

Time Motion Study on Discharge Process of IPD Patients at
C.K. Birla Hospital, Jaipur

By

Kirti B Singh

*Dissertation submitted in partial fulfillment of the requirements of the degree
MBA Hospital and Health Management*

Academic year, 2018-2020



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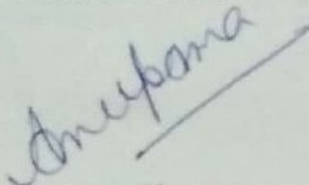
RBH/2020/May/HRD/1583

Date: -30th May 2020

To whom so ever it may concern

This is to certify that Dr. Kirti B. Singh has successfully completed her internship training in Operations Department from 05th February 2020 to 05th May 2020.

We found her sincere, punctual & hardworking. We wish her every success in her future and career.



Anupama Sharma
Unit HR Head
Human Resources

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I would like to express my heartfelt gratitude to Dr. Ashok Chaudhary, Medical Superintendent C.K. Birla Hospital, Jaipur for giving me the golden opportunity to work on this project and to gain an enriching experience. Sincere thanks for all his support and guidance throughout my project.

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Lastly I would like to thank my parents who are my source of inspiration.

All reverence to God almighty for giving me the wisdom to complete my project on time.

Abstract

Title: Time Motion Study on Discharge Process of IPD Patients at C.K. Birla Hospital, Jaipur.

Author: Kirti B Singh

Objective: The current study has been conducted at IP Department of C.K. Birla hospitals Jaipur to map the current discharge process being followed and the bottlenecks associated with it, leading to delayed IPD discharge

Methodology: A descriptive analysis of the secondary data for 1041 IPD discharges in month of February and primary data of 452 IPD discharge in month of March 2020. The secondary data was collected through departmental log sheets, HMIS, and record reviews and the primary data were collected through observation and interaction with process specific stakeholders. The research approach is quantitative in nature; in order to know the discharge cycle time and the bottlenecks associated with it.

Results: The study showed that the average discharge cycle time was 6 hours 18 minutes and 8 hours 15 minutes for cash and insured patient respectively. It was seen that the planned discharge formed 45% of IPD discharge and whereas 55% of discharge were unplanned. The process of discharge summary compilation and the approval from insurance company for insured patient were the major delay points.

Conclusion: The current discharge process stood at 0.80 process sigma level for cash patient and 1.42 process sigma levels for insured patients. More than half of discharge patients belong to cash paying category and in which 59% are planned discharges. Adherence to planned discharge is realized in only 45% cases.

The bottlenecks associated with discharge can be addressed by providing trainings and strict adherence to turnaround time laid down in discharge SOP's and regular monitoring and evaluation for the same.

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List of abbreviations

1. MFD- Marked for Discharge
2. DOR- Discharge on Request
3. DAMA- Discharge Against Medical Advice
4. HMIS- Hospital Management Information System
5. TAT- Turn Around Time
6. NHS- National Health Service
7. FMEA- Failure Mode and Effects Analysis
8. FRAM- Functional Resonance Analysis Method
9. WISN- Workload Indicator for Staffing Needs
10. IT- Information Technology
11. NVA- Non Value Added
12. DMAIC- Define, Measure, Analyze, Improve and Control
13. RFID- Radio frequency Identification
14. RCA- Root Cause Analysis
15. PCP- Primary Care Physician
16. IPD- In patient Department
17. OPD- Out Patient Department
18. ICCU- Intensive Coronary Care Unit
19. HDU- High Dependency Unit
20. GISU
21. MICU- Medical Intensive Care Unit
22. DRR- Drug Return Request
23. MRN- Medical Record Number
24. IP- In Patient
25. TPA- Third Party Administrator
26. GDA- Ground Duty Assistant
27. DPO- Defect per Opportunity
28. DPMO- Defect per Million Opportunity
29. RH- Restricted Holiday
30. GH- Gazette Holiday

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A time motion study on discharge process of IPD patients at C.K. Birla Hospital, Jaipur.

Background:

In today's competitive world hospital forms the most important component of service industry. The ever-increasing privatization has had a profound effect on functioning and utilization of the healthcare system. The emergence of "customer as king" at one end and continuous effort for their delightment at the other end have led to increasing focus on the continuous improvement. Healthcare today is under a constant flux and is overburdened with resource constraints, inefficiencies and errors which can compromise patient safety and service delivery.

Even though hospitals are faced with plethora of complaints, the delayed discharge forms one of the most commonly faced problem . (Campbell) The discharge refers to the point at which patient leaves the hospital and either returns homes or is transferred to another facility. It involves the post discharge medical instructions, medications and care which the patient will need to fully recover.

Discharge planning is a coordinated activity to be carried out in coordination with the treating doctors, resident doctors, nursing staff and billing/ admission department. For the purpose of planned discharge a tentative discharge list is collated after the evening rounds by the doctors or as per estimated discharge date in case of package treatments. This list of tentative discharge is a very vital component in discharge planning.

