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Immunisation Status in Hospitalised Infants: Reasons for Incomplete Immunisation

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SUMMARY

Objective: Immunisation is known to be an effective health intervention that protects children from infectious diseases. Of all children, infants are the most vulnerable if they experience a vaccine preventable disease. The aim of the study was to determine the immunisation status of hospitalised infants, to obtain the reasons of incomplete immunisation and to assess carers' knowledge on immunisation. **Methods:** This was a cross-sectional study conducted in the Institute of Paediatrics at Hospital Kuala Lumpur over a 2-month period from June to August 2001. Data were collected through an interview using a structured questionnaire, with the carer of the infant. Questions pertaining to the immunisation status of the infant, reasons of incomplete immunisation and the carer's knowledge of immunisation were assessed. **Results:** 115 infants were admitted during the study period; however, only 100 carers of the infants were available for an interview. The average age of the infants was 5.7 months. 22% of the infants had incomplete immunisation. 64% of them had missed more than one vaccine. The commonest missed vaccine was the 3rd dose of diptheria-pertussis-tetanus (DPT) and polio vaccine. Reasons of incomplete immunisation include misconception on contraindication of immunisation perceived by both parents and health providers, missed appointment and communication breakdown with health facilities regarding appointment dates. The under-immunisation rate in the study population was 22%. The under-immunisation rate in the study population was 22%. **Conclusion:** Health providers and the public need to be educated on the importance of immunisation and the associated valid contraindications.

Keywords: Infants, carer, under-immunisation, incomplete immunisation

INTRODUCTION

Immunisations are effective and cost-efficient means for the prevention of disease. It is one of the most cost-effective activities in primary health care. Impressive benefit-to-cost ratios have been shown in United States for measles (12:1), rubella (8:1), and whooping cough (11:1).[1]

Despite the achievements made through immunisation, compliance with recommended schedules of immunisation in childhood is not always complete, thus limiting the efficacy of these vaccines. Under-immunisation especially among pre-schoolers has contributed to the current epidemic of measles at preschool level[2,3] and the rising number of children who have acquired pertussis.[4]

The immunisation coverage for Malaysia was more than 90% for all vaccine preventable diseases, with the exception for measles in 1999.[5] However, compared to all other states in

Malaysia, Federal Territory of Kuala Lumpur, where this study was conducted, had the lowest coverage of immunisation.[5] Except for BCG, the immunisation coverage for hepatitis B, DPT (oral polio) and measles was 36%, 37.9% and 30.4% respectively which was far lower than that attained in the other states. Therefore, to improve the immunisation coverage so as to reach the nation's target of 90% coverage particularly in Kuala Lumpur, the reasons for under-immunisation need to be identified and addressed. This study will focus on the immunisation status of infants since more than 80% of the vaccines recommended are given during infancy. The objective of this study was to determine the following: the immunisation status of infants admitted to a general paediatric ward; the reason(s) for incomplete immunisation; carer's knowledge on reasons for immunisation and to further gauge the awareness of the scheduled immunisation due for the child.

MATERIALS & METHODS

Research Setting and Study Population

This is a cross-sectional study carried out in one of the wards in the Paediatric Institute of Hospital Kuala Lumpur, which is a tertiary health care center in Malaysia, over a period of nine weeks from June to August 2001. The assigned ward which is a teaching ward, receives new admissions on 'active days' that is on every other day, for patients ranging from 1 month to 12 years of age.

The study population includes infants admitted to the ward during the study period. An infant was defined as a child of up to 1 year of age. Children with multiple hospital admissions during the period were reviewed at the time of their first admission.

Data Collection

A standard questionnaire format was used for data collection by interviewing the infant's caregiver. The prepared questionnaire had undergone a preliminary testing at a community health centre in the vicinity of the hospital. The immunisation history was obtained from caregivers to ascertain the immunisation status of the patient. In cases where a delay was noted, the reasons for the overdue were obtained and responses grouped accordingly. The patient's immunisation status was further counterchecked with the immunisation card, if available. The immunisation schedule used was in accordance with the earlier recommended schedule prior to the revised one in June 2002. It comprises BCG, three doses of the hepatitis vaccine to be given at birth, 1 and 5 months, three doses of the primary course of diptheria, pertussis, tetanus, and polio (DPT and polio) to be given at 3,4 and 5 months; and measles vaccine at 9 months.

