



# A Time-Motion Analysis of An Urban Immunization Facility in The Konkan Region of India

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## ABSTRACT

**Context/Background:** Time motion studies involve the collection of data regarding the amount of time necessary to perform a specific movement or task by individuals or groups of people. Thus, hospital administrators can determine how much time is needed to execute that activity and whether the time is used efficiently and whether there is any possibility of improvement.

**Aims/Objectives:** To study the operational efficiency of an immunization clinic attached to the urban health training centre. To assess the perception of patients regarding the health service delivery in the immunization OPD.

**Methodology:** It was an observational study carried out in the immunization clinic of an urban health training center attached to a tertiary medical college, in the Konkan region of India for over 6 months. About 300 patients were included in the study.

**Results:** According to 23.34% of study participants, the total time was too long. 24% of study participants were not satisfied with the total time taken while 48.33% of study participants were satisfied with the total time.

**Conclusions:** Management of time at various levels of the healthcare system is a need for the hour and necessary remedial actions should be initiated for optimal functioning of the healthcare system.

**Keywords:** Time motion study, Urban hospital, OPD, Immunization clinic

## INTRODUCTION

Immunization is the most cost-effective preventive public health intervention for reducing mortalities in under-five children. <sup>1</sup>Since the agenda for Sustainable Development was adopted by all United Nations Member States in 2015, immunization has moved centre stage as one of the driving forces behind efforts to meet the Sustainable Development Goals (SDGs)—in particular, the goal to reduce preventable deaths of new-borns and children under 5 years of age. (SDG 3 target 3.2).<sup>1</sup>

Despite continued efforts and millions of dollars poured into the Universal Immunization programme (UIP), immunization coverage in India has shown on-

ly marginal improvement over the last few decades. <sup>2</sup>If we analysed the data from the National Family Health Survey-1 (NFHS-1)<sup>3</sup> it was observed that only 36% of children were fully vaccinated, but there was very little improvement in subsequent surveys. In NFHS-2 <sup>4</sup>only 42% and NFHS-3 only 44% of children were fully vaccinated.<sup>5</sup> Though India has made substantial progress in improving child health in recent years, still India continues to account for many vaccines preventable child deaths.<sup>6</sup>

The number of patients seeking immunization clinics has increased many folds during the last two decades but the facilities in the hospitals have not increased at the same rate. Thus, the immunization clinic re-

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quires a systematic study of its services for its efficient management and function.<sup>7</sup>

To improve health care delivery, it is important to obtain baseline data about current patterns of work for assessing the effects of interventions designed. Time and motion study is a business efficiency technique.<sup>8</sup> Time motion studies involve the collection of data regarding the amount of time necessary to perform a specific movement or task by individuals or groups of people. Thus, hospital administrators can determine how much time is needed to execute that activity and whether the time is used efficiently and whether there is any possibility of improvement.<sup>2</sup> Ultimately, these studies aimed to improve efficiency in a specific workplace. Thus, these studies could be useful as a means of producing a more efficient workplace in.<sup>9</sup>

Recently many hospitals in India and around the world have begun to use time-motion studies to improve their work efficiency.<sup>9</sup> We can use time-motion studies for two purposes: (1) To assist in finding the most efficient way of doing work; and (2) To assist in training individuals to understand the meaning of time-motion importance, and after training to enable them to become proficient in applying time-motion principles.<sup>10</sup>

Patients attending immunization clinics need to be properly managed for patient care and satisfaction. Patients' impression of the hospital begins with their initial encounter with healthcare workers in OPD. The first impression of the patient will dictate the perceived quality of the overall experience of the patient regarding hospital services. That's why OPD is considered the window to hospital services. The main reason for patient dissatisfaction is usually OPD congestion.<sup>11</sup> OPD congestion is one of the most difficult problems faced by hospital management. Thus, hospitals need to carry out a systematic review of their service for its efficient management and function.<sup>12</sup> Therefore, the present study was conducted to study the operational efficiency and find the time required for various activities at different service delivery points in the immunization clinic attached to the urban health training centre of a tertiary medical college and to assess the perception of patients regarding the health service delivery in the immunization OPD.

## METHODOLOGY

A cross-sectional study was carried out in an immunization clinic at the urban health training centre attached to BKL Walawalkar rural medical college, Sawarde, district Ratnagiri, Maharashtra, India for 6 months from July 2019 to December 2019. The study participants included mothers/caregivers attending immunization clinics with their children. Last year's registration records were reviewed, and it was found that the average daily registration included 80 in

number. Pretesting was done to check how many proforma can be filled every day. It came out to be 10. So, it was decided to include every 8th patient in the study. Also, data were collected five days a week for two months which yields 30 working days. Therefore, the expected sample size was 300.