Type of discharges:

- **Planned discharges** are those which are forecasted for the next day morning for a stable patient. These are generally notified by the treating doctor after the evening rounds in the progress notes and a tentative discharge list is then collated.
- **Unplanned discharges** are those which are not anticipated in process flow of discharge planning these include DOR, LAMA cases or death.

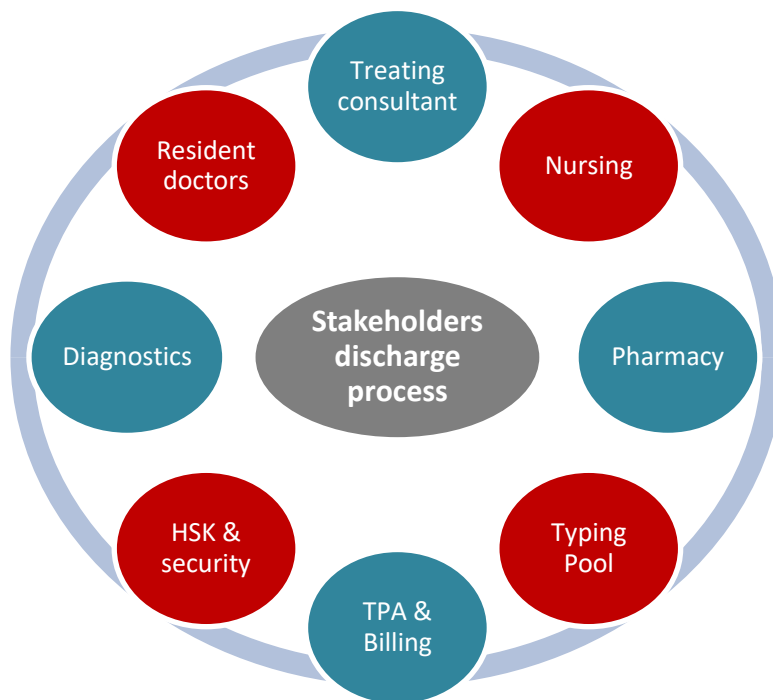


Fig: 1 Stakeholders of discharge process

The discharge process represents the final contact point of hospital's inpatient setting with the patient which reflects the true face of the organization. Majority of hospital are faced with the long waiting time and delays associated with the discharge process. Provision of quick and efficient service is only possible through optimum utilization of resources at disposal and multitasking of various stakeholders involved in it.

A prompt discharge process plays a paramount role in reducing the waiting time by allowing the efficient bed management and its allocation to the incoming patients in shortest time possible. Which would mean the high turnover rate of beds and also indirect reduction in waiting time for beds by the patients who are awaiting admission. A patient discharge process takes up significant amount of time and requires need for the human intervention along side computerized systems. For instance the nurse after doctors intimation need to actualise the discharge by logging into HMIS as marked for discharge (MFD), raise the request for pharmacy clearance and dispatch the unused medications physically with the help of transport pool and simultaneous sent the patient file for getting the discharge summary prepared.

