

Study on Medication Turnaround Time in Inpatient
Pharmacy at Narayana Multi Specialty Hospital,
Jaipur

By

Snehangshu Roy

*Dissertation submitted for the partial fulfillment of the
MBA Pharmaceutical Management*

Academic year, 2017-2019



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TO WHOMSOEVER MAY CONCERN

This is to certify that **Snehangshu Roy**, student of MBA Pharmaceutical Management from The IIHMR University, Jaipur has undergone internship training at **Narayana Multispecialty Hospital, Jaipur from 14 February to 13 May 2019.**

The Candidate has successfully carried out the study **Medication Turnaround Time in Inpatient Pharmacy** assigned to him during internship training and his approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish him success in all his future endeavors.

A handwritten signature in blue ink, appearing to read 'Sandeep Narula'.

Dr. Sandeep Narula

Dean, School of Pharmaceutical Management

The IIHMR University, Jaipur

A handwritten signature in blue ink, appearing to read 'Abhishek Dadhich'.

Dr. Abhishek Dadhich

Assistant Professor

The IIHMR University, Jaipur

The certificate is awarded to

Name : Snehangshu Roy

In recognition of having successfully completed his
Internship in the department of

Name of Department : Supply Chain management

and has successfully completed his Project on

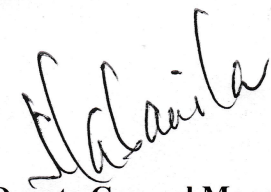
**A Study on Medication Turnaround Time in Inpatient Pharmacy at
Narayana Multi Specialty Hospital, Jaipur**

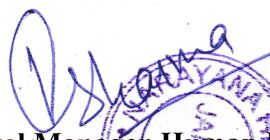
Date: 14th February 2019 to 13th May 2019

Organization : Narayana Multispecialty Hospital Jaipur

He comes across as a committed, sincere & diligent person who has a strong
drive and zeal for learning

We wish him/her all the best for future endeavors


Deputy General Manager-SCM


General Manager-Human Resources



Narayana Multispecialty Hospital

(A unit of Narayana Hrudayalaya Limited)

(Previously Narayana Hrudayalaya Pvt. Ltd.) CIN: L85110KA2000PLC027497

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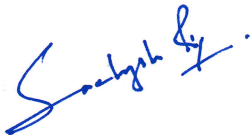
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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled A Study on Medication
Turnaround Time in Inpatient Pharmacy at Narayana Multispecialty
Hospital, Jaipur and submitted by (Name) Snehangshu Roy
..... Enrollment No. 116
under the supervision of Dr. Abhishek Dadhich for
award of MBA in Hospital and Health/ Pharmaceutical / Rural Management in Health and
Hospitals of the University carried out during the period from 14 February to
13 May.....embodies my original work and has not formed the basis for the
award of any degree, diploma associate ship, fellowship, titles in this or any other institute or
other similar institution of higher learning.


Signature

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Acknowledgement

Firstly, i would like to show deep sense of gratitude towards Narayana Multi speciality Hospital, Jaipur for providing me an opportunity to work as an intern and complete dissertation project.

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I'm also thankful to all dispensing pharmacists, clinical pharmacists, runners, nurses with whom i worked, for providing the best of working environment

For successful completion of the dissertation project i would like to express sincere gratitude to my university mentor Dr. Abhishek Dadhich

Abstract

Background

Hospitals have always been in the business of providing patient care. Patient satisfaction is a valuable parameter for health care facility. Now a days hospitals consider patient satisfaction to measure their performance in terms of services provider. Patient satisfaction is linked with clinical outcomes, patient retention. Supply chain management efficiency is the key to access of healthcare supplies on time. Medication turnaround time is defined as the time gap between medication orders are written manually or electronically and the time those medicines are administered or surgical items are used. Monitoring medication turnaround time in inpatient pharmacy measures efficiency of patient care of the organization. The measurement of turnaround time is a helpful indicator of efficiency of the workflow which is applicable in medical departments like MICU (Medical Intensive Care Unit), CCU (Coronary Care Unit), Surgical ward. Prolonged Turnaround Time (TAT) affects patient care and leads to decreased patient satisfaction as well as employee like doctors, nurses' satisfaction adversely

Objective

To observe the work process flow of inpatient pharmacy and to identify the gaps and bottleneck present in the inpatient pharmacy in real time also to suggest remedial measures to improve efficiency ensuring delivery of medicines and surgical items on time

Method

Research study type is observational, applied, cross sectional. Convenience sampling method has been used to collect sample data. Primary data has been collected through direct observation of the IPD work process flow and secondary data is collected from the system and register. Chosen wards are CCU, MICU and Surgical ward. Total sample size is 426 (123/ward) Study population includes all working staffs in IPD, Runners, Nurses, Clinical pharmacists. Advanced Microsoft Excel functions has been used to analyze data obtained from the study.

Result

Average clinical approval time, average indent process time, average dispensing time, average runner delivery time have been found to be 13m, 2m, 74m, 35m respectively. IPD TAT is longer than benchmark in 87% CCU, 88% MICU, 25% Surgical ward cases. Median dispensing time has been found to be 40m. Median TAT for CCU, MICU, Surgical ward has been found as 1h 38m, 1h 31m, 1h 37m respectively. Significant difference has been found between average and median dispensing time for items ordered at night shift dispensed at morning shift. On observation it has been found that indent rejection rate 20% and within 30 min. 4 MRN are repeated at morning and evening shift. It has been found that median of items return to IPD 73 times/day

Conclusion

Through this study various reasons for delay causing longer turnaround time have been identified. Workflow needs to be changed or improved regarding returning of items, indent rejection, repetitive indents, absence of runner in night shift, idle runners, IPD workload, manpower issue, longer clinical approval time following suggestive remedial measures.

Keywords

Inpatient pharmacy, Medication Turnaround Time, Delay, Turnaround time, Hospital

Abbreviation

IPD	-	Inpatient Pharmacy Department
CCU	-	Cardiac Care Unit
MICU	-	Medical Intensive Care Unit
TAT	-	Turnaround Time
ECG	-	Electro cardiogram
PICU	-	Paediatric Intensive Care Unit
NICU	-	Neonatal Intensive Care Unit
OPD	-	Outpatient Pharmacy Department
HDU	-	High Dependency Unit
h	-	Hour
m	-	Minute
OT	-	Operation Theatre

Supply Chain Work Flow Related with IPD

Receiving

In the receiving department items are 3 times stamped for gate pass, guard copy and receiving. Items are properly checked by quantity, expiry date, volume, batch no., company etc. Receiving ledger is maintained. Goods receiving note (GRN) are generated. Items then shifted from main store to IPD

Audit

Daily 3 times audit are done on high value items, medicines related with oncology by IPD pharmacists. Regularly approx. 100 items are audited in morning, evening and night shift. Quarterly audit is done on total IPD items.

Expiry

Items in their last 3 months of expiry are not dispensed to patients as per protocol regarding potency. They are quarantined and exchanged with new same items.

Purchase

For replenishment and in case of unavailability orders are given to purchase department.

Forecast

Re order level (ROL) of items are checked within specific time frame like weekly and monthly. Inventory management is done by forecasting in advanced Microsoft excel in such a way so that optimum stock is maintained problem doesn't happen in emergency time. In rare cases of urgency and unavailability from local vendor items are purchased

Return

Runners also bring return items to IPD in case of patient discharge, code Z or when patients don't require the same medicines while shifting from one ward to another. Return items are updated in system and arranged in proper place

Consignment

Consignments for such as OT are charged after usage by the patient with proper record keeping in system and files.

IPD Medication TAT Workflow



In patient pharmacy medication turnaround time starts when nurses order through system surgical items and medicines form various wards as per consultant doctors freshly or when items are consumed.

In the second step clinical pharmacists approve or reject the order after checking various parameters such as quantity, dosage form, reaction possibility with other medicines or food, dose, previous medication profile history.

In the third step IPD personnel generates indent through taking print out or reject the indent in case of wrong code given by nurses regarding branded / generic issue or unavailability of the items in IPD. In case of indent rejection rest of the items are dispensed after keeping record of rejected item.

In the fourth step basket preparation is done with medicines and surgical items by dispensing pharmacists. In case of unavailability order is given to purchase department. Also it is checked whether the item is in OPD or main store or if it is available in hospital through system checking.

In the final step delivery of baskets with items are completed by runners. They deliver medicines and surgical items to various wards. Runners also bring return items to IPD in case of patient discharge, code Z or when patients don't require the same medicines while shifting from one ward to another.

Objective

- To observe the work process flow of inpatient pharmacy & determine turnaround time
- To identify the gaps and bottleneck present in the process flow of inpatient pharmacy in real time
- To suggest remedial measures to improve efficiency of the process flow and shorten inpatient pharmacy medication turnaround time to ensure delivery of medicines and surgical items on time.

