RESEARCH BRIEF

An Observational, Health Service Based Survey for Missed Opportunities for Immunization

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Studies cite missed opportunities for immunization (MOI) as a contributor to under-vaccination. The present prospective survey aimed at determining the magnitude of MOI, its contribution to under-vaccination, and identifying risk factors for MOI. Mothers of 1384 indoor patients ≤6 years were interviewed. There were 266 (19.2%) children with MOI, accounting for 79.6% of under-vaccination and 93% of under-vaccination time. MOI occurred significantly more often with home delivery (*P* <0.001, Odds ratio 5.1), incomplete or incorrect maternal knowledge of immunization (*P*=0.001, Odds ratio 4.8) and, general practice and non-Pediatric/ non-Medical college based practice (*P*=0.001, Odds ratio 4.0). The impact of sociodemographic factors on likelihood of MOI was not significant.

Key words: *Causes, India, Missed, Under-vaccination, Opportunities.*

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Missed opportunities for immunization (MOI) is defined as missing the benefit of getting immunized by the partially or unimmunized child, during a visit to the health facility for check up or illness, when there is no particular contraindication for that particular immunization as per the National Policy [1]. The global magnitude of MOI is 0 to 99% [2] and 9-81% in India [1,3-5]. Reducing MOI is the easiest and immediate remedy to improve vaccine coverage at no extra cost, by exploiting existing resources [2]. There is, therefore, an urgent need to examine the magnitude and factors responsible for MOI, to rapidly achieve the National immunization targets. We conducted this study to determine the magnitude and risk factors at a tertiary care institution.

METHODS

Over a period of one year, consecutive indoor patients who fulfilled the inclusion criteria (age ≤6 years, availability of the mother and road to health card, Government of India card or private physician's card or verbal recall of the mother as proof of immunization, and proof of a previous visit to a health care facility) were recruited after approval by the Institutional Ethics Committee and obtaining informed consent. Patients dying during admission and under-vaccinated children without a prior health care visit were excluded. The mother was interviewed within 24 hours of admission to avoid bias caused by immunization related intervention. Demographic data and information about the health care facility visit (type of service and qualifications of the attending physician, reason for the visit, previous visits with dates if available for present or prior complaints and diagnosis at those visits) were recorded. The interview also assessed whether the immunization card had been reviewed or immunization history elicited at a prior visit, whether any contraindication to vaccination was present then and in absence of a contraindication, whether the child had been

vaccinated or immunization related information given to the parent. Data recorded for Universal Immunization Program (UIP) vaccines was dates of immunization and age at administration of the vaccine. Difference between the recom-mended age and the actual age of immunization and the number of weeks past due was determined for each under-vaccinated child for every vaccination. For under-vaccinated children with MOI, the number of weeks accounting for MOI was calculated by the total time overdue for each child with MOI. An estimate of the number of weeks of under-vaccination accounted by MOI and the proportion of under-vaccination attributable to MOI was calcu-lated. Children detected to have MOI were referred to the immunization clinic for the due vaccination. The data was analyzed using the Chi square test for univariate analysis and logistic regression for multi-variate analysis (SPSS software version 15). All analysis was carried out at 5% significance (P<0.05).

RESULTS

Inclusion criteria were fulfilled by 1401 amongst 4196 indoor admissions. Seventeen children less than 8 weeks of age were excluded (not yet beyond time when eligible). Thus, 1384 children were analyzed (60.5% males). The mean age was 100.7 ±88 weeks (range 3.7-312.9 weeks). At least one vaccine was received by 1296 (93.6%), 88 (6.4%) were unimmunized and 1050 (76%) children were fully immunized (UIP schedule) [877 (63.5%) age appropriate immunization, 173 (12.5%) up to date but not age appropriately immunized]. The immuni-zation status is presented in ***Fig.*1**.

TABLE I MEDIAN AGE AND DIFFERENCE BETWEEN RECOMMENDED AND ACTUAL AGE OF VACCINATION IN CHILDREN WITH MOI (N=96)

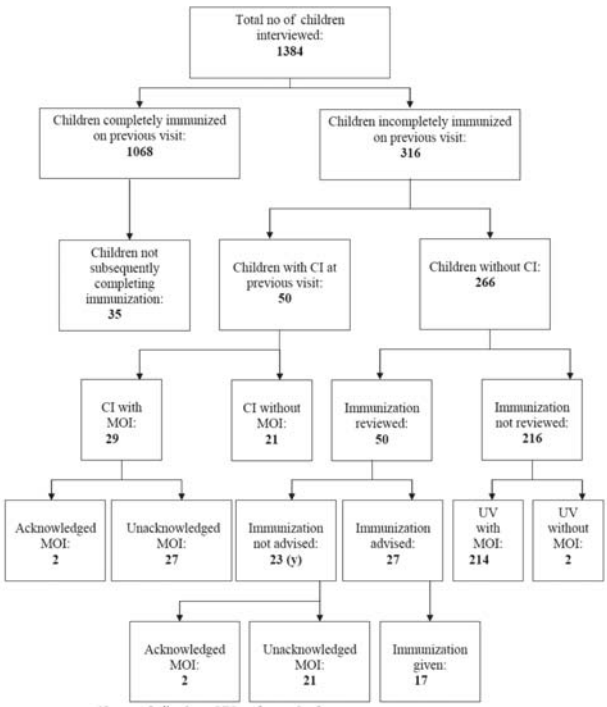
Vaccine	Median age (weeks)	Difference (weeks)
BCG	1.7	5.5
OPV/DPT1	8	0.8
OPV/DPT2	13.7	2.2
OPV/DPT3	18.4	2.5
Measles	42.7	1.1