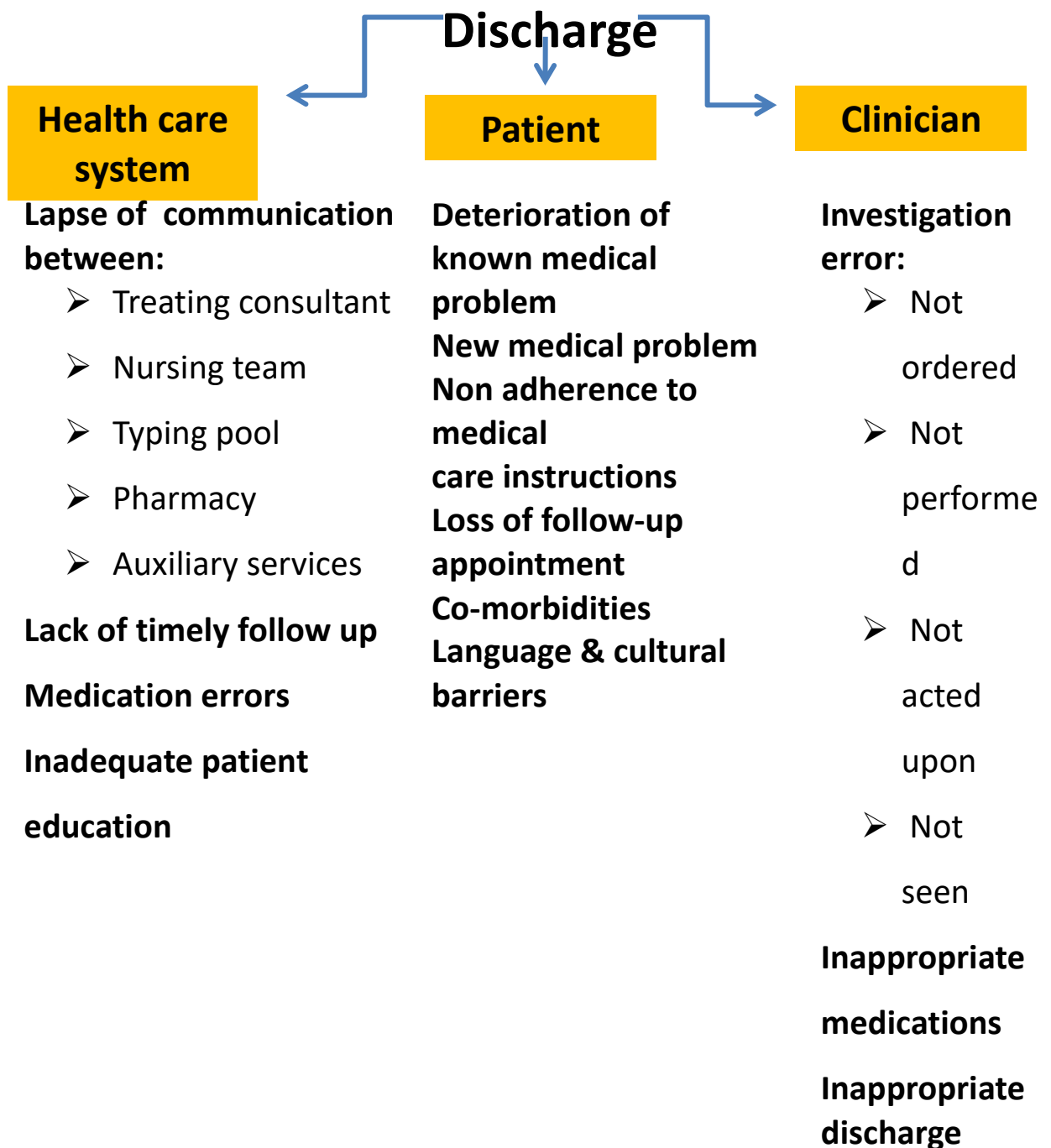


Fig 2: Taxonomy of discharge errors

Review of literature:

Year	Authors	Title	Research design	Conclusion	Inference
2018 India	Kasturi Shukla Shristi Upadhyay	Predictive modelling for TAT of discharge process for insured patients in corporate hospital of Pune City.	A cross-sectional study undertaken from May – July 2015 for a sample of 443 Insurance covered in-patients	Overall TAT was subgrouped into six TAT's, of which discharge summary submission to final bill approval from insurance company had the highest predictive effect on overall TAT. That TAT varied significantly by an hour for long stay patients.	Delayed discharge in insured patients is common encounter for which hospital and insurance companies need to work in tandem by providing complete documentation by the hospital to insurance company and an fast track response to the queries generated
2017 India	Harmanjot Kaur & Roopjot Kochar	A study on discharge process of discharged patients of a multispecialty hospital, Ludhiana	A descriptive cross sectional study carried out in multispecialty hospital of Ludhiana . Sample size of 270	The maximum TAT was of 9:07hrs from discharge intimation to final handover and on average 5:07 hours was taken from	Ambiguity in discharge orders seems to complicate the discharge process. Use of hospital integrated HIS is linked to reduction in

			inpatients taken.	discharge intimation to room prepration for next admission.	number of phone call for seeking clarification
2017 Global	Sally Bullock, Charles. W. Morecroft, Rachel Mullen & Alison B. Ewing	Hospital patient discharge process- an evaluation	A qualitative study involving semi-structured telephonic interviews with 13 members of hospital pharmacy team in acute NHS hospitals across North West England	Thematic annalysis pointed out to lack of patient involvement in discharge process as main theme imapacting the discharge process.	Hospital staff faces a constant pressure to meet the hospital targets and fufill the patient expectation s. An integrated health care portal and staff training were important factors impacting discharge process.
2015 Global	Partha Das, James Benneyan, Linda Powers, Matthew Carmody, Joanne Kerwin, Sara Singer	Engineering safe care cordination from hospital to home: Lessons from USA	A quantitaive and qulitative research that employed techniques like FMEA, FRAM & swim lane diagrams at Mt. Auburn Hospital U.K.	Systems engineering is one viable approach in tackling the complex issues associated with delayed discharge. Swim lane diagrams: provide a schematic representati	Safe transition of hospital patient care requires an effective and continuous coordinatio n between cross funtional teams. It requires a through understandi ng of