Literature Review

Title	Author/Year	Source	Summary
1. “Retrospective Audit of Medication Order Turnaround Time after Implementation of Standardized Definitions”	Heather Naylor, Dona M M Woloschuk, Patric Fitch, Sarah Miller (2011)	Can J Hosp Pharm 2011 Sep-Oct; 64(5): 346–353.	Aim of the research study was to evaluate of differences in median dispensary turnaround time and in median total turnaround time for stat/emergent and urgent/now orders before and after implementation of the standardized definitions. Retrospective audit of turnaround time was carried out in baseline and post intervention stage. Definitions were implemented by educating all pharmacy staff between the two stage about handling stat/emergent and urgent/now In this study, there was no significant decrease in total or dispensary turnaround time with implementation of standard definitions. However, the majority of orders met the target dispensary turnaround time.

			Another finding of the study showed statistically significant increase in total turnaround time for urgent/now orders after implementation of the standardized definitions. Results indicated that implementation of definitions as stat, emergent, urgent, and now orders within a hospital in pharmacy was ineffective in improving medication turnaround time. Further interventions targeted at other health care professionals might be needed to reduce total turnaround time. This research study supports the concept of interdisciplinary interventions for reducing total turnaround time
2. "Evaluation of Medication Turnaround Time Following Implementation of Scanning Digital Prescriber Order Technology"	Heather Neville, Lisa Nodwell, Sahar Alsharif (2012)	Can J Hosp Pharm. 2014 Nov-Dec; 67(6): 410–415	Aim of this study was to evaluate medication turnaround time before and after implementation of DST for all medications specially for antibiotics which are considered more critical than other medications. Retrospective study was carried out for periods before and after implementation of DST in two hospitals at one health region in Canada Implementation of DST showed a result with significant decrease in medication turnaround time when an order was prescribed

			to the time it was dispensed by the pharmacy. Antibiotics were also dispensed significantly faster But total turnaround time for all medications did not differ significantly Regular evaluation of medication turnaround time was recommended to compare with benchmarks, so that hospital standards were being met, and also to measure the effects after implementation of new policy and new technology
3. “A Study on Turnaround Time of Online Indentation of Medicines in a Tertiary Care Hospital”	Diksha Shroff, Brayal Dsouza, Dr Avinash Shetty, Manthan D Janodia (2019)	IJMET: Vol.- 10, Issue 01, January 2019, pp. 527–533, Article ID: IJMET_10_01_054	A Prospective observational study was carried out in the inpatient pharmacy department of a tertiary care hospital in south india. This research article talked about drug dispensing in hospitals which could be collective system where drug related actions are mostly managed by nursing professionals or individualized system where the pharmacy and pharmacists participate more actively on drug usage issues. Total waiting time for medicines to reach wards in first, second, third floor, factors affecting turnaround time had been observed

			Factors affecting turnaround time had been observed such as indent picking and sequencing problem, efficiency of the packaging staffs, system errors, long break, frequent enquiry calls, lack of space. This study revealed that even after adopting technology there were issues and delay.
4. “Evaluation of Turnaround Time for Medication Order Processing with Use of a Novel Scanning System”	Jodi C Rocker et al. (2006)	HOSP PHARM. 41. 10.1310/hpj4103-249	The aim of this research study was to evaluate the efficiency in turnaround time for medication order processing and level of compliance with the pharmacy's service level agreement with nursing using a novel scanning system developed by the information services department at the medical college of georgia health system. In two phases medication turnaround time had been observed for a nursing unit prior to implementation and after implementation of the system Order Comm and then both compared against each other. In this study evaluating parameters for both phases included order entry time, order entry to delivery, order completion time Result revealed that use of a novel scanning system had a positive impact on pharmacy services

5. “Turnaround Time of IP Pharmacy, Monitoring Medication Errors and Material Management of Central Store, OT Store and Pharmacy”	Dr. Farheen Zeba Siddique (2016)	IJIR: Vol-2, Issue-10, 2016	The aim of the study is to assess the turnaround time in in-patient pharmacy, to identify the various types of medication errors and material management of central store, operation theatre store and in-patient pharmacy. A cross sectional study was done in in-patient pharmacy at a multispecialty hospital. Non probability convenient sampling method was used. Interview of staff, preparation of checklist and observation of pharmacy indents and patient files were done. Prescription error, transcription error, administration error, dispensing error all of the four types of medication errors were noticed in the hospital with varying measurement Some of the reasons for the delay in medication dispensing were negligence of employees, staff shortage on some days, medicines stockout, software issues.
6. “Medication Turnaround Time in Hospital Pharmacy Department”	Himanshi Choudhary, Vijay Pratap Raghuvanshi (2013)	International Journal of Research and Development in Pharmacy and Life Sciences August - September, 2013, Vol. 2, No. 5, pp 626-630	Aim of this research study was to find out the delays in the order and delivery system of in-patient pharmacy and check the average total time consumed in delivering drugs and medical consumables to the patients

			Time motion study was done in the inpatient pharmacy at a multispecialty hospital. Nonprobability convenient sampling method was used, with normal indents, new admission indents and urgent indents. Both primary and secondary data has been used in the study Peak hours of indent order, Average number of indents per day were observed. Results revealed that all types of indents were delayed. Delay reasons were random indents from wards, lot of load on the department, repeated indents, stock variability, manual indent.
7. “Analysis of the Medication Turnaround Time in a Tertiary Government Hospital”	Kristine Eves S. Garcia, Antonie Kyna S. Lim, Kenaz Duane Peter A. Segaya, Monet M. Loquias, Lucina Concepcion E. Salazar (2017)	Philippine Journal of Health Research and Development (PJHRD) Vol. 21, No.4 (2017)	The objective of this study was to evaluate the medication turnaround time of medicine and surgery departments and dispensary turnover time of new and stat medication orders of the pharmacy and identify the common factors associated with delays in medication turnaround time and dispensary over time of the hospital. This study aimed to evaluate the MTAT of Medicine and Surgery Departments and dispensary turnover time of new and stat medication orders and identify the common factors associated with delays in MTAT and dispensary over time of the hospital. Data was collected using forms in the departments while time and motion logs

			were used for the dispensary turnover time. Interviews with pharmacists and watchers were conducted to gain their insights on the factors and effects on delays Dispensary turnover time of pharmacies were significantly different from the protocol times. The short range and low variability of the dispensary turnover time observed suggest that protocols can effectively reduce delay in medication turnaround time. Administrative protocol and personal factors that led to delays were identified which could be targeted for process improvement
8. “Mapping Turnaround Times (TAT) to a Generic Timeline: A Systematic Review of TAT Definitions in Clinical Domains”	Bernhard Breil, Fleur Fritz, Volker Thiemann, Martin Dugas (2011)	BMC Medical Informatics and Decision Making2011, http://www.biomedcentral.com/1472-6947/11/34	This research article shows a systematic review of literature concerning different turnaround time definitions. Main objective was to collect and analyse relevant literature regarding process time in respective hospitals domains, review existing definitions. More than 1000 articles were analysed resulting 162 turnaround time definitions in different clinical domains. Starting and end points varied between these domains. A standard timeframe was designed through a consensus process to provide an overview of these definitions resulting prominent terms. Using turnaround times to benchmark clinical workflows were not easy, even within the

			same clinical domain many different definitions existed but mapping of turnaround time definitions to a generic timeline was feasible
9.			
“Turnaround time for urgent or restricted prescriptions for drugs from the pharmacy dispensary”	F Caracuel, U Baños, ML Moya, S Santana, E Romero (2014)	European Journal of Hospital Pharmacy: Science and Practice 2014; 21: A64-A65.	Aim of the study was to measure the time taken for technicians to dispense medicines in the pharmacy and to analyse handwritten prescriptions for drugs. Urgent or restricted medicines could be handwritten and were dispensed immediately. The study was conducted in a tertiary hospital. All handwritten orders were collected and observed for specific time period. Data were recorded regarding department, number of medicines, order arrival time, time taken to prepare the medicine, time of collection, necessity of pharmacist consultation and the reason for it was justified as urgent. The most common causes of delay in preparation was lack of awareness of technician that high number of orders had arrived that needed pharmacist consultation, medicines were not stocked in hospital It was noteworthy that about half of the handwritten orders were not justified as urgent

Methodology

- **Chosen Wards :**

1. MICU (Medical Intensive Care Unit)
2. CCU (Cardiac Care Unit)
3. Surgical Ward

- **Sample Size :**

Total sample size - 426 (142 samples / ward)

Clinical approval sample size

(MICU – 82 CCU – 93 Surgical – 106)

- **Sampling Technique**

Convenience sampling method has been used to collect data.

