ORIGINAL ARTICLE

Role of Primary Care Providers in Dengue Prevention and Control in the Community

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SUMMARY

Dengue fever is a major public health threat in Malaysia, especially in the highly urbanized states of Selangor and the Federal Territory of Kuala Lumpur. It is believed that many seek treatment at the primary care clinics and are not admitted. This study aims at establishing the fact that primary care practitioners, as the first point of patient contacts, play a crucial role in advising patients suspected of having dengue to take early preventive measures to break the chain of dengue transmission. A total of 236 patients admitted to two government hospitals for suspected dengue fever were interviewed using a structured questionnaire over a one week period in December 2008. I t was found that 83.9% of the patients had sought treatment at a Primary Care (PC) facility before admission to the hospital, with 68.7% of them seeking treatment on two or more occasions. The mean time period for seeking treatment at primary care clinic was one and a half (1.4) days of fever, compared to almost five (4.9) days for admission. The majority of patients (96-98%) reported that primary care practitioners had not given them any advice on preventive measures to be taken even though 51.9% of the patients had been told they could be having dengue fever. This study showed the need for primary care providers to be more involved in the control and prevention of dengue in the community, as these patients were seen very early in their illness compared to when they were admitted..

KEY WORDS:
Dengue transmission, Dengue case control, Dengue prevention, Primary care, Dengue education

INTRODUCTION

Dengue is a serious public health threat in the country with over 48,000 cases notified to the Ministry of Health in 2008 and over 3,000 cases reported in the first 2 weeks of 2009 with 8 deaths[1,2]. Most of the dengue cases are reported by the hospitals where in 2007, 98.5% were from the hospitals, both public and private3. Selangor and FT Kuala Lumpur, the two most urban and affected states, contributed to almost half the cases (47.5%) reported in the country.

Dengue fever is transmitted through the bite of the female Aedes mosquito that has been infected earlier after biting a person with dengue fever. A person with dengue is infective during the viraemic phase of the illness which is between 24-48 hours prior to onset of symptoms, and another 4-5 days after the onset of symptoms before the rise in antibody titre[4].

A study on the protracted dengue epidemic in North Queensland, Australia in 1997-1999 indicated that the outbreak spread very rapidly via movements of viraemic individuals to initiate multiple foci of the disease that could not be controlled using conventional methods[5]. Hence, managing the infected human host and preventing him/her from infecting the Aedes mosquitoes could be one way of limiting the transmission of dengue by reducing the incidence of sick persons infecting the Aedes mosquitoes. This in turn would reduce the number of new infections to the human and break the chain of dengue transmission.

The problem of this approach, however, is identifying these individuals early enough to institute preventive measures. Most commonly used laboratory tests or rapid tests do not yield positive results till 4-5 days of fever[6-8]. In addition, control is also made difficult due to the wide spectrum of clinical presentation with many inapparent infections, which had been reported ranging from 50 to 90 percent[9-11].

Malaysia has a very comprehensive National Dengue Control Programme, covering aspects of vector control, law enforcement, public education and case management[12]. In case management, control measures are taken within 24 hours of notification of a case of suspected dengue to the health authorities. However, such measures tend to be too late in containing the transmission. The average day of illness at the time of notification was about 4-5 days after the onset of illness[13]. A study on an outbreak in Gombak, a district in Selangor, showed that control measures were only taken 9 days after onset of fever of the index case[14]. This is not surprising as many people who are ill initially seek treatment at a primary care clinic before going to a hospital when the condition worsens. In Selangor, private clinics are an important point of contact where the 3rd National and Health Morbidity Survey showed that 77.6% of those with a recent illness went to private clinics[15].

Thus, primary care facilities as the first points of contact where most symptomatic dengue patients initially seek treatment, present a golden opportunity to institute early measures to break the chain of transmission of dengue.

This study aims at establishing the fact that many dengue patients seek treatment at primary care clinics and primary care practitioners play a crucial role in helping to control the spread of dengue in the community through appropriate advice given to patients on simple preventive measures.

MATERIALS AND METHODS

This was a cross-sectional study involving adult patients who were admitted for suspected dengue in two large government hospitals in the Klang Valley where many dengue patients are admitted. All suspected dengue patients in the wards except those under exclusion criteria were interviewed using a structured questionnaire over a one week period in December 2008. Patients who were ill, and foreign workers who were unable to communicate in the local languages were excluded.

A sample size of 350 was derived based on estimated 60% of patients having gone to see primary care practitioners before admission at power of 80% and 95% confidence interval using Naing L, Winn T and Rusli BN Sample Size Calculator for Estimations[16].

Questionnaires were developed by the investigators and pretested in one of the hospitals before use. Interviews were conducted by the investigators in English or Bahasa Malaysia by interviewers who were 2 medical doctors and a nursing sister from the Health Management Institute. In one of the hospitals, a nursing sister and a senior health inspector from the hospital assisted in the interview. All the interviewers were briefed on the questions and manner of conducting the interview earlier. For Chinese or Tamil speaking patients, the help of two Chinese speaking interviewer or nursing staff was sought.