				on various stakeholder's FMEA: an effective communication between clinician & community care nurse successfully mitigated the high risk failure modes.	system engineering, learning from the successes and failures and top management commitment to facilitate the redesigning of processes.
2015 Global	Ghada R. El Eid, Roland Kaddoum, Hani Tamim and Eveline A. Hitti	Improving Hospital Discharge Time- A Successful Implementation Of Six-Sigma Methodology	A quantitative pre-post intervention study carried out in 386 bedded tertiary care hospital, Lebanon	A 22.7% decrease in discharge time from 2.2 hours to 1.7 hours post intervention . Hospital LOS dropped from 3.4 days to 3.1 days post intervention .	Adoption of the core principles of six sigma in to day functioning of hospital is more effective in reducing the delayed discharges rather the institution specific intervention
2014 Global	Theodore T. Allen, Shih-Hsien Tseng, Kerry Swanson & Mary Ann McClay	Improving hospital discharge process with Six Sigma Methods	An interventional study involving application of DMAIC approach in streamlining the discharge process at a 204 bedded Aliance	Incorporation of discharge worksheet in patient medical records along with cooperation of IT personnel and nursing staff	Discharge communication is most critical and most difficult component of hospital care. Hence method of communication need to be

			community hospital in Ohio.	resulted in average discharge time reduction from 3.3 hrs to 2.8 hrs (p=0.068) and a dramatic reduction of missing chart entries by 62%.	standardized and specific. The expectation should be communicated uniformly including the patients family.
2014 India	S.Arun Vijay	Reducing and optimizing the cycle time of patient discharge process in a hospital using six-sigma DMAIC approach	The quantitative study carried out in general medical and surgical department of at K.G Hospital for the duration of 3 months for discharge process redesigning	61% reduction in average discharge time from 234 minutes to 143 minutes by elimination of NVA steps and adoption of DMAIC approach.	Optimization of discharge process is essential to achieve fullest satisfaction of the patient. The common delays occur at timely availability, manual checking and merging of patient reports findings into discharge summaries, its proof reading .
2008 Global	Y.-Y. Jiao, K.Li, R.J.Jiao	A case study of hospital patient discharge	An interventional study carried out in Tan	Patient discharge process with RFID implementa	The patient discharge process offers various

		process re-engineering using RFID	Tock Seng Hospital in Singapore	tion and discharge lounge is able reduce the number of staff needed and shorten the bed wait time for the patients	touchpoints to automate human tasks through communication based on computerized systems and to address the variability and capture real time data.
2005 Global	David Anthony, V.K. Chetty, AnandKarth, Kathleen McKenna, Maria Rizzo De Paoli, and Brian Jack	Re-engineering the Hospital Discharge: An Example of a Multifaceted Process Evaluation	A mixed method study with application of FMEA, RCA approach and probabilistic risk assesment for comprehensive process evaluation to improve quality of discharge process at Boston Medical Centre.	The handoff from hospital care to primary care is a potential ground for medical care errors. Adequate and timely dissemination of information from PCP to hospital team & vice versa. A proper delineation of roles & responsibilities of personnel go a long way in smoothening out the hospital	Patient safety issues are entwined to the discharge process. Fragmented, non standardised and haphazard care can lead to adverse events especially at time of hand-off from hospital care to primary care.

				care transfers.	
1999 Global	Serpil Ozcan & Peter Hornby	Determining hospital workforce requirements: a case study	Turkish case study employing the WISN for human resource requirements in health sector is based on manpower utilization and workload.	The WISN ratio of 1 indicates there is a perfect match between required and actual staffing level, if greater than 1 the overstaffing exists and vice versa.	The hospital staffing practices need to be governed by its locality, requirements as per scope of services and not merely based on institutional norms.

The review of the previous studies reflected that the time taken for discharge of patient from the hospital is a key variable affecting the patient satisfaction. Ramifications of slow and unpredictable delayed discharge include the patient dissatisfaction, loss of potential revenue, increases chance of acquiring HAI by patients, delay in admission of upcoming patient, reduced bed viability and overwhelming of staff resources. Discharge process involves the interaction of interdisciplinary stakeholders. Better care coordination requires a complete, uniform and smooth flow of information across departmental boundaries and the process ownership of the stakeholders. A fully integrated HIS is an important aid for processing the huge amount of data generated in hospitals and drawing practical conclusions from it.

Need for the study: The delay in discharge not only cause frustration to attendants and patient but also delays the admission of incoming patients. The discharge issue was taken up as the critical issue based on these parameters: patient centric mission of the hospital, past patient complaints and data analyzed from the patient satisfaction record.

Research question: What is the current discharge process of IPD patients, and the bottlenecks associated with it at C.K. Birla Hospital, Jaipur?

Objective: The current study was conducted with the objective of:

- To map the as-in current discharge process being followed.
- To identify the bottlenecks in achieving timely discharge.
- To identify of non-value adding activities increasing the cycle time of discharge process.

Methodology:

Operational definitions:

1. Discharge planning: the discharge planning is the process of deciding what health care a patient needs for a smooth move from one level of care to another. (Medicare)
2. TAT: the time interval from commencement of discharge planning to the time of completion of discharge process.
3. Inpatient: a person who is admitted to the hospital for receiving medical/ surgical care, for a period exceeding 24 hours.