Convenience sampling method is a type of non - probability sampling technique method where subjects are selected and observed because of their convenient accessibility and depends on the proximity to the researcher

- **Study Population**

All working staffs in IPD, Runners, Nurses, Clinical pharmacists

- **Data Analysis Tool**

Advanced Microsoft Excel functions has been used to analyze data obtained from the study.

○ **Study Design**

Research study type is observational, applied, cross sectional.

Primary data has been collected through direct observation of the IPD work process flow and secondary data is collected from the system and register

- **Applied research**

It is mainly used to solve a specific and practical problem of individual or group. Applied research is used in healthcare, medicine and drug discovery to find solutions that may cure or prevent diseases, solve scientific problems, develop technology or improve work process flow.

- **Observational method**

It is a type of research method where the target respondent or subject is observed and thereafter data are analysed. Observational type of research is mainly used when other data collection procedures such as surveys, questionnaires etc. are not effective or adequate. To evaluate an ongoing behaviour work flow process, events, or situation where physical outcomes can be readily seen.

- **Cross sectional study**

Generally In medical research or social science cross-sectional study is used as a type of observational study where samples are being observed and data are analysed from a specific population or representative subset, at a specific point of time denoted as cross-sectional data

○ **Study Period**

3 months (February – May)

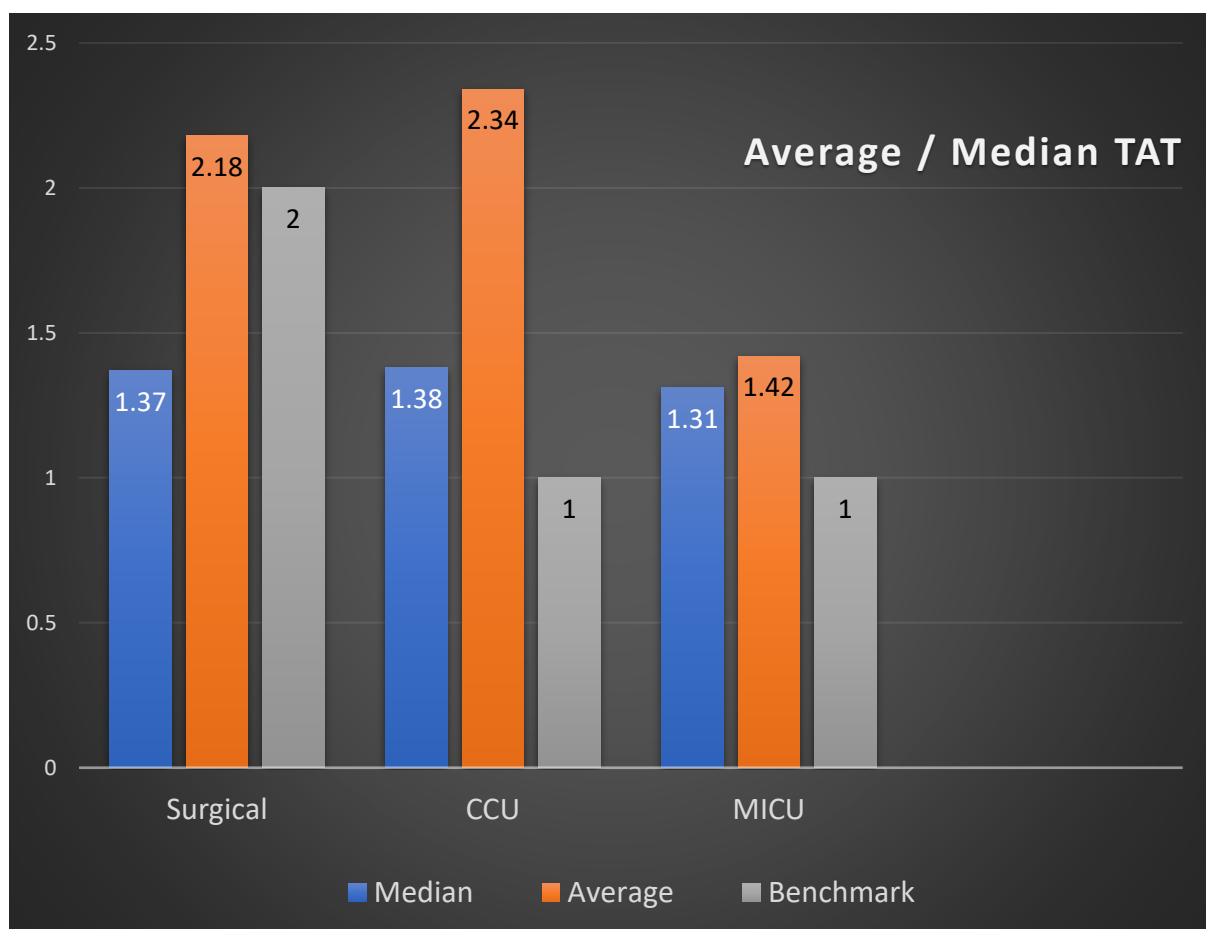
Findings / Interpretation

▪ Average / Median Turnaround Time

Here turnaround time means the time gap between medicines, surgical items ordered by nurses and the time when items finally delivered by runners to various wards.

Below the bar chart graph represents average and median turnaround time

Fig. i



Findings / Interpretation of Fig. i

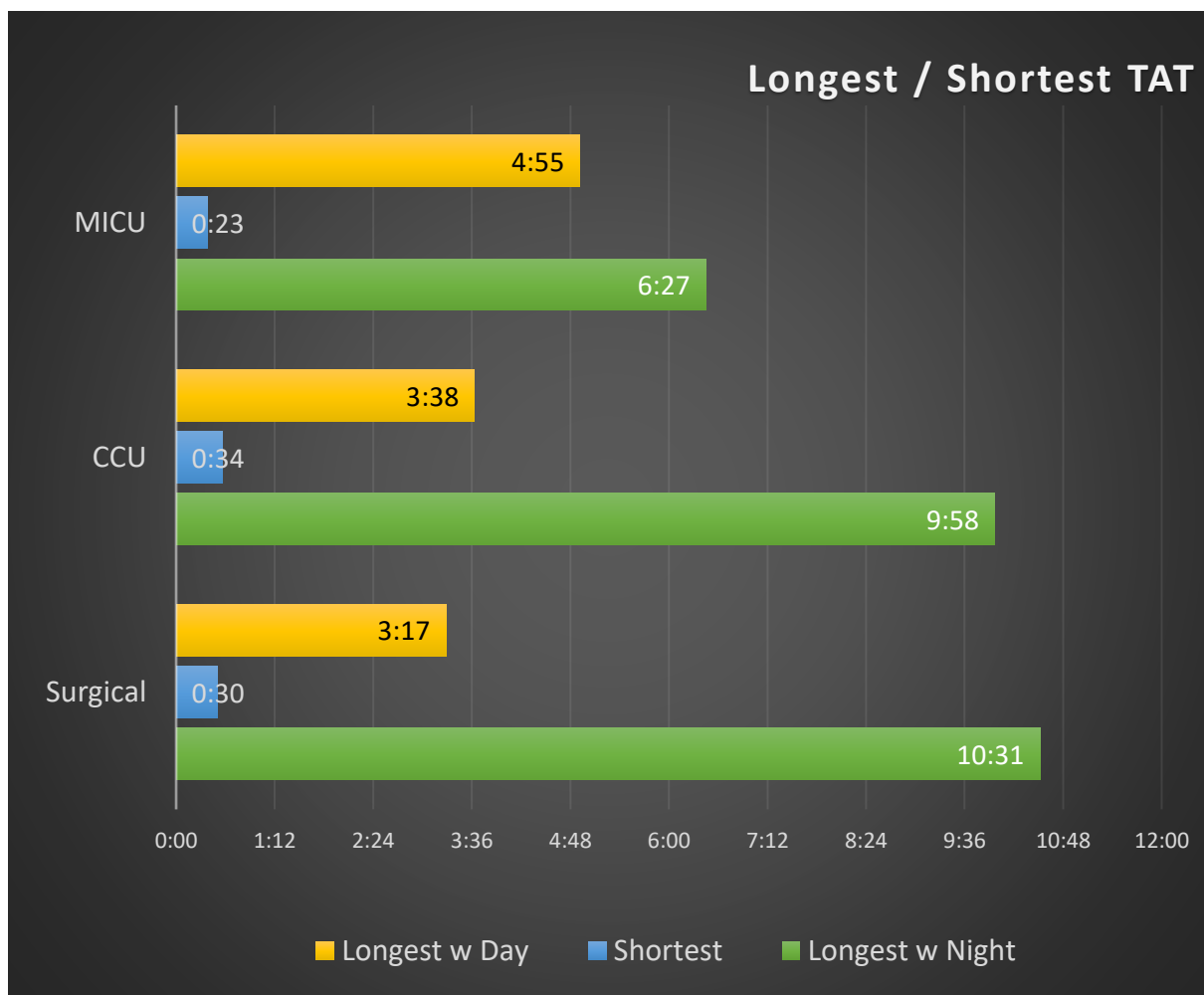
- IPD benchmark TAT for Surgical ward, CCU, MICU is 2h, 1h, 1h respectively.
- Median IPD TAT is being nearly same around 1h 30m for Surgical, CCU, MICU to be specific 1h 37m, 1h 38m, 1h 31m respectively
- Among 3 wards except Surgical ward average TAT and median TAT both are higher.
- Only Surgical median TAT is lower than the benchmark TAT which should happen in all other cases creating on time delivery of medicines and surgical items
- In all 3 wards average IPD TAT is higher than the benchmark TAT, 2h 18m, 2h 34m, 1h 42m for CCU, MICU, Surgical ward respectively.
- Longer average time has been found due to the night items cases. Items ordered by nurses at night shift after 12:00 am when delivery to the wards don't happen due to the absence of runners, have been dispensed and delivered to wards in morning shift.
- In some cases medicines and surgical items ordered by nurses in the first hour or early morning shift have been dispensed and delivered in the late morning shift or early evening shift around 2:00 p.m causing longer IPD TAT average
- Difference between average IPD TAT and IPD benchmark for Surgical ward, CCU, MICU is 18m, 1h 34m, 42m respectively
- Difference between median IPD TAT and IPD benchmark for CCU, MICU is 38m, 31m respectively

