ORIGINAL ARTICLE

A RAPID ASSESSMENT OF TYPHOID REPORTING SYSTEM, KELANTAN, MALAYSIA, 2001

Wan Mansor H[1,4], Wan Mohd. Sulaili WS[1], Khalid Y[1], Hamzah AM[2], Abdul Haris M[2], Hani MH[1], Ooyub S[3] & Chuleeporn J[4]

[1] *Epidemiology Unit, Kelantan State Health Department, Malaysia*
[2] *Kota Bharu District Health Office, Kelantan, Malaysia*
[3] *Disease Control Division, Ministry of Health, Kuala Lumpur, Malaysia*
[4] *International Field Epidemiology Training Program (Inter-FETP), Bureau of Epidemiology, Ministry of Public Health, Thailand*

ABSTRACT

A study was conducted in Kelantan, Malaysia, in the year 2001, to assess the typhoid reporting coverage and timeliness, and to estimate the annual incidence. Cases were persons given the diagnosis of typhoid clinically, and confirmed cases are those with positive laboratory results. In all, 174/252 (69%) cases (95% CI = 63%-75%) were reported, of which 89/131 (83%) within 7 days of diagnosis. The estimated annual typhoid incidence in Kelantan is 37/100,000.

Key words: *Typhoid fever, reporting system, communicable diseases surveillance, Salmonella typhii, Malaysia.*

INTRODUCTION

Typhoid fever is a systemic bacterial infection, characterized by insidious onset of sustained fever and constitutional symptoms and signs like severe headache, malaise, anorexia and hepatosplenomegally[1,2]. It is virtually always acquired by ingestion of food or water contaminated by human excreta that contains *Salmonella typhii*[1].

Kelantan is one of the states in Malaysia with the population of 1.34 million, divided into 10 districts with Kota Bharu as a state capital. There are 8 government hospitals, 1 medical teaching hospital and 1 private hospital operating in the year 2001.

The Health Management Information System (HMIS) was implemented since the last 15 years with regular report sent from peripheries to the central level. Medical practitioners were obliged to report 26 reportable diseases diagnosed within specified time range to the nearest health office. Every year Kelantan recorded the highest annual incidence rate (IR) of typhoid fever in Malaysia. The annual IR per 100,000 population between the years 1996-2000 ranged from 15 to 22, compared to the national level which ranged between 3 to 5[3-6]. A proper surveillance system is important to show a clearer epidemiological picture so that appropriate public health action can be taken[7,8]. However so far, no formal evaluation of the reporting system has ever been carried out in Kelantan.

This study is to determine the reporting coverage and reporting timeliness of typhoid cases and estimate the annual incidence rate in the year 2001 for the state of Kelantan, Malaysia.

METHODOLOGY

A cross sectional study was carried out to review typhoid cases diagnosed at hospitals in Kelantan within the period 1 of every 4 weeks in the year 2001 which was arbitrarily selected. Data were retrieved from Ward Admission Register Book, Laboratory Register Book, monthly Health Management Information System (HMIS) report from hospital's record office, patient's case notes and from the District Communicable Diseases Register Book (Epid 101) available at each District Health Office. Raw data compiled in Excel spreadsheet format were transferred to the Epi-info file and analysis were made using Epi-info version 6. Patients investigated but not diagnosed as typhoid or resided outside Kelantan were excluded from further analysis. Analysis to describe the coverage and timeliness of reporting was made based on all diagnosed cases. Confirmed cases were used to estimate the annual incidence rate of typhoid fever in Kelantan.

Definitions: A case was defined as a patient admitted to a hospital in Kelantan within the study period and diagnosed as typhoid by the physician. A confirmed case is a patient with any one positive laboratory investigations: culture, typhidot or Widal-Weil-Felix (WWF)[9].

The Reporting Coverage measured as a percentage of a report made out of total typhoid cases diagnosed. Overall reporting coverage referred to all cases diagnosed whereas reporting coverage of confirmed cases referred just to confirmed cases only. The Predictive Value Positive is defined as the percentage of confirmed cases among all reported cases.

The Reporting Timeliness measured the duration taken in days for five stages: Admission Duration is the duration between the date of onset to the date of admission, Diagnosis Duration is the duration between the date of admission to the date of diagnosis made, Reporting Duration is the duration between the date of diagnosis to the date of the report received by the district health office of which the legal cut-off point in Malaysia was not more than 7 days, Reporting Time Index is the duration between the date of onset to the date of the report received and Average Reporting Time Index (ARTI) is a mean of Reporting Time Index, calculated as the cumulative of Reporting Time Index of all cases divided by the number of reports received. The ARTI is equivalent to the Average Notification Time Index (ANTI) used as an indicator in the National Quality Assurance Program which was set at less than 14 days[10].