Study setting: In-Patient Department at C.K. Birla Hospital, Jaipur

Study design: Descriptive and observational

Study population

Inclusion criteria: IPD discharges (cash or insurance covered) with patient stay of 24 hours or more at general ward, maternity ward, and critical care areas like ICCU, MICU and GICU,

Exclusion criteria: emergency cases, OPD patients, day care procedures. Night indents are not monitored for primary data collection.

Study tools: Discharge checklist, discharge tracker by HMIS

Duration of study: 1.5 months (10th Feb 2020- 31st March 2020)

Sample size:

- ❖ Primary data: 452 discharges from IPD situated on (2nd, 3rd, 4th and 5th Floor) from month of February and March.
- ❖ Secondary data: 1041 IPD discharges in month of February (HIS of hospital)

Sampling technique: Convenience sampling

Sources of data collection

- Interaction with process specific stakeholders
- Observations for typing pool
- Interactions with patients
- Secondary data via HMIS, logbooks, discharge summaries and patient file.

The strategies adopted for addressing the objective of mapping the IPD discharge process is described below.

The primary aim was to know what could optimize the discharge process to allow timely handover of the discharge summary to the patient. The key output variable was average time taken for discharging the patient.

Firstly, the data for the previous months in hospital provided the summary for the TAT taken for discharge of the patients. The protocol laid down in discharge SOP of the hospital mentioned the specification limit for discharging the patient as 120 minutes for cash patients and 240 minutes for those covered under insurance.

The discharges made in month of February were noted for the discharge cycle time for the cash category of patient, the type of discharges done as, unplanned discharges and planned discharges. Also, the discharge timings were noted for the discharges made before or after mid-noon with the help of secondary data (sample size 1041) captured in HMIS

For addressing the second and third objective of identifying the bottlenecks and the non-value adding activities in discharge process, the main focus group for the observation was the typing pool staff, entrusted with responsibility of typing the discharge summaries.

The time study was done separately for the typing pool to measure time consumed for the major activities in compilation of the discharge summary. The main ways for accumulation of the data (information) for making analysis of the typing pool activity were:

- The direct observation of activities
- Recording of data on log sheet (manual)
- Interaction with the relevant staff.

The observational data was collected for the following:

- Activities performed during the shift hours
- The time taken to perform these activities
- The time spent idle.
- Also the summaries prepared were noted for the number of correction/ additions made per discharge summaries and the number of times the summaries were corrected before getting finalized and signed by the doctor and
- The time elapsed between the subsequent corrections.

For understanding the non value adding activities in the billing counterpart the tracking of discharge adherence was done using primary data (sample size 452), in order to know the percentage of planned discharged actualized on per day basis.

Findings:

The mapping of patient discharge process was carried out to help get clearer understanding of process flow and the stakeholders involved in it.