- **Longest / Shortest Turnaround Time**

Here turnaround time means the time gap between items ordered by nurses and the time when items finally medicines, surgical items delivered by runners to various wards.

Below the bar chart graph represents longest, shortest turnaround time taken for CCU, MICU, Surgical ward

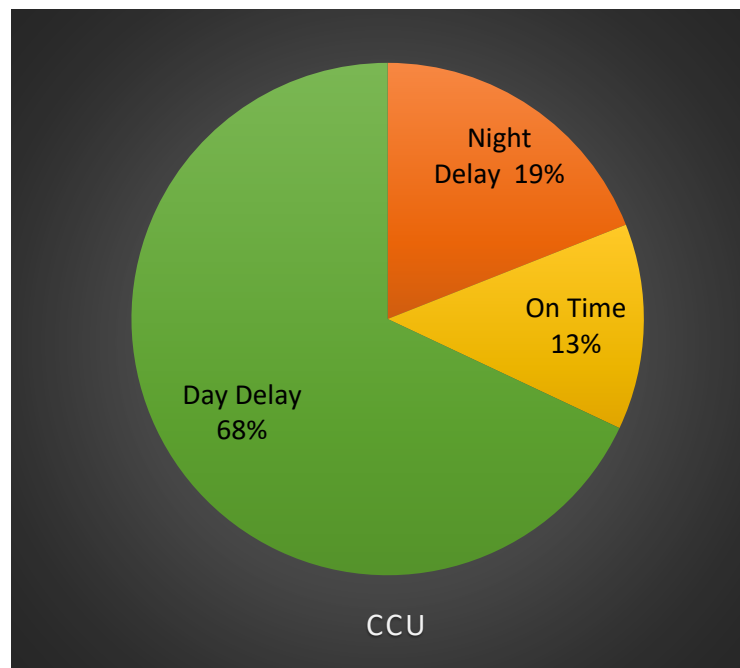
Fig. ii



Findings / Interpretation of Fig ii

- Longest day shift IPD medication TAT for MICU, CCU, Surgical ward have been found as 4h 55m, 3h 38m, 3h 17m respectively
- Longest night shift IPD medication TAT for MICU, CCU, Surgical ward have been found as 6h 27m, 9h 58m, 10h 31m respectively
- Shortest IPD medication TAT for MICU, CCU, Surgical ward have been found as 23m, 34m, 30m respectively in day shift
- Longest night shift IPD medication TAT for MICU, CCU, Surgical ward have occurred due to ordered items in night shift being dispensed and delivered at day shift.
- In longest day shift IPD medication TAT for MICU clinical approval and indent process time together have been found longest period
- In longest day shift IPD medication TAT for CCU dispensing process time has been found longest individual period
- In longest day shift IPD medication TAT for Surgical ward clinical approval and indent process time together have been found as longest period

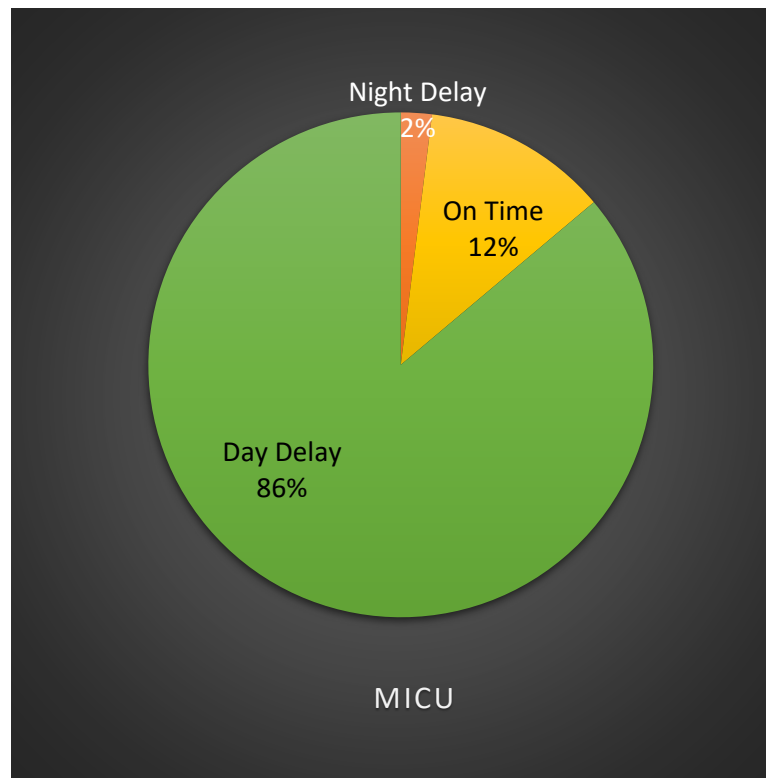
Fig. no. iii : On Time / Delay % of IPD Medication TAT for CCU



Interpretation

- In 87% cases of CCU, IPD TAT have been found longer than benchmark
- Among delayed cases regarding CCU items 19% delay have been observed related with ordered items at night shift and 68% delay have been found related with items ordered at morning shift or evening shift.
- In 13% cases IPD TAT have been found within benchmark

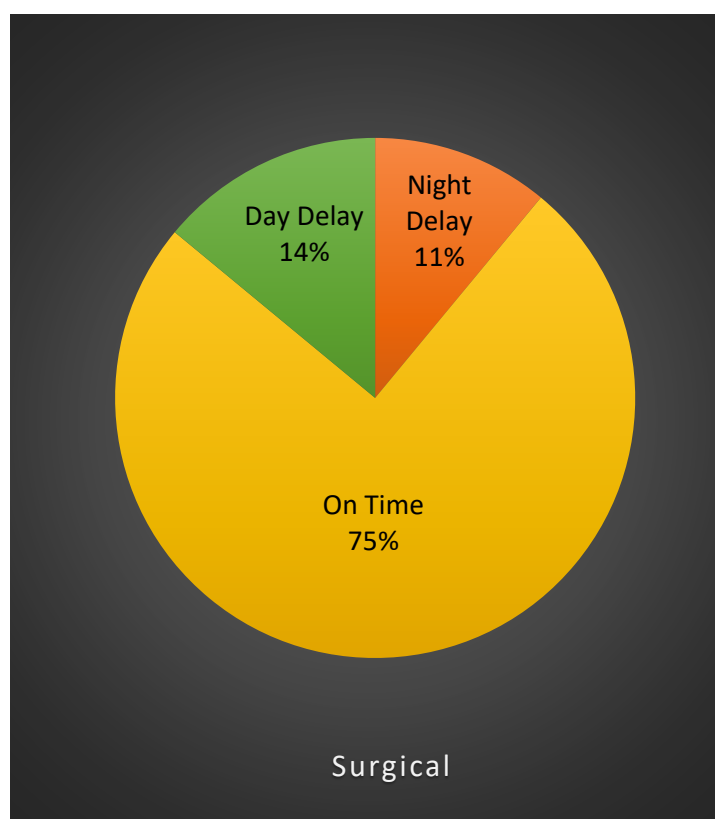
Fig. no. iv : On Time / Delay % of IPD Medication TAT for MICU