MOI: Missed opportunities for immunization

Under-vaccination was observed in 24% of children (334). MOI accounting for 79.6% of under-vaccination was present in 266 (19.2%). Almost all MOI (98.5%) were unacknowledged. Sixty-eight cases (4.9%) were under-vaccinated but without a MOI. For a child with MOI, if each vaccine missed was considered as a missed opportunity, then 1243 vaccinations were missed (4.67 missed vaccinations child). If each visit when vaccination was missed was considered a missed opportunity, 702 visits were associated with MOI (2.64 missed opportunities child).

Median age at vaccination and the difference between recommended and actual age of vaccination could be determined in 96 children with MOI having records with date of vaccination (***Table* I**). Of 2473.1 weeks of under-vaccination, MOI accounted for 2299 weeks. The proportion of under-vaccination weeks attributable to MOI was 92.9%.

The demographic parameters of children with MOI (n=266) were comparable to those who were under-vaccinated (n=68) in terms of gender, religion, birth order, residence, maternal age, and socio-



CI: Contraindication; UV: Undervaccination; MOI: Missed opportunities for immunization.

FIG. 1 *Immunization status of the study population.*

WHAT THIS STUDY ADDS?

- Missed opportunities for immunization with a magnitude of 19.2% was responsible for 80% of under-vaccination and 93% of under-vaccination time.
- Home delivery, incomplete or incorrect maternal knowledge of immunization and general practice and non-Pediatric/ non-Medical college based practice were highly predictive of missed opportunities of immunization.

economic status. MOI occurred during a visit for an acute illness in 80.5% of cases, for a chronic disease in 18.8% and a well child visit in 0.7%. The type of health facility visited was general practice (45.5%), medical college (23%), practicing pediatrician (15.4%), public health facility (6%), private institution (8.6%) and an alternative medical practice (1.5%). The qualification of the health care provider was MBBS (50.4%), post-graduate degree in Pediatrics (43.6%), degree in alternative medicine (3.4%) and super-specialty or non-Pediatric degree (2.6%). The reasons for MOI were immunization history not reviewed (94%), false contraindication (2.2%), wrong immunization history (1.5%), physician not advising immunization (1.1%), unavailability of immunization card (0.7%), and visit not on 'immunization day' (0.5%).

MOI occurred significantly more often with home delivery, incomplete or incorrect maternal knowledge of immunization, and general practice and non-Pediatric/ non-Medical college based practice [odds ratios: 5.1 (95% CI 2.3, 11.0), 4.8 (95% CI 1.2, 18.5) and 4.0 (95% CI 1.9, 8.3), respectively]. Testing with Hosmer and Lemeshow goodness of fit test indicated fitness of data in the model.

DISCUSSION

The present study documents that 80% of under-vaccination and 93% of under-vaccination time was due to MOI, occurring during acute illness visits. Almost all MOI were unacknowledged, attributable to oversight on the part of the health care provider in obtaining history of immunization in 94% of cases. This underscores the necessity of implementing interventions in office practice to reduce MOI including screening a child for eligibility at every preventive or curative visit, a tracking system to alert the physician when immunization is due, recording dates of immunization, and ensuring caregivers carry the immunization card at every visit [2]. Similarly, every hospital admission must be exploited as an opportunity to immunize the eligible or advise the due vaccine at discharge.

Previous studies have implicated provider misconceptions like avoiding immunization during minor illness as a significant predictor for MOI [6]. Though illness characteristic was not significantly predictive of MOI in this study, the likelihood of MOI was higher with visits to non-Pediatric/non-Medical college based practice including General Practitioners. This is relevant as a large proportion of health care delivery in India is by General Practitioner, who often are the first and only contact for patients [7, 8]. Their correct compliance with the National vaccination policy is critical for its success. Our study draws attention to the urgency of correc-tive measures to encourage desirable immunization practices such as simultaneous vaccination, safety of vaccination during mild acute illness and knowledge of true contraindications amongst other practitioners [2].

Earlier studies have documented that maternal knowledge about vaccines and contraindications for immunization was sub-optimal [9-11]. Many harbored erroneous beliefs and misconceptions, especially about vaccinating during acute illness [6, 9-14]. However, maternal acceptability of immunization was documented to be high in those with MOI [3]. Therefore education about the diseases being targeted, nature and timing of vaccines, their benefits and adverse effects, and acceptance of immunization during minor febrile illnesses will be critical to empower mothers to demand vaccination and reduce drop-out [6,11-13,15].

In conclusion, MOI can be tackled by accomplishing the National population policy target

of 80% institutional deliveries [16], empowering mothers to demand immunization [6,9,17] and ensuring optimum immunization delivery by general practitioners. Periodic surveys for MOI should be a performance indicator for delivery and utilization of immunization services in the country [2,19].

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