The Estimated Annual Incidence Rate (EAIR) is defined as the 4 x number of confirmed typhoid cases found in this study x 100,000 and divided by the total population of Kelantan for the year 2001.

RESULTS

In total, 426 patients were listed for record review. Of that, 172 (40%) patient's records were misplaced and could not be reviewed, 21 (5%) not diagnosed as typhoid and 2 (1%) were non-Kelantan residence. At the end, 252/426 (59%) patients were included in the analysis. All hospitals reported typhoid cases with Hospital Kota Bharu having the highest number (Table 1). Out of 252 cases, 114 (45%) were diagnosed on admission. Finally, 124/252 (49%) cases were diagnosed as confirmed cases, of which 37/124 (30%) by culture, 57/124 (46%) by WWF, 5/124 (4%) by typhidot and 25/124 (20%) by more than one method.

Reporting coverage: Overall 252 cases diagnosed, only 174/252 (69%) were reported with 95% Confidence Interval (CI) at 63% to 75% and variations between hospital (Table 1). The reporting coverage of confirmed cases was at 60%, lower than among unconfirmed cases at 78%. The Predictive Value Positive (PVP) was calculated at 43% (Table 2).

Reporting Timelines: Out of 252 cases diagnosed, 248 (98%) cases were analyzed for the admission duration, 209 (83%) cases analyzed for the diagnosis duration, 131 (52%) cases analyzed for the reporting duration and 171 (68%) cases analyzed for the reporting time index. Others could not be analyzed because necessary dates were not stated in the record. Values for each period as stated in Figure 1.

Among all reports made, 8 out of 10 hospitals reported at least 80% of them within 7 days except Hospital Gua Musang with only 50% and Hospital Universiti Sains Malaysia with 70%. The Districts of Kota Bharu, Pasir Mas, Tumpat and Jeli had ARTI more than 14 days.

Incidence rate: With 124 confirmed cases detected in the study period, the Estimated Annual Incidence Rate (EAIR) of typhoid fever in Kelantan was 37/100,000. Seven out of 10 districts with EAIR >20/100,000 with Districts Jeli, Pasir Mas, Tumpat and Kota Bharu recorded EAIR >40/100,000. Districts Machang, Kuala Krai and Gua Musang recorded EAIR <20/100,000.

Table 1. Reporting Coverage of Typhoid Cases By Hospital, Kelantan, Malaysia, 2001.

Hospital (H)	Number of cases diagnosed	Reporting Coverage
Kota Bharu (HKB)	107	87 (81%)
Kuala Krai (HKK)	4	1 (25%)
Pasir Mas (HPM)	35	20 (57%)
Tanah Merah (HTM)	12	9 (75%)
Tumpat (HTpt)	24	16 (67%)
Machang (HMcg)	4	1 (25%)
Pasir Putih (HPP)	15	11 (73%)
Gua Musang (HGM)	2	2 (100%)
Univ. Sains (HUSM)	40	22 (55%)
KB Medical Center (KBMC)	9	5 (56%)
TOTAL	252	174 (69%)*

