance after Symptoms of Enterovirus or preliminary symptoms of enterovirus infection with severe complications occur in Children**

	Suspected Symptoms of enterovirus			Suspected preliminary symptoms of enterovirus infection with severe complications	
	n	%		n	%
Clinic	530	58	Clinic	157	17
Pediatric Clinic	441	48			
ENT Clinic	26	3			
Internal Medicine Clinic	18	2			
Family Medicine Clinic	17	2			
Nearest Clinic (No specified Type)	28	3			
Hospital	364	40	Hospital	735	81
Pediatric	310	34	Medical Center	326	36
Internal medicine	18	2	Local Hospital	218	24
Emergency	13	1	District Hospital	191	21
Gastroenterological	9	1			
ENT	7	1			
Family medicine	4	0			
Skin	3	0			
Other	17	2	Other	19	2
Rest and do not seek medical assistance	2	0	Don't know / Refuse to answer	19	2
Don't know / Refuse to answer	15	2			
n	911			911	