Infants were considered to have incomplete immunisation for their age if they had not received a scheduled dose at the time of the study, and it was more than 1 month overdue. Knowledge of the caregiver on immunisation covering aspects such as the reason(s) to immunise was obtained through an open-minded question. The caregiver was also asked about the next scheduled immunisation for the child; including the expected age and the type of vaccine due.

RESULTS

A total of 115 infants were admitted to the assigned ward during the study period. Of these, only 100 infants were included as the rest were discharged before their caregivers were interviewed.

Twenty-two out of 100 hospitalised infants had incomplete immunisation; giving the immunisation rate of 78% for the study population. Immunisation cards were available in 63 cases for inspection.

Table 1 shows the distribution of infants according to age and Table 2 the number of infants with incomplete immunisation according to the type of vaccine. The most common vaccine that was missed was the 3rd dose of DPT and polio vaccine followed by 3rd dose of hepatitis B vaccine. One infant could have missed more than one vaccine in any series of incomplete vaccination. This study found that 64% of these infants had missed more than one type of vaccination.

Table 1. Distribution of infants according to age

Age group (Months)	No/ %
0-3	26
3.1-6	27
6.1-9	29
9.1-12	18
Total	100

Table 2. Number of infants with incomplete immunisation according to the type of vaccine(s) missed

Type of immunisation	No.
BCG	3
Hepatitis B 1st dose	1
Hepatitis B 2nd dose	4
DPT + Polio 1st dose	2
DPT + Polio 2nd dose	6
DPT + Polio 3rd dose	10
Hepatitis B 3rd dose	9
Measles	3
Total	38

* One infant could have missed more than one vaccine in any series of incomplete vaccination.

Table 3 shows the reasons given by the caregivers for incomplete immunisation. Most of them said the infants being ill at the time of vaccination was a reason for not getting them vaccinated. This perceived contraindication occurred not only among parents but also among health providers. Of the vaccinations deferred by health staff, 8 were deferred by doctors

during health visits, 3 during hospital admission and 2 were deferred by nurses. Although we could not ascertain whether these vaccinations were appropriately deferred based on valid contraindications or not, there were three cases that definitely constitute missed opportunities. These infants, aged more than one month at the time of interview, were born premature with respiratory distress in a hospital. BCG was not given on discharge and surprisingly, the BCG was again deferred when they had their subsequent vaccination. As for the other 6, parents did not go to the clinic because they thought vaccination would be harmful as their children were already not too well then.

Table 3. Reasons for incomplete immunisation

Reasons for incomplete immunisation	No.
Vaccination deferred by health staff as infant was ill*	13
Vaccination deferred by parents as infant was ill*	6
Parents missed immunisation schedule	2
Late appointment	1
Total	22

* Constitute as perceived contraindication

Knowledge of Immunisation

In response to the question 'why do we immunise children', 87% of caregivers gave appropriate answers referring to disease prevention (eg. to prevent disease, to protect my children and for their well being). A small proportion gave answers referring to doctor's recommendation (3%), government's requirement (1%) and (9%) said that they did not know the reason for immunisation. In response to the question 'What and when is the next immunisation schedule due for your baby?' 60% of caregivers correctly stated what the next immunisation was and 66% knew when the next immunisation was due.

DISCUSSION

Inner city areas are known to have low immunisation coverage[6,7]. The Federal Territory of Kuala Lumpur also had the lowest coverage in the country, which was only 30% to 40%[5]. From this study, it was found that the immunisation uptake for the study population was 78%, a level lower than the required 90-95% for herd immunity to prevail in the general population.[8] However, this result is higher compared to a report of a children's hospital in Australia; in which of 204 mothers interviewed, only 135 (66%) had complied fully with the recommended schedule.[9]

Compared to other vaccines, the 3rd dose of DPT and polio were the most frequent vaccines to be missed. Therefore, the immunisation uptake rate for the 3rd dose of DPT and polio in the ward was ninety percent. The low compliance in completing the immunisation series could be due to a combination of parental delay in seeking preventive care and the fact that compliance falls with repeated dosing. This result does not correlate with the trend of immunisation coverage in the Federal Territory that showed a fall of 40% after the first

dose of DPT (oral polio) vaccine.[5] The percentage of infants who received DPT 3rd dose is used as a quality assurance indicator for the Expanded Programme of Immunisation (EPI) to evaluate immunisation coverage. The most recent EPI target was for global immunisation coverage of 90% by the year 2000. The percentage for DPT 3rd dose coverage attained in this study population is within the EPI set target but not reflecting the general population of Kuala Lumpur. This could be due to a small sample size and the study was limited to hospitalised infants and probably was not reflective of the general population characteristics.

