

A REVIEW OF CRITICAL PERTUSSIS IN PICU UMMC FROM 2010-2015

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Introduction

Since 1994 to 2009, ascribed by the good coverage of immunization, the incidence of pertussis has been less than 1 in 100,000 populations [1]. Nevertheless, the incidence and prevalence increased tremendously for the past 2 years, i.e. 2014 and 2015.

Pertussis potentially causes severe clinical presentation requiring intensive care. Pertussis illness requiring admission to the PICU is referred as critical pertussis [2].

On the other hand, infantile malignant pertussis is distinguished by severe respiratory failure, pulmonary hypertension, hyperleukocytosis and death [3].

Methodology

A retrospective cohort study reviewing medical record of patients with critical pertussis admitted to University of Malaya Medical Center from 2010-2015.

Inclusion criteria:

- Diagnosed pertussis clinically, with or without confirmatory test, and WCC of $> 30 \times 10^9/L$
- Patients admitted to PICU between years 2010-2015

Result

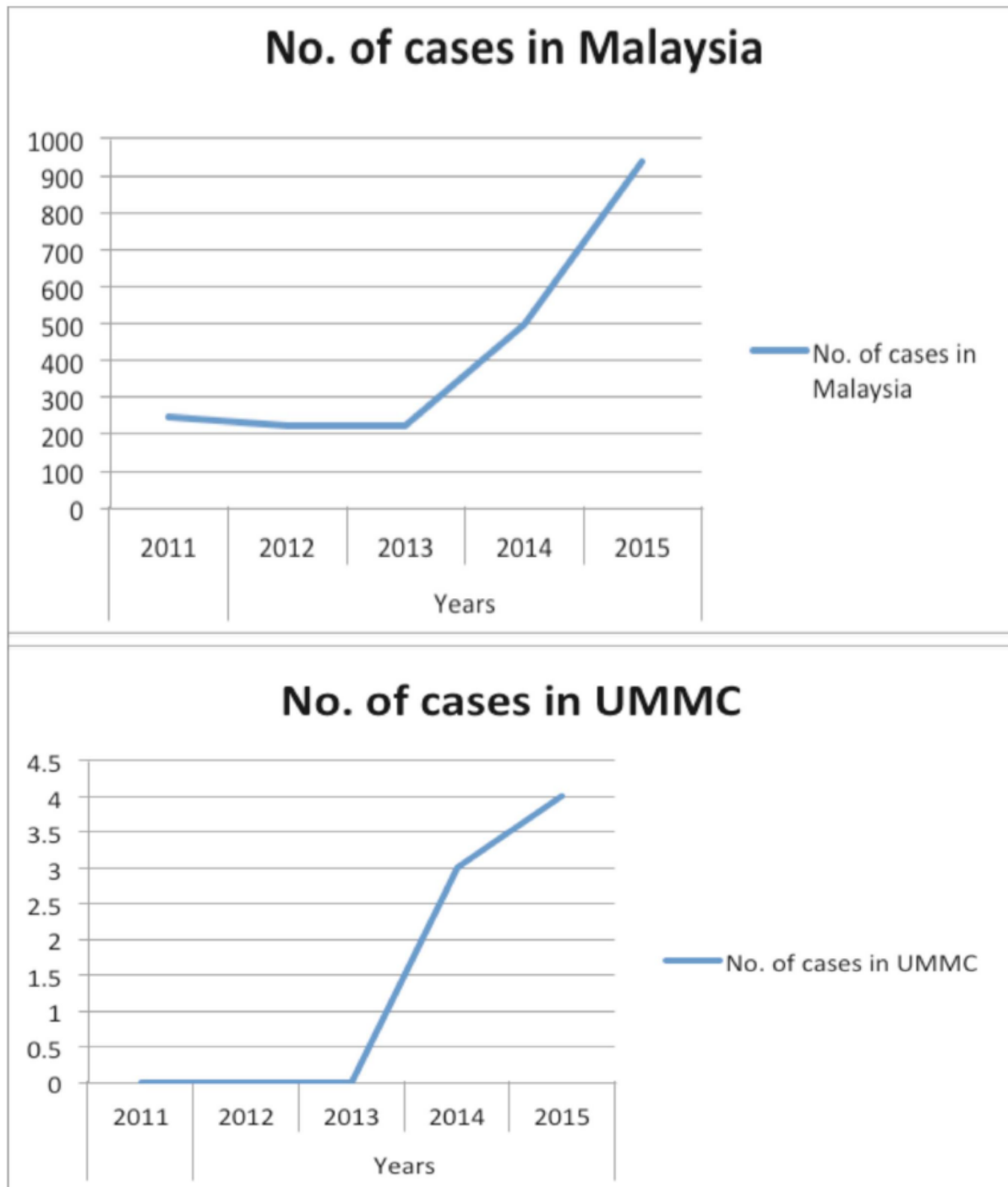
There were 7 patients with clinical pertussis from year 2010-2015, age ranged between 1-9 months old. Majority of patients, 5 out of 7 were less than or equal to 3 months old. Mean duration of cough was 1 weeks and 86% of patients had cough less than 10 days prior to presentation. More than half of the patients (57%) had known ill-contact in the family. 86% of patients had WBC more than $60 \times 10^9/L$, and all of the patients had received macrolide (either erythromycin and azithromycin) with double volume exchange transfusion. Despite treatment, the mortality rate was high (29%) with complication of refractory pulmonary hypertension.

