

## Time Motion Study to analyse the Medication Management from Prescription to Administration in a Private Hospital at East India

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### Abstract

### Original Research Article

Indian healthcare systems have passing through a state of transition and especially tertiary hospitals face daunting challenges, like evolving technologies and reimbursement policies, and a worsening skilled workforce shortage. A reconsideration of skilled health manpower and work processes holds the potential to affect the efficiency and effectiveness of health care delivery for the foreseeable future. The time and motion study are to understand the time taken in several work stations and used for performance, evaluation, and planning of any process. The Hospital under study was facing some issues of Medication management and there by Patient satisfaction and patient safety was under risk. This is a Cross sectional Observation study. It starts from Medication prescription to Indenting, arranging, dispensing, and finally to administration to the patient. Three Volunteers were recorded the data One at Ward level, One at Pharmacy Level and One at Transportation Level. A total of 80 prescriptions were tracked from different Wards or ICU areas. A total six time were recorded and six duration were found namely D1 (Prescription to Indent Time), D2(Indent to Dispense Time), D3(Dispense to Delivery Time), D4(Delivery to Receiving Time), D5(Receiving to Administration Time) & D6 (Prescription to Administration Time).It was found that average time taken for various process are as D1 – 236 minutes (3 Hrs 56 mints), D2 -120minutes (2 Hrs), D3 – 162 minutes (2 Hrs 42 mints), D4 - 38 min, D5 – 535minutes (8 Hrs 55 mints), & D6 – 1091minutes (18 Hrs 11 mints). In all areas average distribution of five duration are D1(22%), D2(11%), D3(15%), D4(3%) and D5(49%). On detail discussion over interview, it was found that Pharmacist and Nursing Manpower may need optimization. Although an age-old technique, Time Motion study can be used to analyse any process flow to detect the bottlenecks and find the suitable solution to the problems.

**Keywords:** Time Motion Study, Medication Management, Motion Study, Medication safety, Patient safety, medication error.

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## INTRODUCTION

The present trend toward increased efficiency altogether kinds of skilled work has caused a widespread interest in motion and time and time and motion study. The term "time study" and "motion study" are given many interpretations since their origin. time and motion study, originated by Taylor was mainly used for rate setting; and time and motion study, developed by the Gilbreths, was largely employed for improving methods, one group saw time and motion study only as a way of determining the dimensions of the task that ought to constitute a day's work, using the stop watch because the timing device. (Bhargo L, 2014). Nothing during this world is more important than time. A time and motion study could also be a business efficiency system that was developed by combination of the time and motion study work of Frederick Winslow Taylor with motion study work of

Frank B. Gilbreth and Lillian Gilbreth. (Chattopadhyay A, 2012), (Manna, 2014). It's a serious portion of scientific management. (Anand TR, 1983). The 2 techniques became integrated and refined into a widely accepted method applicable to the development and up-gradation of working systems. the target of a time and time and motion study is to assess average time for employment by simple observation and recording of some time being dedicated to every task. Time motion studies are thus used for performance evaluation and planning purposes.

Time-motion study could also be used for two purposes. First, to help find the foremost efficient method of doing work and second, to help in training individuals to know the meaning of time-motion importance, and when the training is administered with enough thoroughness, to enable them to become