D/C order by consultant

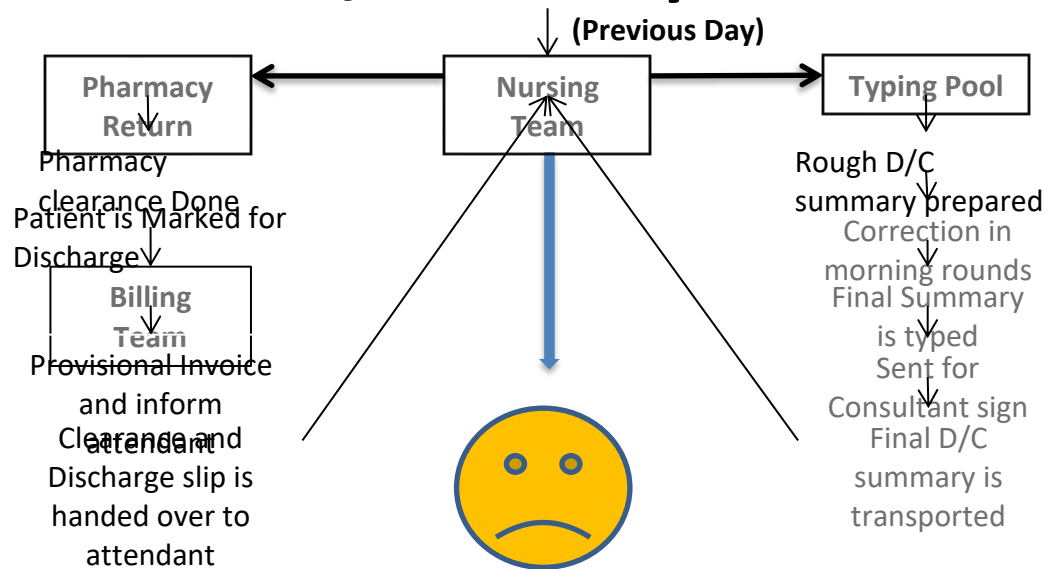


Fig3: Basic outline of planned discharge process as is in IPD

D/C order by consultant

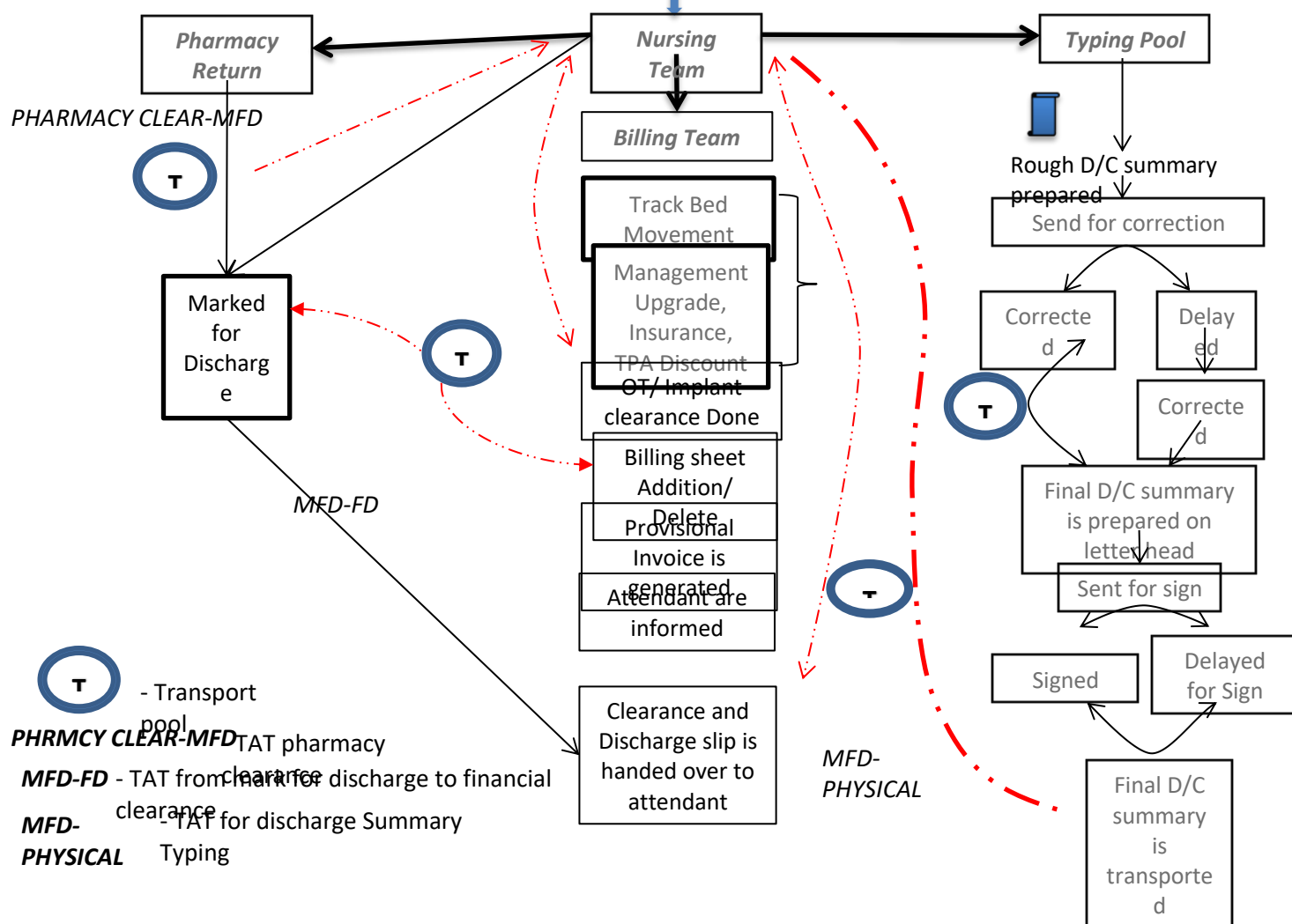


Fig 4: The Discharge process as is- Inpatient setting

The discharge process begins with the treating doctor intimating for the patient discharge at the time of IPD rounds to the nursing team. After which the nursing team initiates the pharmacy return, billing team updates the provisional bill and the typing pool compiles the discharge summary. The financial settlement is done and the attendant is handed over the final bill and followed the physical discharge of the patient from the hospital.

The discharge process was broken down into three sub processes viz.