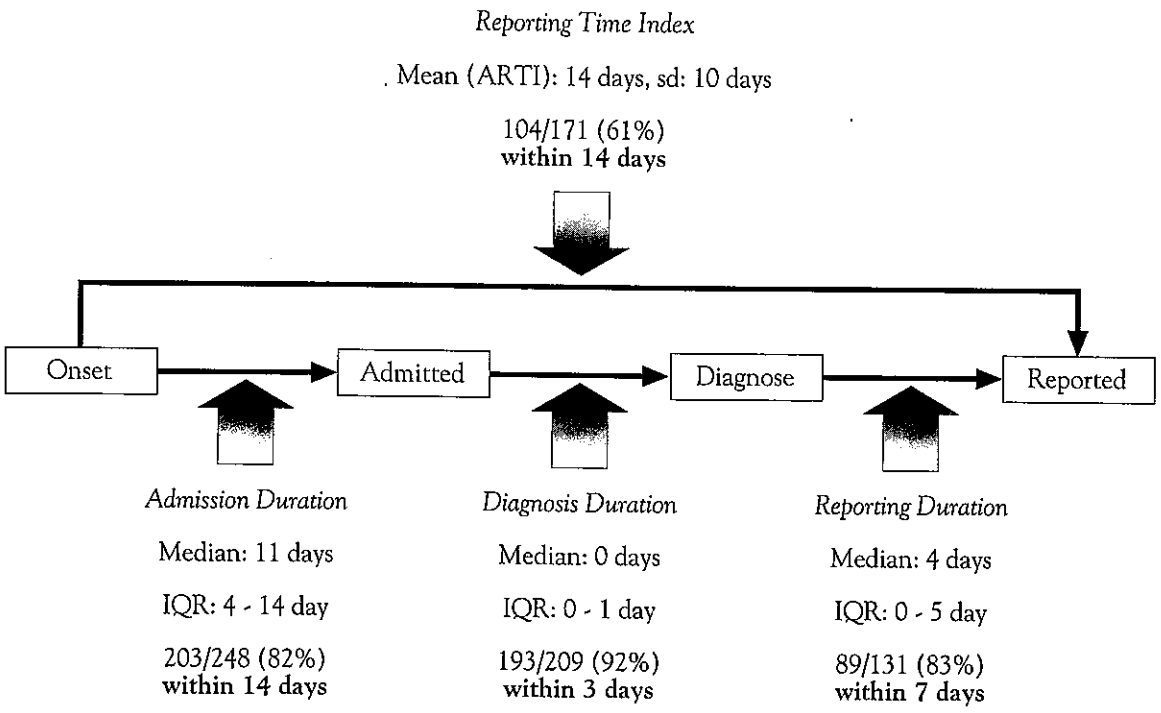
** 95% Confidence Interval: 63% - 75%.*

Table 2. Reporting Coverage of Typhoid Cases By Final Diagnosis, Kelantan, Malaysia, 2001.

Final Diagnosis	Reported (%)	Not Reported (%)	Total (%)
Confirmed Typhoid	74 (60%)	50 (40%)	124 (100%)
Non Typhoid (Unconfirmed)	100 (78%)	28 (22%)	128 (100%)
Total	174 (69%)	78 (31%)	252 (100%)

Reporting coverage of confirmed cases: 74/124 = 60%
Non-reporting coverage on unconfirmed cases: 28/128 = 22%
Predictive Value Positive (PVP): 74/174 = 43%

Figure 1. Different Stages of Reporting Timeliness of Typhoid Cases, Kelantan, Malaysia, 2001



Note: sd = standard deviation; IQR = inter quartile range

DISCUSSION

With the overall reporting coverage of 69% (CI: 63%, 75%) shows that typhoid cases were under-reported in Kelantan. However this finding is similar with what has been reported by Janes *et al* who says because most of surveillance systems are based on conditions reported by health care providers, under-reporting is inevitable, and depending on conditions, 5% to 80% of cases that actually occur will be reported[11]. In this study, though the non-reporting rate of unconfirmed cases (22%) and PVP (43%) are low, but the overall reporting coverage (69%) and reporting coverage of confirmed cases (60%) are considerably high. It is very important because in surveillance system, reporting rate among confirmed or true cases is required most in order to detect more cases thus outbreak control activities could be instituted in the earliest possible.

The timeliness of various steps in the reporting process is acceptable. With the median admission duration of 11 days and 92% of patients were diagnosed within 3 days of admission, most patients were detected, diagnosed and received early treatment.

The study shows the whole state of Kelantan and 4 districts namely Kota Bharu, Pasir Mas, Tumpat and Jeli with ARTI more than 14 days and could be classified as an outlier of ANTI indicator as set in the national quality assurance (QA) standard[10]. With the Estimated Annual Incidence Rate (EAIR) of typhoid fever at 37/100,000, it doubles with the actual Annual Incidence Rate (AIR) reported from the surveillance data for the year 2001 which is 18/100,000, and 10 times higher than the national AIR which is 4/100,000[4].

In this study, though typhoid cases diagnosed in hospitals were only 69% reported, but with most cases were able to be diagnosed, treated and reported early without complication, it shows that typhoid surveillance system in Kelantan is adequate and acceptable. However there are still many points could be improved to prevent the prevalence of disease remain high. Corrective measures need to be taken to those hospitals with low reporting coverage and high number of cases diagnosed, especially Hospital Universiti Sains Malaysia (HUSM) which reported only 22/40 (55%) cases since it is a high capacity teaching hospital. Requirement for timely reporting is need to be regularly briefed to medical practitioners and active record review in major hospitals is necessary. More active prevention and health promotional activities are recommended to be carried out in high burden districts.

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