proficient in applying time-motion principles. (RM., 1940). Today, the Indian hospital systems has during a state of transition and outpatient services in tertiary hospitals face daunting challenges, like evolving technologies and reimbursement policies, demographic trends, competing fiscal demands, and a worsening skilled workforce shortage. now in time also affords a singular opportunity because the India is within the midst of one of the foremost important health services and renovation booms in history. A reconsideration of skilled health manpower and work processes holds the potential to affect the efficiency and effectiveness of health care delivery for the foreseeable future. Bold changes within the outpatient work environment are imperative to make sure the sustainability and affordability of the outpatient as a part of the Indian health care delivery system. (Anand TR, 1983). There is requirement to note the record of accountability staff and time spent debriefing and to make sure that an evidence of the debriefing is noted within the extra information of the info collection form. A time and motion study could also be a strategy for recording time spent on a selection of tasks. The methods utilized in the study (Chattopadhyay A, 2012) are wiped out a narrow range of specialised work settings, like the initial registration and nutritional assessment of the youngsters. Patient cares are the linchpin of a reconsideration of hospital design and work processes holds the potential to affect the efficiency and effectiveness of health care delivery for the foreseeable future. In healthcare centres, there's always the matter of finding most economical ways of doing tasks then determine the quantity of task completed as compared to manufacturing unit thanks to lack of incentive plan of wage payment, but time and motion study provides a way that's unequalled for locating method of greatest economy and for measuring labor accomplishment. (RM., 1940) There is much requirement to trained health personnel and hospital caregiver about the efficient use of their time and energy with accountability of interruptions and events, most often occur quickly and follow one another with only a minor pause, makes it difficult to list each individually. So, an option should be made of noting the beginning and ending time of the sequence of events or recording the time in 1/10 th make the best guess at the total numbers of cases that had entered. This sequence of events would be limited by time itself. After the last event, would notice of the time and record on subsequent line of the gathering form how long the break lasted. It would be appropriate to list, ever so briefly, at the beginning of the next event, and would move down to the next line. (Tucker AL, 2006). One study of hospital environment showed that how health personnel spend their time, in real time and in real work contexts. The findings demonstrate that health personnel spent quite three quarters of their time on clinical practice-related activities-but but one-fifth of all health practice time on activities defined as patient care activities. Three other activities accounted for the bulk of outpatient practice

time: Documentation, care coordination, and drugs administration. Only 7.2% (31 min) of clinical time was dedicated to patient assessment and recording of vital signs. Of all reported time, 6.6% (36.3 min) was categorized as waste. Activities within this category-many of which were "hunting and gathering" behaviors-are clearly targets for improving efficiency. The much larger proportions of your time dedicated to care coordination, medication administration, and especially, documentation can also represent opportunities for process improvement. Documentation accounted for the largest proportion of nonclinical time; in fact, this category by itself accounts for 27.5% of all reported time, more than unit-related functions, nonclinical activities, and waste combined. (Hendrich A, 2008). Another group saw motion study only as an expensive and elaborate technique for determining a good method of doing work. Today the discussion of the comparative value of using either the one or the opposite of the 2 techniques has largely passed; industry has found that time and motion study and time and motion study are inseparable, as their combined use in many sectors now demonstrates. (Baurngart A, 2009). Taking cognizance of present trends and recognizing the fact that motion study always precedes the setting of a time standard, was presented in the same article (Chattopadhyay A, 2012).

These findings illustrate the complex and demanding hospital work environment and suggest opportunities to improve the efficiency of clinical work. Changes to the method and technology of documentation, communication, and drugs handling, also because the physical design of units, may benefit physician efficiency and therefore the safe delivery of care. Truly transforming the hospital-patient care environment to enhance the delivery of safe, top quality, patient-centred care would be a paradigm shift. The task now is to test solutions to create a more effective work environment that seamlessly supports clinicians in the direct care of the patients. Main aim of this study is to analyse the process flow of the Medication Management from Prescription of the medication to Indenting, Processing, arranging, dispensing, delivering, receiving and finally administration to the patient with the help of Time Motion Study.

## MATERIALS AND METHODS

This study is an Observational Cross-Sectional study at a Private Hospital situated at eastern India. Basic process flow of the Medication Management under the current study.

1. Doctor Prescribe the medication in the patient's bed head ticket during patient round.
2. Nurses placed indent of the medications for the patient in Hospital software.
3. Pharmacists arranging the medications and dispensed in the Hospital software.

4. Pharmacy boys physically delivered the Medications at Ward/ICU level.
5. Nurses receiving the medications at Ward/ICU level.