The data analysis and calculations were carried out using SPPS statistical package, version 16. Fisher's exact test was used to compare difference in proportions for small numbers.

RESULTS

1. Respondent profile

A total of 354 patients were admitted during the study period, of which 236 were interviewed giving an overall response rate of 66.7%. Those not interviewed were either too ill, had language barrier, were not on the bed at time of visit to the wards, or had been discharged before they could be interviewed. The profile of respondents are shown in Table I.

2. Health seeking behavior

83.9% of the patients had sought treatment at a Primary Care (PC) facility before being admitted to the hospital, with 68.7% of them seeking treatment on two or more occasions. Thirty-eight of them (16.1%) were admitted on day of consultation either through the emergency department of hospital, or through referral from a PC facility (Table II).

Most patients sought treatment at the PC facility very early (mean 1.43 days, median of 1 day) with 30% of them seeking treatment on the same day of illness. In contrast, those admitted had a longer duration of illness before they were admitted (mean 4.93 days, median 5 days) (Table II).

3. Advice given by primary care providers

Advice by primary care providers were mainly centered on the illness like taking medication, drink more water and go for blood test. Less than 5% were told about preventive measures to take like avoid being bitten by mosquitoes, destroy adult mosquitoes in the house although 51.9% of them were told they could be suffering from dengue fever (Table III).

DISCUSSION

The findings of this study indicated that the majority (83.9%) of patients admitted for suspected dengue fever had sought treatment at a primary care facility prior to admission, with more than two thirds of them seeking treatment on two or more occasions. The time when they sought treatment at the primary care centre were also much earlier than when they were admitted (mean of 1.43 days, median of 1 day versus 4.93 days and 5 days respectively for those admitted). This means that patients who sought treatment at primary care facilities were still at the early viraemic phase of their illness and therefore posed a risk of infecting the Aedes mosquitoes if they are bitten. It also presents a golden opportunity for early interventions to break the chain of transmission of dengue fever, in particular by not being by bitten by the Aedes mosquitoes, and by attempting to destroy adult mosquitoes in house - assuming that most symptomatic patients spend most of their time in the house during the early phase of their illness.

Table I : Characteristics of Respondents

Respondent Profile	Number of respondents (%)		
	Hospital 1, (n = 121)	Hospital 2, (n = 115)	Total (n = 236)
Gender			
Male	73 (60.3)	73 (63.5)	146 (61.9)
Female	48 (39.7)	42 (36.5)	90 (38.1)
Ethnic group			
Malay	58 (47.9)	68 (59.2)	126 (54.4)
Chinese	15 (12.4)	11 (9.5)	25 (11.0)
Indian	25 (20.7)	23 (20.0)	48 (20.3)
Others	23 (19.0)	13 (11.3)	36 (15.3)
Nationality			
Malaysian	105 (86.8)	100 (86.9)	211 (86.9)
Foreigners	16 (13.2)	15 (13.0)	31 (13.1)
Education level			
Primary school	24 (19.8)	19 (16.5)	43 (18.2)
Secondary school	65 (53.7)	76 (66.1)	141 (59.7)
College/University	26 (21.5)	18 (15.6)	44 (18.6)
No education	6 (5.0)	2 (1.7)	8 (3.4)

Table II : Health seeking behavior of those with suspected dengue fever

Health seeking behaviour	Frequency	Percent (%)
Sought treatment at PC facility (n = 236)		
Yes	198	83.9
No	38	16.1
No. of consultations at PC facility (n = 198)		
Once	62	31.3
Twice or more times	136	68.7
Type of PC facility where treatment was sought (n = 198)		
GP clinic	138	69.7
Government. health clinic	37	18.7
Hospital outpatient clinic	14	7.1
Others	9	4.5
Duration of illness before first treatment at PC facility (n=198, mean 1.43 days)		
Same day	60	30.3
2-3 days	98	49.5
4-5 days	32	16.2
6-7 days	8	4.0
>1 week	0	0.0
Duration of illness before admission to hospital (n= 233, mean 4.93 days)		
Same day	0	0.0
2-3 days	46	19.7
4-5 days	108	46.4
6-7 days	59	25.3
>1 week	20	8.6

Table III : Advice given to patients who sought treatment for fever at PC facilities

Advice given by PC provider (n = 181)	All patients (%)
Told they could be having dengue fever	51.9
Take medication given	94.9
Drink more water	79.7
Advised on blood testing	45.9
Return if fever does not subside	37.9
Asked if anyone else in the family with similar illness	31.8
Seek further treatment in a hospital if not better	23.7
Avoid being bitten by mosquito	3.5
Search and destroy Aedes breeding places in and around the house	3.0
Kill adult mosquitoes in the house	1.5

Table IV : Analysis on advice given at PC facilities between those who were told they could be having dengue fever, and those who were not told

Advice given by PC provider (n = 92)	Told could be having dengue fever		P value
	Yes	No	
Avoid being bitten by mosquito	4.3%	2.4%	0.684*
Kill adult mosquitoes in house	3.3%	0.0%	0.247*
Search and destroy Aedes breeding places in and around the house	5.4%	1.2%	0.213*

* P > 0.05, Fisher's exact test

There was no significant difference in the advice given on preventive measures between those who were told they might be having dengue fever and those who were not told (Table IV) for each of the advice (P > 0.05).