Ethical committee clearance was taken. Informed consent was taken from the patient. The doctors and staff present in the immunization clinic were involved in the following core functions: 1) Initial registration {collecting demographic information like name, sex, date of birth, and record-keeping regarding vaccination (vaccine, dosage, dose number, site of vaccination)}; 2) Nutritional assessment (Recording of Weight, Height, and plotting of growth chart); 3) Health education regarding nutritional advice and preventing common childhood illnesses; 4) Vaccine administration and record keeping related to vaccination; and 5) Post-vaccination advice (regarding when to seek medical help and what are common side effects and when to come for the next dose of vaccine)

Pre-synchronized stopwatches were used to record total activity time in predesigned and pretested schedules. Total activity time was waiting time plus time required for giving service. Time was recorded at the entrance (Desk 0), after consultation with the doctor (Desk 1), after completion of health education by a social worker (Desk 2), after registration by nursing staff (Desk 3), after vaccine administration by nursing staff (Desk 4), and after completion of post-vaccination advice (Desk 5).

Data was entered in the Microsoft excel sheet. For analysis of data software, EPI-Info version 2.3 was used. The time has been expressed as mean and standard deviation. In certain places trimmed mean (5% of values at both extremes were excluded) was used as data was very much skewed leading to large standard deviations.

## RESULTS

Out of 300 study subjects, 70 were old cases and 230 came for the first time to the immunization clinic. Each study participant had spent  $3412.10 \pm 114.2589$  seconds in an immunization clinic on average.

**Table 1: Time required for service delivery at different tables**

Activity	Mean (seconds) ± SD	% of total activity time
Registration	363.01 ± 16.97	19.39
Nutritional assessment	343.68 ± 16.05	18.36
Health education	394.26 ± 10.89	21.06
Vaccine administration	440.87 ± 18.73	23.55
Post-vaccination advice	335.82 ± 11.52	17.64
<b>Total time</b>	<b>1872.13 ± 62.37</b>	<b>100</b>

SD=Standard Deviation

**Table 2: Time required for Service delivery at a different table for old and new cases**

Activity	Type of registration		P value
	New (Mean (seconds) ± SD)	Old (Mean (seconds) ± SD)	
Registration	383.14 ± 3.86	350.44 ± 10.99	<0.0001
Nutritional assessment	362.31 ± 4.07	338.01 ± 13.9	<0.0001
Health education	405.91 ± 3.59	390.71 ± 9.84	<0.0001
Vaccine administration	470.43 ± 9.05	432.34 ± 9.67	<0.0001
Post-vaccination advice	350.19 ± 4.59	331.75 ± 9.34	<0.0001
Entrance to exit	1971.99 ± 13.77	1843.25 ± 33.73	<0.0001

SD=Standard Deviation

**Table 3: Time required for service delivery in seconds at a different table concerning the day of visit**

Activity	Monday	Tuesday	Wednesday	Thursday	Friday
Registration	360.57 ±16.85	357.40 ±17.00	357.07 ±17.77	358.23 ±17.25	357.07 ±17.82
Nutritional assessment	345.85 ±16.21	343.35 ±16.14	342.68 ±16.20	343.68 ±15.71	342.68 ±16.64
Health education	396.76 ±11.54	393.92 ±10.89	393.26 ±11.12	394.26 ±11.37	393.09 ±12.84
Vaccine administration	443.23 ±19.32	440.89 ±19.03	440.23 ±19.41	441.23 ±18.70	440.56 ±19.27
Post-vaccination advice	337.55 ±11.82	335.72 ±11.66	335.05 ±12.21	336.05 ±11.59	335.55 ±11.45
Entrance to exit	1883.95 ±57.66	1871.29 ±62.77	1868.29 ±64.74	1873.45 ±62.11	1868.95 ±65.08

Values are in mean (seconds) ± Standard deviation

**Table 4: Level of satisfaction of study population and perception regarding the total time taken in the OPD (n=300)**

Response	Number (%)	Satisfaction level (number and percentages are concerning the responses and not the total study population)			
		Not satisfied (%)	Average satisfied (%)	Satisfied (%)	Don't know (%)
Too long	70 (23.34)	50 (71.43)	8 (11.43)	2 (2.86)	10 (14.28)
As per need	150 (50)	08 (5.33)	24 (16)	102 (68)	16 (10.67)
Too short	40 (13.33)	0 (0)	04 (10)	36 (90)	0 (0)
Can't say	40 (13.33)	14 (35)	09 (22.5)	05 (12.5)	12 (30)
Total	300 (100)	72 (24)	45 (15)	145 (48.33)	38 (12.67)

Table 1 shows the time required for service delivery at different activity points in the immunization clinic. The mean time taken for registration was 363.01 ±16.9677 seconds. Maximum i.e., 23.55% of the time was taken by vaccine administration with a mean of 440.87±18.7320 seconds. For nutritional assessment of the patient's time taken was 343.68 ±16.0541 seconds while for giving health education time taken was 394.26±10.8903. Post-vaccination advice took 335.82±11.5166 seconds.