6. Finally, Patient received, or Nurses administered the medication.

The above six processes have been marked on Time and Duration sequences as below,

**Table-1: Six Time and Duration Sequences.**

T1	Prescription Time	D1	Duration between (T2 & T1)
T2	Indent Time	D2	Duration between (T3 & T2)
T3	Dispense Time	D3	Duration between (T4 & T3)
T4	Delivery Time	D4	Duration between (T5 & T4)
T5	Receiving Time	D5	Duration between (T6 & T5)
T6	Administration Time	D6	Duration between (T6 & T1)

The flow diagram of the time motion study is as below.

**Table-2: Flow diagram of Time and Duration sequences**

T1	T2	T3	T4	T5	T6
T1 (Prescription Time)	T2 (Indent Time)	T3 (Dispense Time)	T4 (Delivery Time)	T5 (Receiving Time)	T6 (Administration Time)
[D1] Duration (T2-T1)					
	[D2] Duration (T3-T2)				
		[D3] Duration (T4-T3)			
			[D4] Duration (T5-T4)		
				[D5] Duration (T6-T5)	
[D6] Duration Total (T6-T1)					

This study was under taken to analyse the bottle necks in the Medication management. It starts from Medication prescription to Indenting, arranging, dispensing, receiving and finally to administration to the patient. Three Volunteers were recorded the data One at Ward/AC/Deluxe Ward/ICU level, One at Pharmacy Level and One at Transportation Level. A total of 85 Prescriptions were tracked from three different areas namely General Ward, AC/Deluxe Wards and ICU areas.

After collecting all the data, it was found that in 5 prescription tracking some data were missing. So, we discard the Five data set and finally we have 80 prescription tracking data for analysis. Out of 80 data set for AC/Deluxe Ward 27 data set, for Ward 46 data set and for ICU seven data set were tracked.

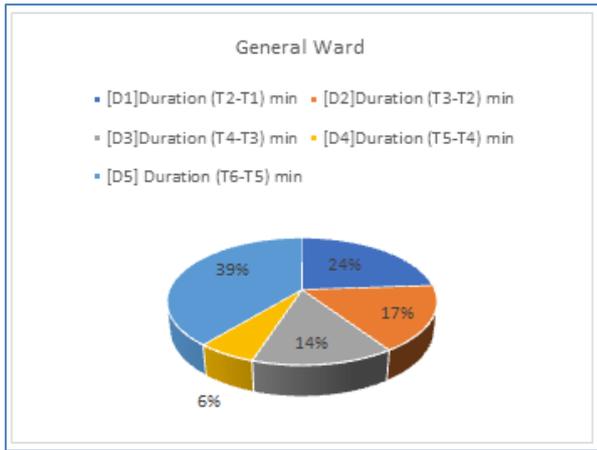
## RESULTS & DISCUSSION

After careful analysis of the data, we found the various time duration for the six duration as mentioned above. The duration for the three mentioned area as given below, -

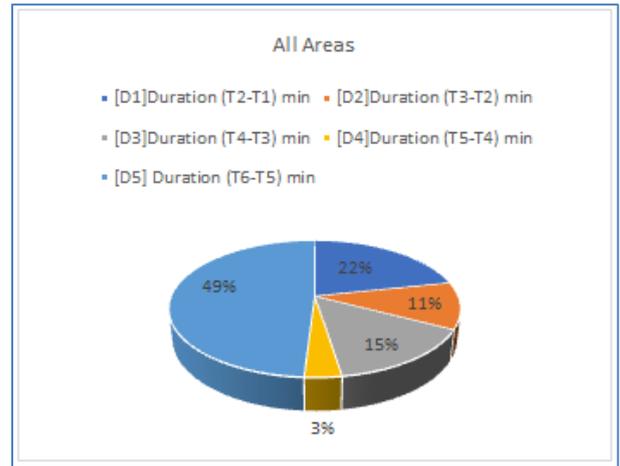
**Table-3: Average Time Duration in various areas**

TIME & DURATION						AVERAGE TIME IN MINUTES AREAS WISE			
T1	T2	T3	T4	T5	T6	AC/Deluxe Ward	General Ward	ICU	All Areas
[D1]						253	218	237	236 (3 Hrs 56 mints)
	[D2]					168	154	40	120 (2 Hrs)
		[D3]				229	131	125	162 (2 Hrs 42 mints)
			[D4]			26	55	32	38 min
				[D5]		478	357	770	535 (8 Hrs 55 mints)
[D6]						1154	915	1203	1091 (18 Hrs 11 mints)