- Pharmacy clearance to marked for discharge (Fig 5)
- Marked for discharge to final billing (Fig 6)
- Final billing to physical discharge (Fig 7)

The process flow for these three individual sub processes forming the part of discharge is shown as below:

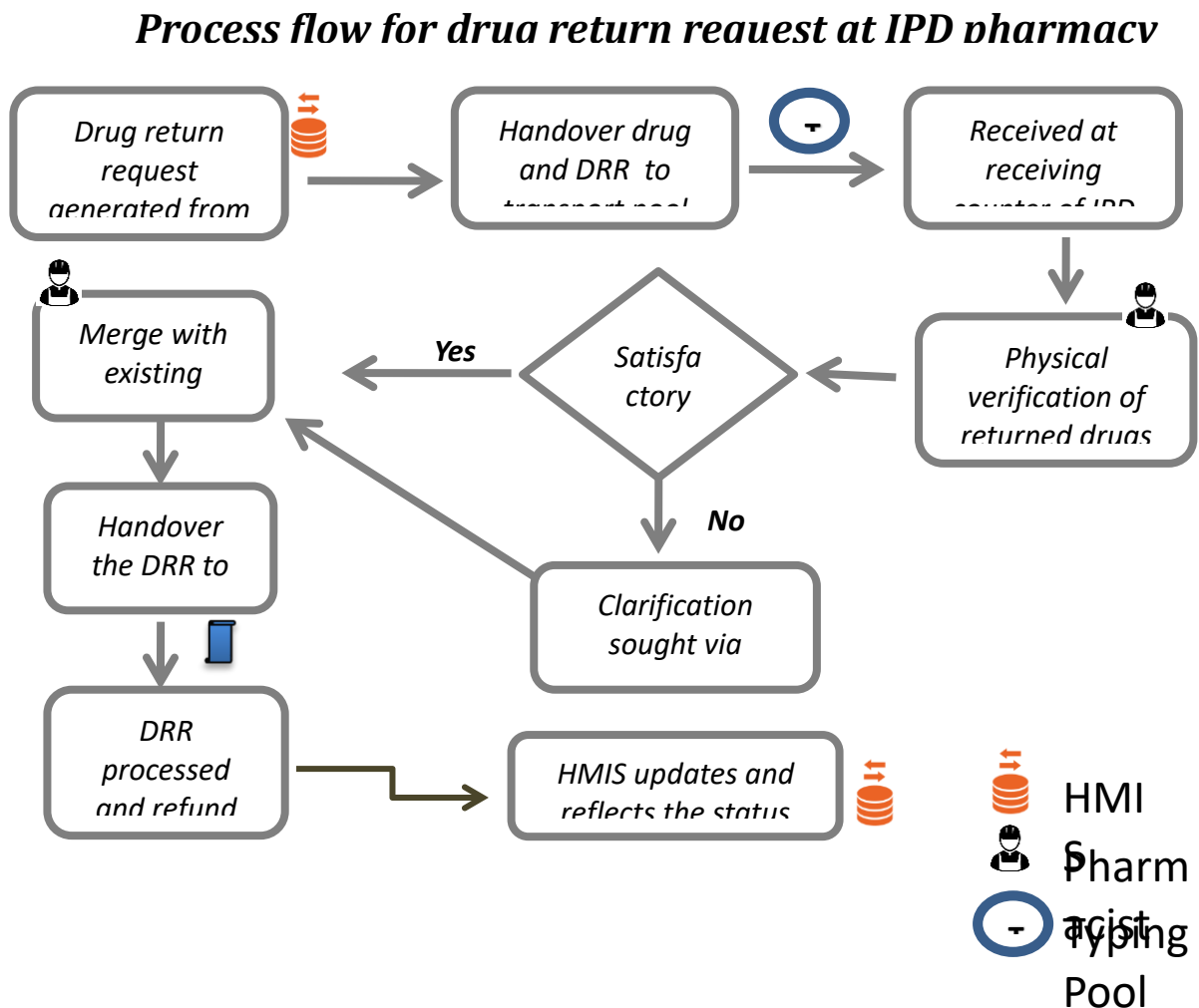


Fig 5: Sub-Process Flow of Pharmacy Clearance

After the discharge intimation by the treating doctor, the nursing supervisor raises the pharmacy return request in order to return the unused medicine through the HMIS (process flow is shown in Fig 5).

The prerequisite for the pharmacy clearance is the manual collection of all the unused drug/ consumables which were ordered for the patient from the patient bedside by the allocated shift nurse at the nursing station. Thereafter the medications codes are keyed in the HMIS platform to raise the request for the pharmacy return; the transport pool is summoned and handed over the contents to be returned in zip pouch marked with the patient label indication MRN, bed number and name of patient.

At this step there is dependence on the human counterpart i.e. transport pool for the timely delivery of the returned medications to IPD pharmacy and the certain amount of cognition on nursing staff in order to recall the codes while raising the drug return request via HMIS.

The medicines are collected at the receiving counter of IP pharmacy is physical verified and merged into stock. The DRR is processed and its status then reflects on inpatient screen of HMIS. In order to know the status of raised DRR the nursing staff keys the patient MRN no. into the system, or queries over the telephonic call.

There is a pre-installed pneumatic-chute system which is currently nonfunctional which can be harnessed to expedite the pharmacy return process and reduce the dependence on the human counterpart.