This study found that slightly more than one-third of caregivers (37%) did not have the immunisation card with them during the interview. Although it has been suggested that parents should carry an immunisation card for their children,[9] a survey among in-patients in Australia found that such records were available at the presentation of less than half of all admissions.[10] It is important to stress that parents bring the card for any health visits including during hospitalisation in order to update the immunisation status of the child. Parent's recall can be inaccurate at times as illustrated by a study in the United States who found that 30% of parents gave the admitting physician inaccurate immunisation histories.[11]

Regarding the caregiver's knowledge of immunisation, we found that the vast majority of parents firmly believed immunisation to be an extremely important way to protect children against serious disease. This could have been due to the on-going intensive dissemination of education information by the Ministry of Health to the public on the importance of immunisation. However, there were still nine percent of the caregivers interviewed who did not know the reason for immunisation and this could adversely affect their decision-making. Not knowing the benefits and reasons for vaccination would definitely sway negatively towards vaccination uptake.

Correct knowledge of the immunisation schedule is significantly associated with a higher immunisation rate.[12] Incorrect knowledge of the recommended age for the first measles-mumps-rubella (MMR) vaccine was found to be a significant risk factor for delayed immunisation in 2-year-old children in Colorado.[12] In this study, two-fifths of the caregivers were not aware of the next scheduled immunisation due for their child. This group may represent possible future non-compliance in completing their child's subsequent course of immunisation. This was further reinforced by the fact that two infants in this study were under-immunised because their parents were ignorant about the schedule. Therefore, it is important that medical staff take the opportunity at any encounter during the hospital stay to reinforce the immunisation schedule on the parents. Furthermore, to further remind parents, postcard reminders with date and time of appointments or reminders in the form of calls were suggested by parents in two studies conducted in the United States.[11,13]

In this study, eight of the immunisations were deferred by health staff, comprising mainly of physicians. Immunisation was deferred in these children as they were not too well at the time of visit. Although we could not ascertain whether these vaccinations were appropriately deferred based on valid contraindications or not, there were three cases of ex-premature infants that definitely constitute as missed opportunities. Prematurity has often been perceived as a contraindication to immunisation among health paramedics although this issue has been addressed in present local guidelines.[14]

Several studies have shown that missed opportunity contributes to undervaccination in preschool-aged children.[15,16,17] During an encounter with a health provider McConnochie found that 27% among 515 preschool children attending a hospital-based primary care centres were not routinely vaccinated.[15] During a measles outbreak in the United States, almost 50% of the undervaccinated children had made contact with a medical provider at a time when they could have been vaccinated.[16] Conway further found that of the 142 children who had missed an age-appropriate immunisation, none of the reasons given was a valid contraindication.[17] Have argued that if all missed opportunities were eliminated, the total undervaccination would be reduced by one half, if the patient's medical aid seeking behaviour were kept constant.[16]

Parents' misconception on contraindication to immunisation is also well illustrated in this study as six patients were not brought for immunisation as they were thought to be unwell. A common misconception that often occurred is that trivial illnesses such as upper respiratory tract infections or diarrhoea were thought to be a contraindication to defer immunisation. Therefore, it is important that health staff explain the true contraindications to immunisation to avoid deferment of indicated immunisations. Similarly, in her study on reasons for delayed immunisations among 162 Kelantanese babies showed that 28% of them was attributed to the mother's misconception that their babies were too unwell for immunisation.[18]

Another reason for incomplete immunisation was late appointment. In one case, the appointment was given more than 1 month after the vaccine was due. Therefore it is important that providers maintain up-to date and easily retrievable records so that patients' appointments are kept on time.

There are several limitations to the study. First, the sample size was small and therefore not reflective of the general population characteristics, and thus our findings may lack external validity. The other limitations are our data include children in the first 12 months rather than the first 24 months of life and limited to hospitalised infants. Nonetheless, some of these findings are consistent with other published data.

In conclusion, this study shows the magnitude of the problem of under-immunisation among hospitalised infants in the Federal Territory of Kuala Lumpur. In order to increase vaccination coverage, it is important to educate the public as well as health staff regarding valid contraindication of immunisation to avoid misconception. Physicians can take the opportunity to educate parents during health visits because parents usually rely on their physician regarding health information. Immunisation coverage can further be improved by reducing the rate of missed opportunities.

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