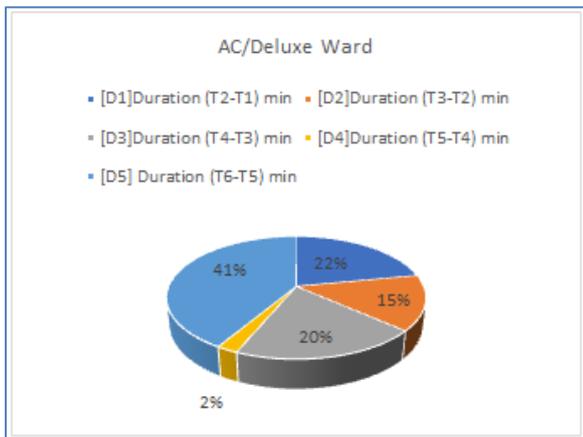
The individual area wise distribution of five Durations from D1-D5 is shown as below.



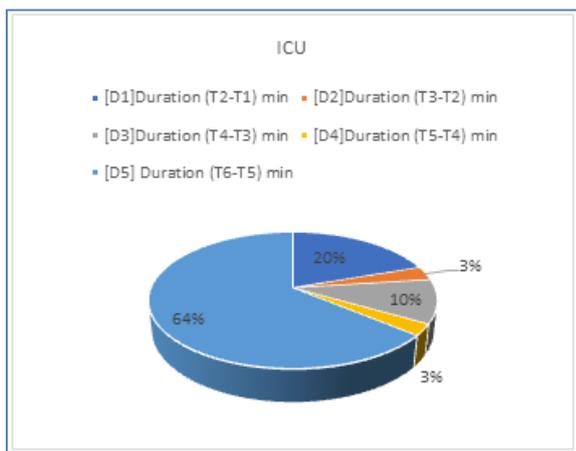
**Fig-1: General Ward Average Time Duration distribution**



**Fig-4: Average Time duration distribution of all areas**

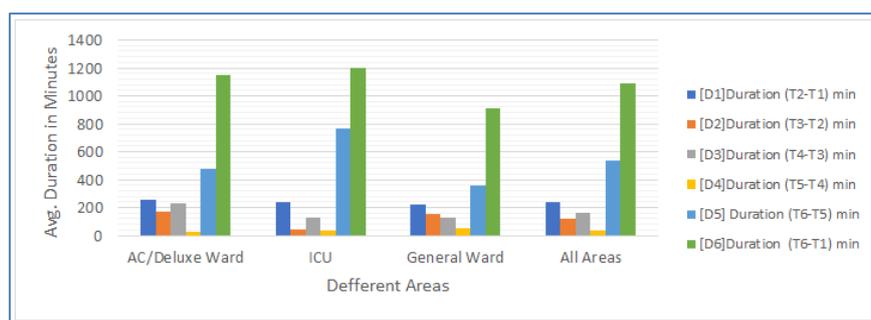


**Fig-2: AC/Deluxe Ward Average Time Duration distribution**



**Fig-3: ICU Average Time Duration distribution**

The duration D1 is highest in General Ward (24%) and lowest in ICU (20%) as compared to all areas average (22%). It means ICU Nursing staff is fastest in entering from prescription to indent the medication in system than all other areas. On average it took 3 hours 56 minutes which is quite high, the reason stated below. The highest duration D2 is in the General Ward (17%) and lowest in ICU (3%) as compared to all areas average of 11%. That means Pharmacists are giving priority to ICU compared to other areas, which is evident and should be. But still it is high 2 hours. D3 duration from Dispense to delivery of the medication to the respective areas were fastest in ICU (10%) and slowest in AC/Deluxe ward (20%). It averages about 2 hours 42 minutes. D4 the receiving time after reaching the medication in the respective areas were highest in General ward (6%) as the patient load in General ward are more and the Nurse patient ratio is also more compared to other areas. Although overall the duration D4 is only 3% average 38 minutes. D5 is highest in ICU (64%) and lowest in General ward (39%) as compared to all areas average of 49%. It averages 8 hours 55 minutes. It means ICU staff indents more firstly and on advance as compared to General Ward. From the Area wise distribution it is evident that D4 duration is the lowest and D5 is the highest duration. General ward and AC Deluxe ward has more delay compared to other areas.