Interpretation

- In 88% cases of MICU, IPD TAT have been found longer than benchmark
- Among delayed cases regarding MICU items 2% delay have been observed related with ordered items at night shift and 86% delay have been found related with items ordered at morning shift or evening shift.
- In 12% MICU cases IPD TAT have been found within benchmark

Fig. no. v : On Time / Delay % of IPD Medication TAT for Surgical Ward

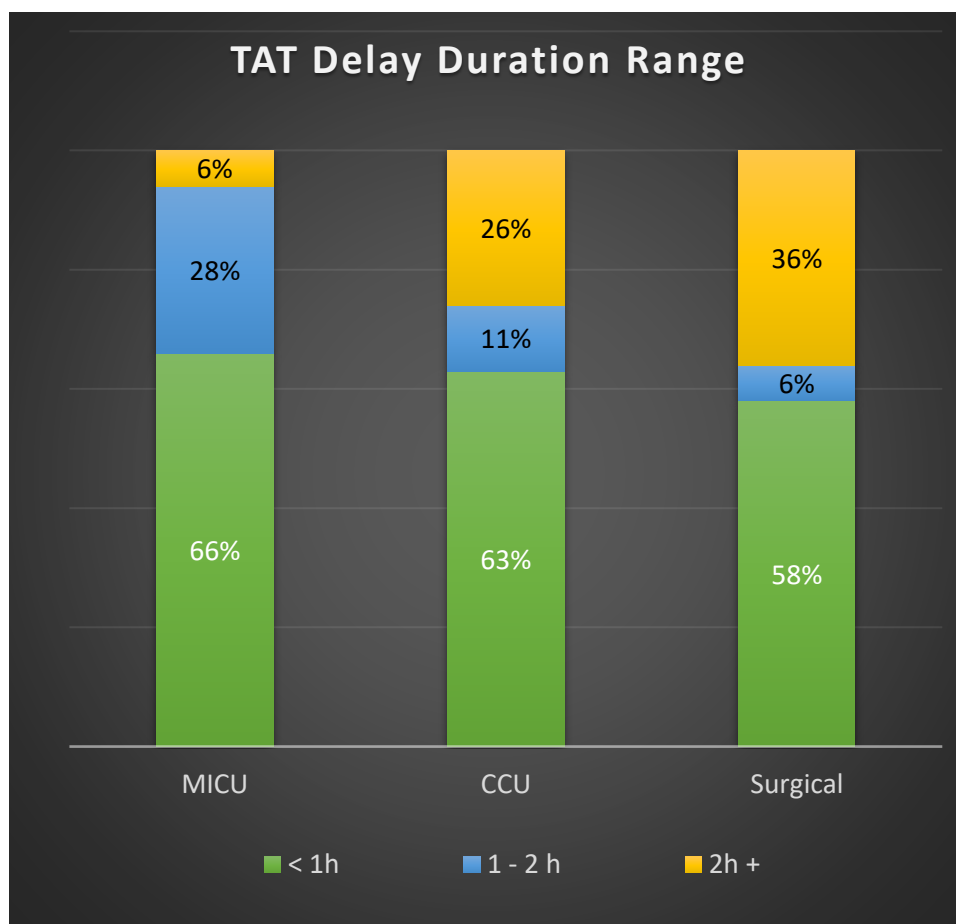


Interpretation

- In 25% cases of Surgical ward, IPD TAT have been found longer than benchmark
- Among delayed cases regarding Surgical ward items 14% delay have been observed related with ordered items at night shift and 11% delay have been found related with items ordered at morning shift or evening shift.
- In 75% Surgical ward cases IPD TAT have been found within benchmark

Turnaround Time Delay Duration Range %

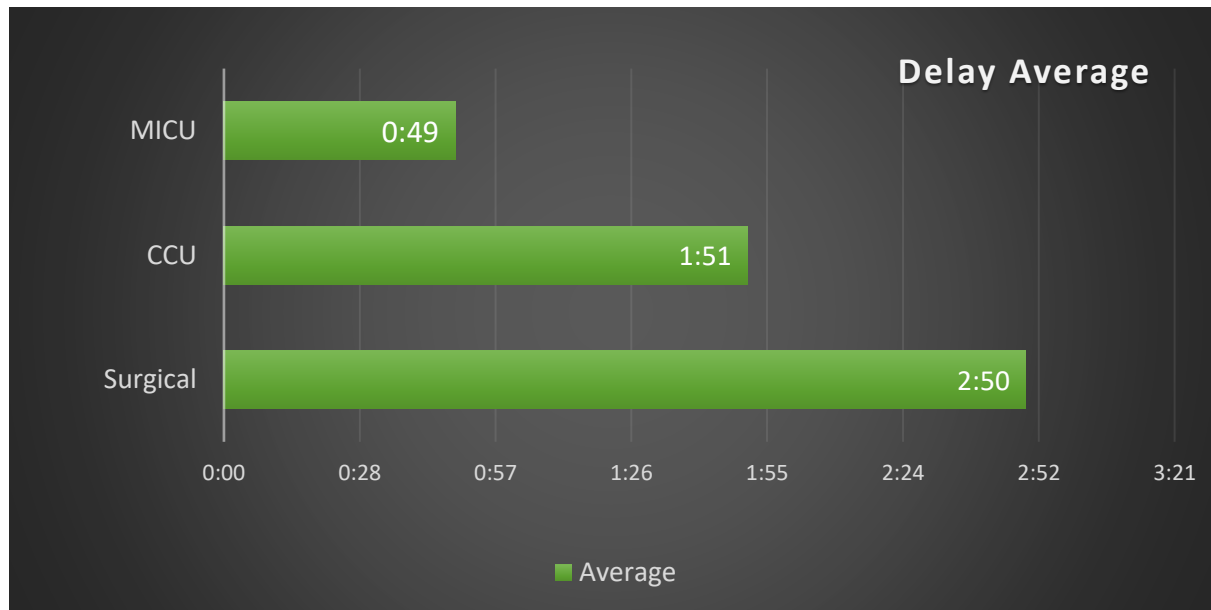
Fig. no. vi



Interpretation

- In 6% MICU, 26% CCU, 36% Surgical ward cases have witnessed more than 2h delay in IPD medication TAT which are major area of concern and need to be worked out.
- In 66% MICU, 63% CCU, 58% Surgical ward cases have been observed less than 1h delay in IPD medication TAT which can easily be improved.

Fig. vii : Average Turnaround Time Delay Duration



Interpretation

- 49m, 1h 51m, 2h 50m average delay has been observed in case of IPD TAT for MICU, CCU, Surgical ward respectively
- Longest average delay has been observed in surgical ward where benchmark IPD medication TAT is 2h

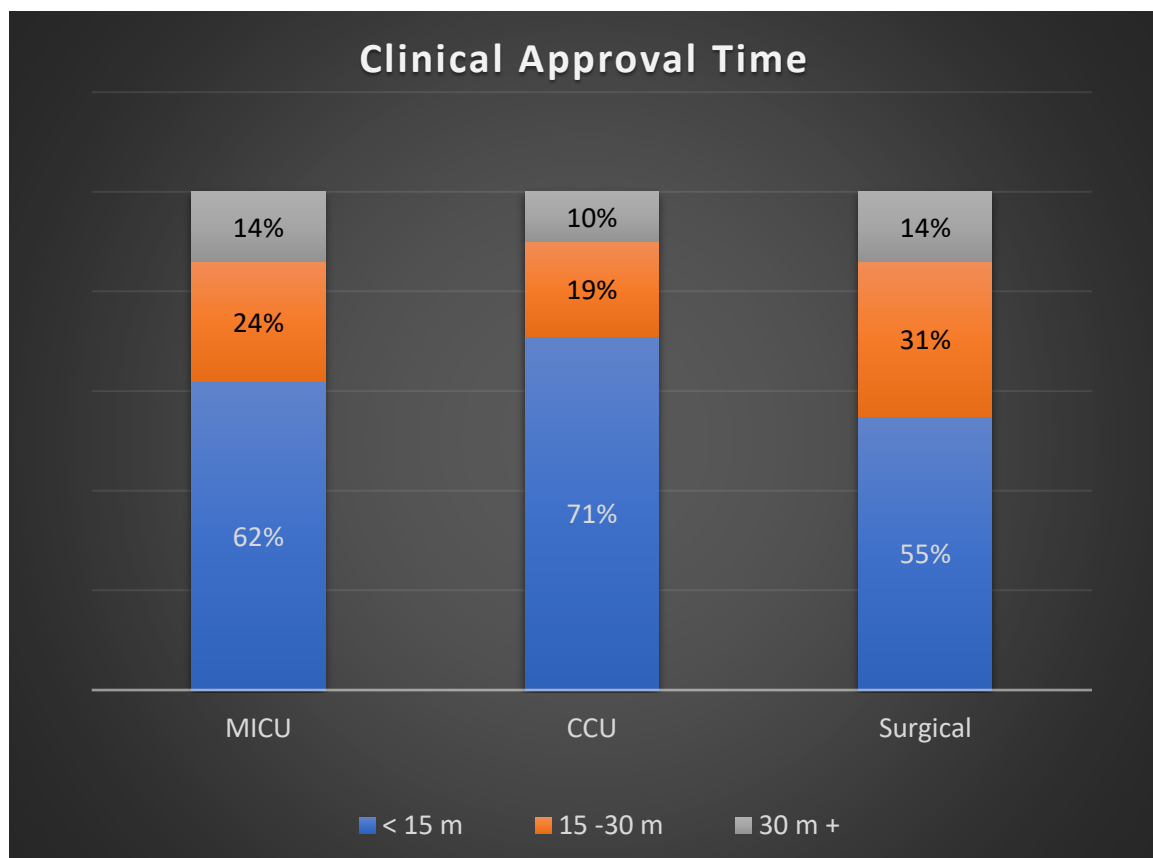
Clinical Approval Time (n = 281 cases)