Table 2 shows the time taken for service delivery concerning old and new cases. It was found that new cases took more time than old cases at all the service delivery points, and the difference was found to be statistically significant for all service delivery points with a p-value less than 0.0001 for all.

Table 3 presents the time required for service delivery concerning the day of visit. Vaccine administration took maximum time on each day and the maximum time required for vaccine administration was on Monday.

Table 4 shows the distribution of the study population according to the level of satisfaction of the study population and perception regarding the total time taken in the immunization clinic. According to 23.34% of study participants, the total time was too

long. It was found that 24% of study participants were not satisfied with the total time taken in the immunization clinic. 48.33% of study participants were satisfied with the total time taken for service delivery in the immunization clinic

## DISCUSSION

A roadmap for achieving 90% full immunization coverage in India was published by the Ministry of health and family welfare, India in 2019 with a commitment to save the lives of children and protect them against vaccine-preventable diseases. Key strategies here are mission Indra Dhanush, building vaccine confidence, gap assessment, immunization coverage improvement plan formulation, health system strengthening, and monitoring for action. It has also given importance to the better operational efficiency of already functioning immunization OPDs.<sup>13</sup>

Many studies stated that in India major obstacles in achieving full immunization coverage are long waiting times and insufficient and inefficient staff.<sup>14,15</sup> Such problems are more severe in rural areas because of a lack of resources and infrastructure and especially if we are dealing with paediatric patients.<sup>14,15</sup> In the present study, it was observed that study participants must spend 20% of the total time

spent in initial registration only. Though adequate healthcare workers are posted in immunization clinics long waiting times could be due to a lack of adequate healthcare workers.

Any task is composed of different components and different components of a task require varying times for completion. If we find out the time required for individual subcomponents and find out the reasons for the delay, we can find out the most suitable measures to complete the task more efficiently. In the present study, most of the time spent by study participants was on getting vaccination followed by health education and initial registration. Also, it was observed that new cases spent more time at all service delivery points than old cases. The reason for this may be healthcare workers take more time to enter various sociodemographic details during initial registration and old cases are more familiar with all the steps involved in getting the vaccination. Similar results were observed in a study conducted in Kolkata by A. Chattopadhyay et. al. and a study conducted in Delhi by Kumar V et. al.<sup>14,15</sup>

For achieving universal health coverage there should be equal access to all healthcare facilities for all people on all days of the week. In our study, we found that on Mondays time spend at all service delivery points was more than on other days. This could be due to a greater number of patients coming to the immunization clinic after Sunday on which day OPD is closed. The reason for such differential access to health facilities may be the efficiency of the involved staff on that day or the number of staff present on the particular day of study. So, these factors need to be further in-depth study. The finding is similar to a study by Manna et al.<sup>16</sup>

In the present study total satisfaction of study participants was 48.33%. In a study by Umar et al total satisfaction level was 45%.<sup>17</sup>In Bilkish et al study total satisfaction of patients with OPD services was 50.89%.<sup>18</sup> The study conducted by Chetwynd reported total satisfaction was 49%.<sup>19</sup> Kumari et al in their study total satisfaction was 73%.<sup>20</sup>Aswar NR et al showed 65.3%. are satisfied.<sup>21</sup>

The present study is one of the very few time and motion studies carried out in an immunization clinic of an urban health training centre attached to a rural medical college in developing countries, and as such, provides a useful baseline for future carrying out further in-depth study to identify bottlenecks and constraints in the system. This is very crucial as we can analyse them, and we can try to find out simple solutions to improve the quality and efficiency of OPD services.

Being an observational study, it has few limitations. The results of the study cannot be generalized as data was collected from a single immunization clinic attached to an urban health training centre. Much more in-depth research work on a wider area is required to generalise the results of the study.

## CONCLUSION

Our study demonstrates that health personnel spent more than three-quarters of their time on clinical practice-related activities like registration, nutritional assessment, health education, and post-vaccination advice but less than one-quarter on immunization. Nearly one-fifth of time was spent on registration-related activities which should be the target for improving efficiency.

About one-quarter of study participants consider that time spent in the immunization clinic was too long and three-quarters of them were not satisfied with the services provided. Half of the study participants consider that time required is as per need even though some of them were not satisfied with the services provided.

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