Table 1. Demographic data and outcome of patients with pertussis admitted to PICU, UMMC

| | |
|--|----------|
| Number of cases | 7 |
| Gender (Male/Female) | 4/3 |
| Median age | 2 months |
| Mean duration of cough prior to presentation | 1 weeks |
| Mean WBC at presentation ($\times 10^9/L$) | 77 |
| Mean duration of PICU stay (days) | 10 |
| Mean duration of hospital stay (days) | 17 |

| | | |
|--------------|----------------------------|---|
| Immunization | Too young for immunization | 5 |
| | Incomplete | 1 |
| | Unimmunized | 1 |
| Outcome | Survive | 5 |
| | Death | 2 |

Graph 1. Comparison of number of cases in Malaysia and UMMC from 2011 to 2015



Discussion

Malaysia has increasing incidence of pertussis from year 2014 to year 2015, similarly the incidence of critical pertussis admitted to PICU, UMMC. In this study infants aged less than or equal to 3 months old were highly susceptible to the critical pertussis. Despite vaccination scheme proposed by Ministry of Health Malaysia, incidence rate of pertussis rising has doubled each year since year 2013. Factors that may have contributed to the surge of whooping cough are – increase in awareness of the disease, wide-spread use of PCR which is higher in sensitivity and specificity in diagnosing pertussis, reduced efficacy of DTaP vaccine and genetic change of *Bordetella pertussis* strain [5].

There was an increase of the incidence of pertussis in infants, adolescents and adults since after vaccination [6]. It was reported that adolescents and adults transmitted pertussis to infants who were too young for immunization or had incomplete immunization [6]. Close family contact was known as the cause for the transmission of the disease to unprotected young infants [6]. In our study, almost 2/3 of the patients had ill-contact from family members. Infant who is too young for immunization and at the risk of exposure in family, often suffer from the most severe form of critical pertussis, malignant pertussis. Cocooning strategy, vaccination among pregnant women and family members, may be helpful in protecting those young infants from pertussis [6].

High mortality rate of critical pertussis was reported in many other studies, in between 2.5-9% [4,8]. It was reported that children with WBC more than $50 \times 10^9/L$ had 10 times higher risk of mortality [4]. This is consistent with mortality rate reported in our

centre which is 29%, as all of the included patients had hyperleukocytosis.

The morbidity of critical pertussis is high as shown in this study with prolonged PICU and hospital stay. In other words, financial burden of this disease is high. In New Zealand, estimated cost for intensive care per non-epidemic year was 81860 NZD [9]. Effective and adequate immunization program in preventing pertussis is the solution in minimizing the morbidity and mortality of the disease.

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