(time gap between ordering items by nurses and approval by clinical pharmacist)

Table no. A

	Average	Highest	Lowest
MICU (n =82)	14 m	1 h 2m	0m
CCU (n =93)	11m	49m	0m
Surgical (n=106)	15m	52m	0m

Fig. no. viii



Findings & Interpretation Fig. viii & Table A

- Longest clinical approval time have been observed as 1h 2m, 49m, 52m for MICU, CCU and Surgical ward respectively
- Average clinical approval time have been observed as 14m, 11m, 15m for MICU, CCU and Surgical ward respectively
- Shortest clinical approval time have been observed as 0m for all 3 wards.
- Less than 15m clinical approval time have been witnessed as 62%, 71%, 55% for MICU, CCU and Surgical ward cases respectively which can be easily improved
- 15m to 30m clinical approval time have been seen as 24%, 19%, 31% for MICU, CCU and Surgical ward cases respectively
- More than 30m clinical approval time have been witnessed as 14%, 10%, 14% for MICU, CCU and Surgical ward cases respectively which are areas of concern
- Longer time of clinical approval process is one of the reasons behind overall longer TAT. Sometimes unavailability of system for clinical pharmacists to approve at various wards create longer clinical approval time. They come IPD from various wards to complete the approval process.
- A specific problem exists regarding clinical approval. Pending task assigned by a clinical pharmacist is not shown to all clinical pharmacists. Only he or she has to clear the particular task. If by mistake the task has not been cleared by the clinical pharmacist then it remains kept as pending task

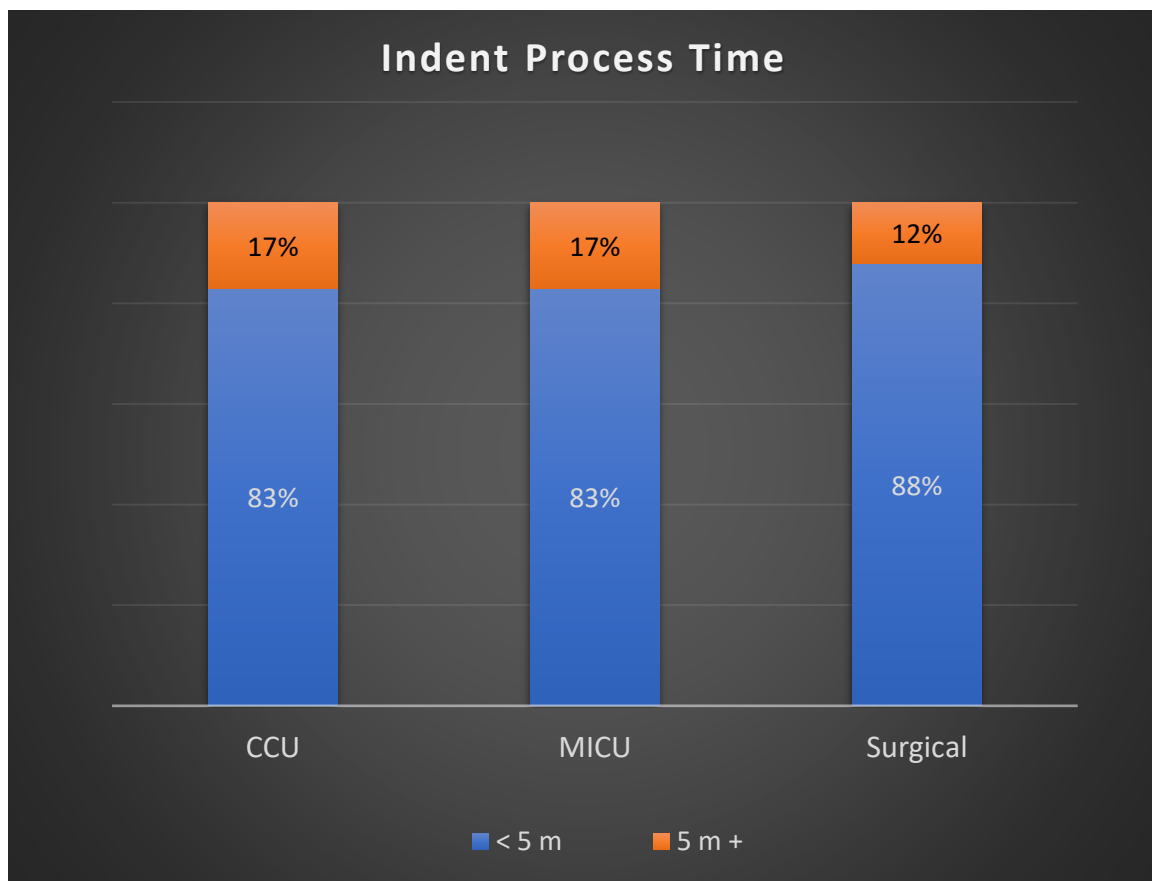
Indent Process Time (n = 281 cases)

(time taken to take print out after clinical approval to dispense items)

Table no. B

	Average	Highest	Lowest
CCU (n =93)	2m	9m	0m
MICU (n =82)	2m	10m	0m
Surgical (n=106)	2m	9m	0m

Fig. no. ix



Findings & Interpretation Fig. ix & Table B

- Less than 5m indent process time have been seen 83%, 83%, 88% cases for CCU, MICU, Surgical ward
- More than 5m indent process time have been seen 17%, 17%, 12% cases for CCU, MICU, Surgical ward
- In daily observation among 5 indents processed by IPD personnel 1 indent is generally have been rejected
On observation daily indent rejection rate 1/5 or 20%

Indents are rejected for dispensing process due to items with wrong code regarding generic / brand issue, type or item unavailability on daily basis.

- Average indent process time has been found 2m for all 3 wards
- On average Repetitive indents are ordered by nurses for single patient within short span of time. These incidents happening continuously create extra workload in IPD causing longer IPD medication turnaround time.

This problem created by nurses who often find slow software system and order less items repetitively.

In daily observation average 4 MRN have been repeated within 30 min. in morning and evening shift.

- Longest indent process time have been observed as 9m, 10m, 9m in CCU, MICU, Surgical cases
- Shortest indent process time have been found as 0m that means within the same min. clinical approval and indent process happened.