**Fig-5: Area wise distribution of all Six Time durations**

Distance was measured from each area and the data were analysed but distance was not found of any concluding evidence. It is evident from the above graph that D2 can be reduced in AC/Deluxe Ward and General Ward as compare to ICU. It is evident that priority for ICU is given there for ICU medication dispensed earlier than other areas in the pharmacy. If staff strength can be increased in pharmacy the D2 can be reduced. D3 duration is more at AC/Deluxe areas, on enquiry the reason found that comparative stable patients were admitted there, and priority was given less due to less manpower and separate location from ICU and Ward. D4 duration is more at General ward compare to other areas as the number of patients is more and the indent and supply are also more but the Nursing manpower are less. So, it could be reduced if the Nursing manpower be optimised. It will reduce the time for the delivery boys also, so that they can deliver in other areas earlier. Over all the average durations are quite high. Which may be reduced with optimised manpower?

Though the distance factor were not included in this study as most of the delay was due to inadequate supply chain management and manpower deficiency.

## CONCLUSION

Millions of hours are unused annually due to the insufficiencies of the buildings, equipment and management of Man, Material and Money. (Time and Motion Study, 1958) One of the most important factor of Medication errors is the Timely availability of the Medication. In the above study it was found the average duration from prescription to medication was quite high.

In a study it was observed that out of total time, 20.4% was spent on medication management and of these tasks the highest proportion of time was spent on communications and dispensing medications. (Holmqvist M, 2018) After detail discussion and interview and analysing all the data and facts following recommendations were made, -

1. Optimise the Pharmacist Manpower

2. Optimise the Nursing Manpower at General Ward. Or
3. Optimise the number of transport boys.

A detail Time motion study of the Nursing and Pharmacy department may be done to find out the optimum solution. The above recommendation may reduce the time duration and increase the efficiency. These may reduce the medication error and increase Patient Safety as a whole.

## REFERENCES

- Anand, T. R., & Gupta, Y. P. (1983). Rationalization of working of OPD in a hospital: A case study. *Health Population, Perspective and*, (1983), 6.
- Baurngart A, N. D. (2009). Scientific Management in the operating room. *Qual Saf Health Care*, 18; 413-5.
- Bhargo L, M. A. (2014). Time-motion study to know: Efficiency and effectiveness of clinical care is essential to hospital function? *Indian J Community Med*, 39; 254-255.
- Chattopadhyay A, G. R. (2012). A time motion study in the immunization clinic of a tertiary care hospital of kolkata, west bengal. *Indian J Community Med*, 37; 30-3.
- Hendrich A, C. M. (2008). A 36-hospital time and motion study: How do medical-surgical nurses spend their time? *Perm J*, 12; 25-34.
- Holmqvist M, E. M. (2018). Medication Management in Municipality-Based Healthcare: A Time and Motion Study of Nurses. *Home Healthc Now*. Jul/Aug;36(4)(doi: 10.1097/NHH.0000000000000671. PMID: 29979305.), 238-246.
- Manna, D. N. (2014). A time motion study in the OPD clinic of a rural hospital of West Bengal. *IOSR Journal of Dental and Medical Sciences*, 13(7), 34–37. <https://doi.org/10.9790/0853-13723437>.
- RM., B. (1940). *Motion and Time study*. 2 nd ed. New York: John Wiley & Sons Inc.
- Time and Motion Study. (1958). *Work Study*, Volume 7 Issue 6(<https://doi.org/10.1108/eb048113>), pp. 13-59.
- Tucker, A. L, S. S. (2006). Operational failures and interruptions in hospital nursing. *Health Serv Res*, 41(3 Pt 1):643-62.