Transmission dynamics of dengue is a function of the basic reproduction number, defined as the number of secondary infections produced by a single infected person in an entirely susceptible population during the infectious period[17]. This means that if an infection is unable to produce at least one secondary infection, the disease will die out. Following this logic, by preventing the dengue patient from infecting the Aedes mosquito, secondary infections can be reduced if not prevented all together.

Considering the fact that many patients could have possibly been treated at the primary care facility alone without being admitted, plenty of opportunities for early intervention had been lost since preventive and control measures by the health departments are only taken on cases that are notified and only 1.5% of notifications were from the clinics (both public health clinics and private clinics, 2007)[3].

Thus, primary care providers provide a vital link in the control of dengue transmission by educating suspected dengue patients to take measures aimed at preventing Aedes mosquitoes from being infected by them, and at immediately killing all adult mosquitoes in the house to reduce the potential for Aedes bites as well as to destroy Aedes mosquitoes in the house that could have already being infected by them using mosquito aerosols. This is after all, the aim of indoor fogging when a case of dengue is being notified to the Health Department. Although spraying with the domestic mosquito aerosol is not as encompassing as fogging machines used by the Health Department, nevertheless it is better than not doing anything. Unfortunately, primary care practitioners appeared not to be giving this kind of advice even though 51.9% of the patients were told they could be having dengue fever.

Current practice by primary care providers in the management of suspected dengue patients appeared to be too disease and symptom orientated with little consideration on public health perspective. This is partly due to the fact that dengue cannot be diagnosed with certainty at the early stage of the disease when patients present with non-specific fever that mimic many other febrile illnesses. However, since dengue is common in Malaysia, with many outbreak areas in the Klang Valley region, and it could be fatal, primary care practitioners must exercise vigilance and enquire on the possibility of dealing with a dengue infection. A high index of suspicion and appropriate history taking, particularly with regards to a recent stay in dengue hotspots, are useful for early and accurate diagnosis of dengue[12].

Ideally, it would be easier for primary care practitioners to play their role if dengue can be diagnosed early. Although a *decision-tree algorithm* has been reported to be able to predict the diagnosis of dengue with accuracy of up to 84.7% using a combination of clinical, haematological and virology data at the time of presentation within 72 hours of onset of fever [18], this is not practical as most primary care clinics in the private sector do not have laboratory facilities.

Nevertheless, with limitations in making early confirmatory diagnosis, current national dengue control measures are taken based on notification of a suspected dengue, as waiting for serological or virology confirmation would have been too late to contain the spread of the disease. Hence, advice on preventive measures by primary care practitioners should proceed based on clinical suspicion, especially in dengue outbreak areas. Moreover, such measures are simple to carry out and do not cause harm or incur excessive cost.

Dengue case control measures should not be instituted at the notification of a case alone, as doing so means missing out many others that were not notified as in cases treated at the primary care facilities. Enforcement on notification should not be the focus for primary care providers. Instead, they should be enlisted as partners in the prevention and control of dengue fever in the community through appropriate patient education.

Prevention and control of dengue in the community requires a multi-prong approach and the involvement of primary care practitioners is just one additional strategy that should be looked into. While the issue of symptomatic cases can be addressed at the primary care level, more thoughts need to be given on the situation of asymptomatic and subclinical cases that continue to contribute to the prevalence of infected Aedes mosquitoes in the community and perpetuating the dengue transmission cycle.

LIMITATIONS
The study was conducted on patients admitted for suspected dengue and they could well turn out to be other illness on discharge, especially chikungunya which has a very similar presentation. Nevertheless, such limitation is also faced in real life where case control for dengue is largely based on notification of a clinically diagnosed case and major measures are taken without waiting for confirmation of diagnosis.

The study is limited to patients admitted to two government hospitals in the Klang valley alone, excluding those in the private sector and university hospitals. Nevertheless, as the major healthcare provider in the Klang valley region where dengue is most rampant, the findings do provide very valuable information for the national dengue control programme.

CONCLUSION
Dengue fever is a major health threat in Malaysia. Primary Care practitioners, as the first point of patient contact, are crucial partners in the fight against dengue by providing advice to patients suspected of having dengue on simple preventive measures to be taken on their own, as patients were seen very early in their illness compared to when they were admitted. This study showed the need for primary care providers to be more involved in the control and prevention of dengue in the community.

RECOMMENDATIONS
Primary care providers must be made important partners in the prevention and control of dengue fever in the community. Appropriate education and information on dengue outbreak areas should be in place for primary care doctors to be more vigilant on possible dengue cases when treating febrile illnesses; and in providing appropriate advice to patients suspected of having dengue fever to break the chain of dengue transmission at the earliest opportunity. Law enforcement on failure to notify suspected dengue cases should not be the focus for primary care providers so that they can participate fully in this role without fear.

ACKNOWLEDGEMENT

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