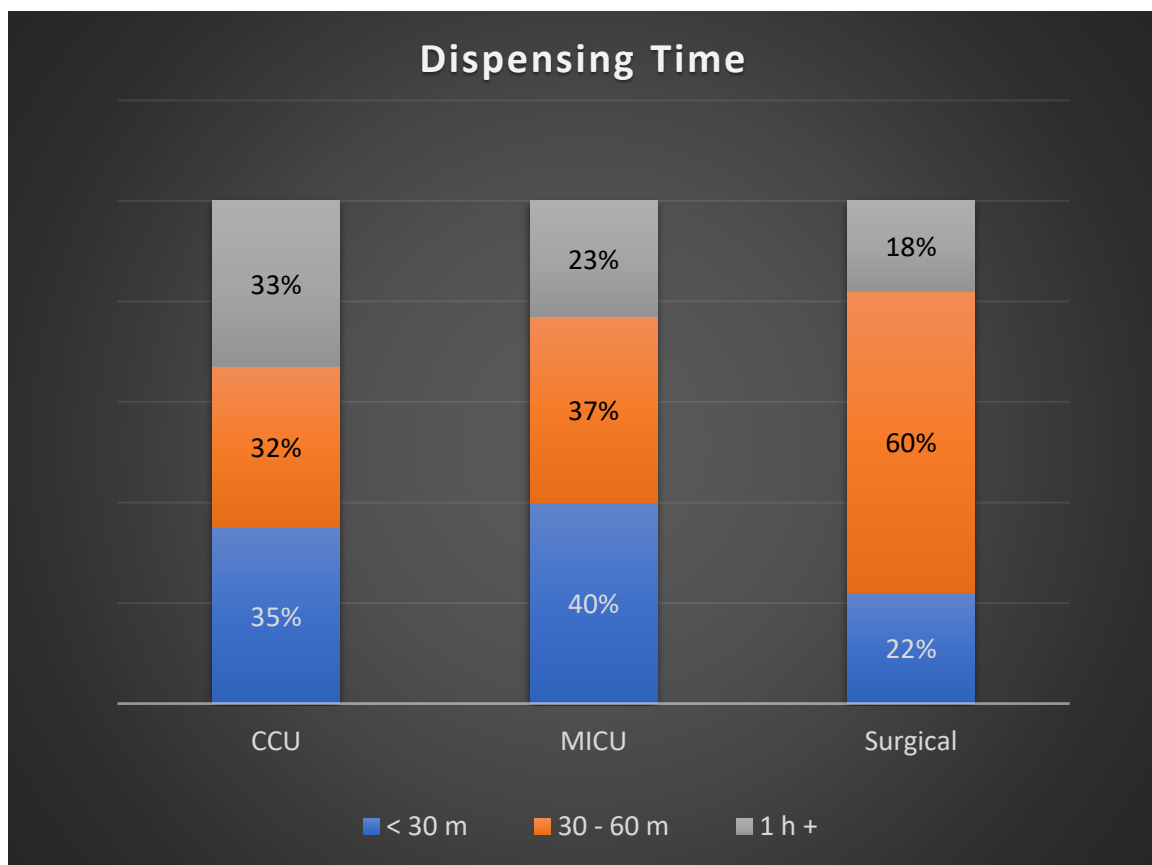
Dispensing Time (n = 426 cases)

(time taken for dispense and keeping items in basket to be delivered after taking indent print out)

Table no. C

	Average	Median	Highest	Lowest
CCU	1h 38m	43m	9h 24m	4m
MICU	43m	34m	2h 47m	1m
Surgical	1h 22m	43m	9h 19m	3m

Fig. no. x



Findings & Interpretation Table C & Fig. x

- Total 426 cases, 123 samples per ward for MICU, CCU, Surgical ward have been observed regarding basket preparation of medicines & surgical items by dispensing pharmacists
- Dispensing process become bottleneck when only one pharmacist dispenses ordered items. Often dispensing process becomes slower with regular activities like solving queries from various wards, daily perpetual audits, arranging and updating system regarding returned items.
- In case of dispensing process of CCU, MICU and Surgical ward 33% , 23% , 18% cases respectively have taken more than one hour where things need to be improved
- Medicines and surgical items ordered at night shift sometimes have been dispensed in the morning shift causing delay to deliver at various wards causing longer turnaround time. Longest dispensing process for CCU, MICU and Surgical ward have taken 9h 24m, 2h 47m and 9h 19m respectively
- Average IPD dispensing time for CCU, MICU, Surgical ward is 1h 38m, 43m, 1h 22m respectively
- Median IPD dispensing time for CCU, MICU, Surgical ward is 43m, 34m, 43m respectively
- Significant difference is seen between average time and median time due to the items ordered night shift or just at the beginning of the morning shift being dispensed at late morning shift or before evening shift.
- Lowest IPD dispensing time for CCU, MICU, Surgical ward is 4m, 1m, 3m respectively.
- Less than 30 min time are taken for CCU, MICU, Surgical ward in 35%, 40%, 22% cases respectively.

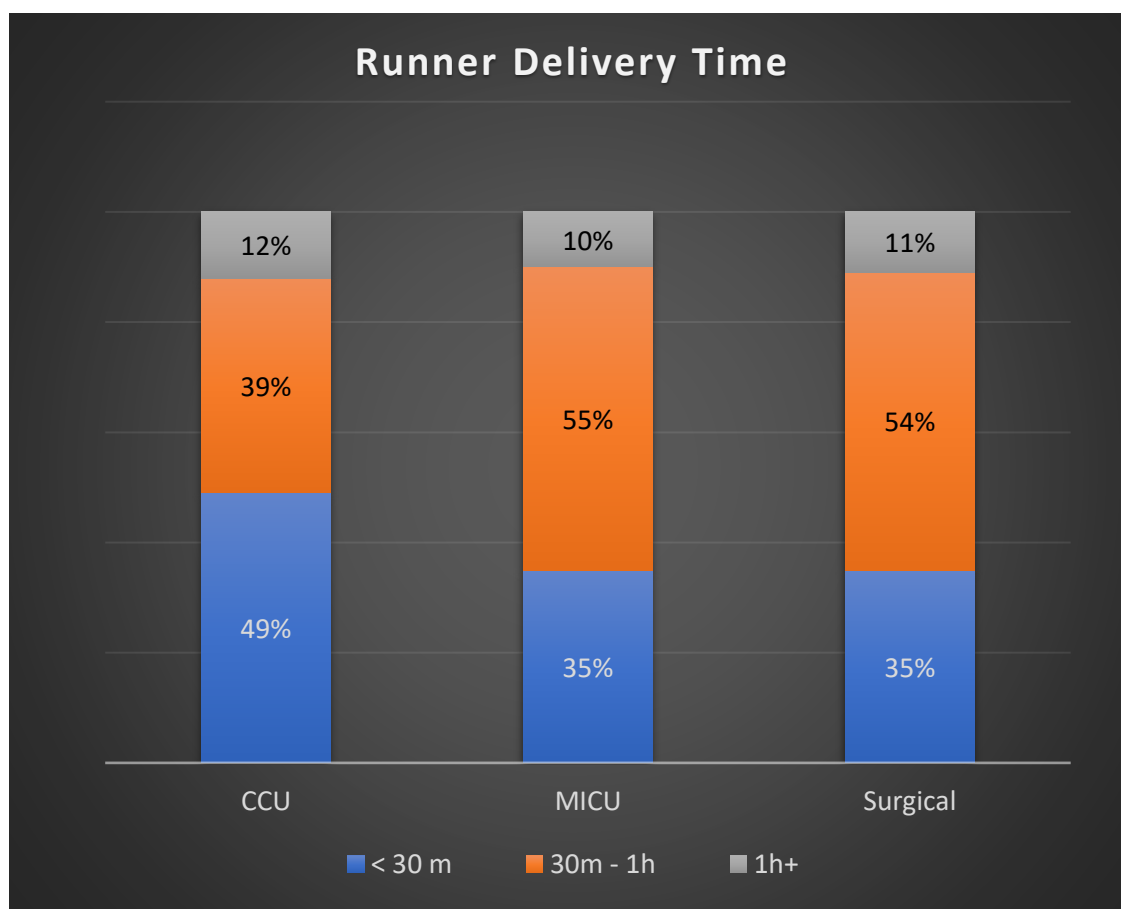
Runner Delivery Time (n = 426 cases)

(delivery to wards by runners after medicines and surgical items are kept in basket)

Table no. D

	Average	Highest	Lowest
CCU	33m	2h	4m
MICU	35m	1h 55m	5m
Surgical	36m	1h 37m	5m

Fig. no. xi



Findings & Interpretation Table D & Fig. xi

- Longest runner delivery time have been observed as 2h, 1h 55m, 1h 37m for CCU, MICU and Surgical ward respectively
- Average runner delivery time have been observed as 33m, 35m 36m for CCU, MICU and Surgical ward respectively
- Shortest runner delivery time have been observed as 4m, 5m, 5m for CCU, MICU and Surgical ward respectively
- Less than 30m runner delivery time have been witnessed as 49%, 35%, 35% for CCU, MICU and Surgical ward case respectively which can be easily improved
- 30m to 1h runner delivery time have been seen as 39%, 55%, 54% for CCU, MICU and Surgical ward cases respectively
- More than 1h runner delivery time have been witnessed as 12%, 10%, 11% for CCU, MICU and Surgical ward cases respectively which are areas of concern
- Habit of idle runners for waiting medicines and surgical items to be dispensed for specific ward creates delay in overall IPD TAT.

After coming from a specific ward like CCU if a runner sees a basket with items for MICU to be delivered then he or she waits for more baskets to gather. A runner wants to carry maximum number of baskets to a specific ward at a time.

▪ Problems / Delay Reasons for Longer Turnaround Time

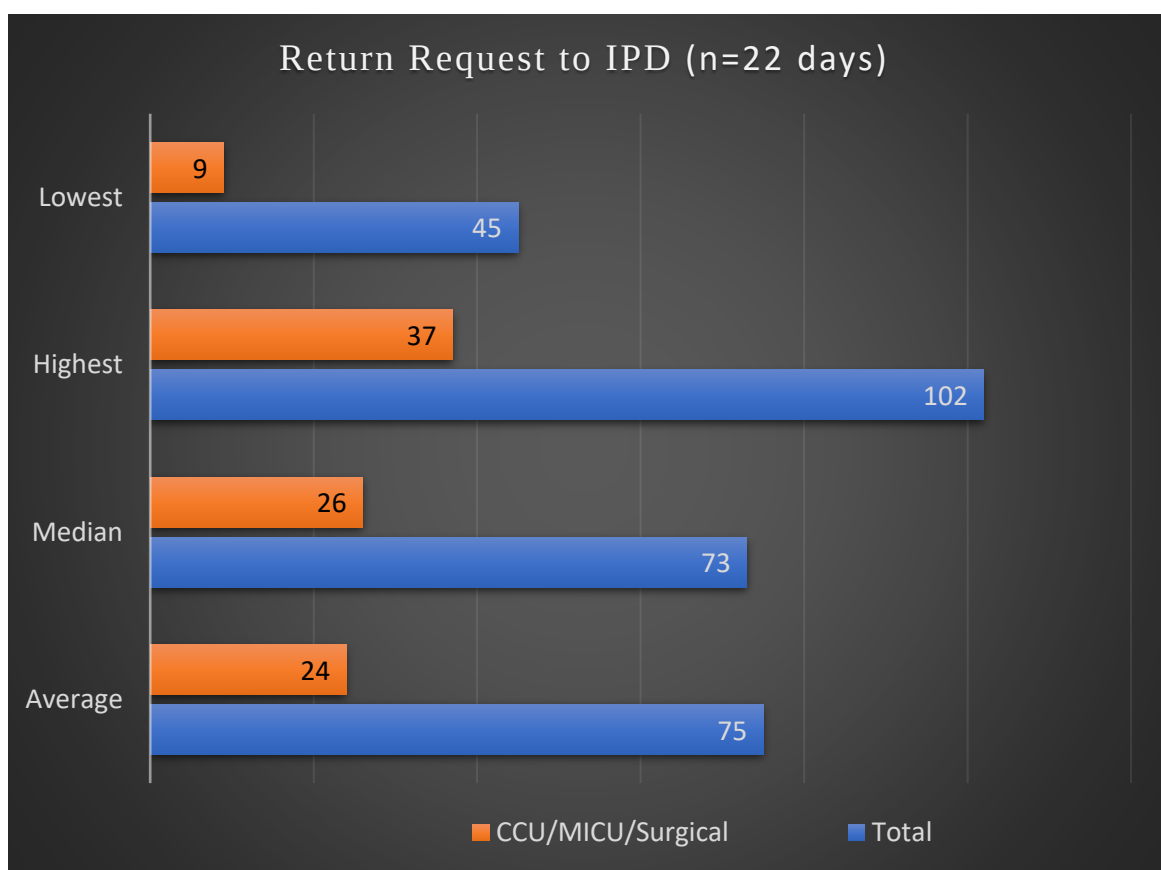
1. Item Returns

Daily return of medicines and surgical items happen to IPD from various wards throughout 24 hours.

Reasons behind this phenomena are code Z, discharge of patients, patient shifting from one ward to another ward, change in the prescription by consultant doctor, excess medicine for dose change etc.

Daily return of items to IPD may not seemed to be a direct problem causing delay in patient medication or longer turnaround time but it creates a huge extra load in IPD work flow which needs a strong skilled manpower to handle.

Fig. no. xii



2. Indent Rejection

Indents are rejected for dispensing process due to items with wrong code regarding generic / brand issue, type or item unavailability on daily basis.

In daily observation among 5 indents processed by IPD personnel 1 indent is generally have been rejected.

Indent rejection creates extra load for IPD personnel processing indents. Again the items are ordered by nurse and indent is again processed by the pharmacist causing delay in patient medication turnaround time.

On average indent rejection rate 1/5 or 20%

3. Indent Repetition

Repetitive indents are ordered by nurses for single patient within short span of time. These incidents happening continuously create extra workload in IPD causing longer IPD medication turnaround time.

This problem created by nurses who often find slow software system and order less items repetitively.

In daily observation average 4 MRN have been repeated within 30 min. in morning and evening shift.

4. Idle Runners

Habit of idle runners for waiting medicines and surgical items to be dispensed for specific ward creates delay in overall IPD TAT.

After coming from a specific ward like MICU if a runner sees a basket with items for MICU to be delivered then he or she waits for more baskets to gather. A runner wants to carry maximum number of baskets to a specific ward at a time.

5. Item Unavailability

Sometimes unavailability of physical stock of items in IPD creates delay. Average 5 items remain unavailable on daily basis in IPD. It may happen items are available not in IPD but in main store or in OPD

6. IPD Workload

Often dispensing process become slower with regular activities like perpetual audit and solving queries from various wards.

Process becomes bottleneck when only one pharmacist dispenses.

7. Clinical Approval Issue

Longer time of clinical approval process is one of the reasons behind overall longer TAT. Sometimes unavailability of system for clinical pharmacists to approve at various wards create longer clinical approval time. They come IPD from various wards to complete the approval process.

A specific problem exists regarding clinical approval. Pending task assigned by a clinical pharmacist is not shown to all clinical pharmacists. Only he or she has to clear the particular task. If by mistake the task has not been cleared by the clinical pharmacist then it remains kept as pending task.

8. Manpower Issue

Absenteeism, high turnover rate among pharmacists shows lack of motivation. 3 dispensing pharmacists resigned between March – April. IPD manpower problem need to solved in order to bring efficiency in the workflow and to maintain overall TAT benchmark.

9. Night shift Work

Medicines, surgical items ordered at night shift not being dispensed and delivered create extra workload in IPD causing further delay for items freshly ordered at morning shift.

All of the 44 cases of items ordered at night shift have been found delayed causing longer patient medication turnaround time by IPD

Author's Suggestions

Suggestive solution for problem 1

- Proper measures should be taken for medicines and surgical items for patients shifting from one ward to another.
- Over stock of medicines in various wards should be avoided to minimize return of items to IPD on daily basis.
- Habit of ordering excess items in advance should be avoided by the nurses.

Suggestive solution for problem 2

- Clinical pharmacists should take extra responsibility regarding indent rejection by dispensing pharmacists for specific items
- Nurses should be aware about right items with right codes. Clinical pharmacists and dispensing pharmacists should come forward together regarding this. They should make aware nurses with prepared list of items with right codes or may make aware nurses about wrong codes so that those get deactivated from the system for no usage.

Suggestive solution for problem 3

- Repetitive ordering by nurses with less items should be replaced with maximum items in single indent preferably at specific time frame.
- Nurses should be aware, trained and monitored regarding this.

Suggestive solution for problem 4

- Delivery to a specific ward should be repetitive with short interval time. Delivery by the runners should be continuous process without waiting for baskets to gather for a specific ward or taking long gap between delivery.

Suggestive solution for problem 5

- Forecasting process should be more accurate with proper systematic audit
- Dispensing pharmacists should know the whereabouts of items. If the ordered item is not available it may remain at the main store or OPD. A system search is required to know the item position in the hospital before reorder and purchase.

Suggestive solution for problem 6

- Different time schedule should be introduced for audit and dispensing process. Both should not be done together so that dispensing pharmacists feel confused whether to dispense or to do audit and eventually IPD medication turnaround time becomes longer than benchmark.
- Audit should be done preferably at night shift.

Suggestive solution for problem 7

- Extra system should be available to clinical pharmacists to approve on the way or at various wards to reduce clinical approval time
- Before handover to the next clinical pharmacist all the pending tasks should be cleared. Pending tasks should be visible to all clinical pharmacists.

Suggestive solution for problem 8

- More skilled motivated manpower is required to handle regular heavy load at inpatient pharmacy department.

Suggestive solution for problem 9

- Items ordered at night should not be left for dispensing pharmacist at morning shift. Dispensing pharmacists at night shift should prepare the baskets with medicines for various wards.
- At least one runner should remain at night shift to carry baskets to various wards.

Suggestive Individual Process Time Benchmark

As of now individual process benchmark time of IPD medication turnaround time does not exist but it should be applicable to monitor time taken by individual process.

Overall benchmark for IPD medication turnaround time for CCU, MICU and surgical ward are 1h, 1h, 2h respectively. Based on that and data analysis, regular observation throughout dissertation project individual process time benchmark are suggested below

		CCU / MICU	Surgical
Clinical Approval	-	15 m	30 m
Indent Process	-	5 m	10 m
Dispensing	-	20 m	50 m
Delivery	-	20 m	30 m
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		1 h	2 h

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