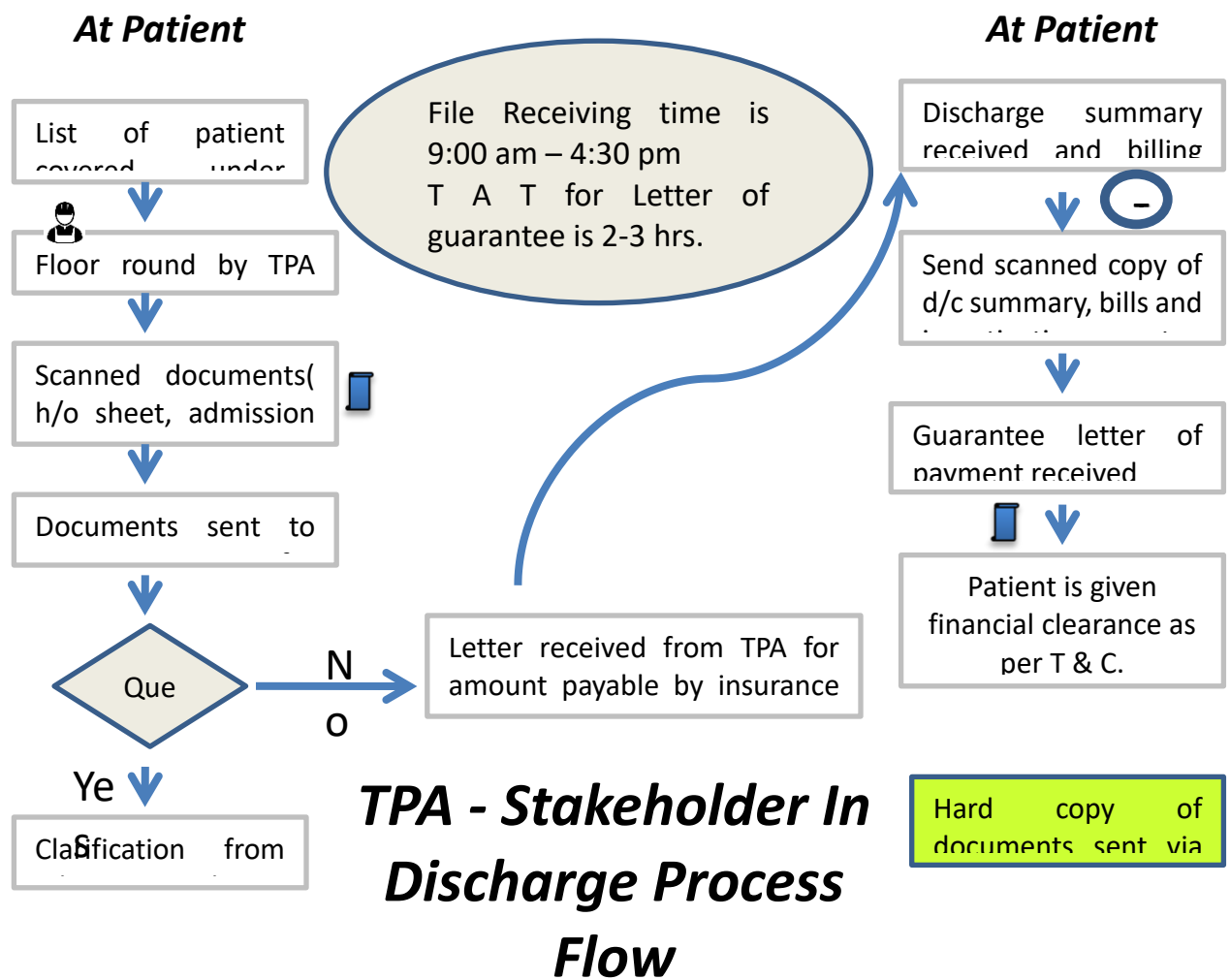


Fig 6: Role of TPA in Discharge Process

For the patient covered under the insurance the TPA plays an essential role in processing the payment for the services and the related documentation for it. There is a dedicated area allocated on the ground floor for the TPA personnel. They are the important touch points both at time of admission and discharge of the patient. The essential prerequisite is the documented and correct relaying of the patient health care information between the insurance company and the hospital, along with a clear understanding and counseling of patient attendant regarding the payment clause which isn't covered by the insurance company.

At this step the timely receiving of the required documents i.e. discharge summary, investigation and reports, updated provisional bill for processing the discharge is an important step, which is collected by TPA personnel manually by taking IPD rounds.

For the discharge of insured patient the TPA department sends the scanned copy of the medical documents like history sheet, investigation and reports and copy of provisional bill with the discharge summary to the respective insurance company, which then verifies the information and provides the letter of guarantee for payment of dues.

After receiving the payment approval from insurance company the patient file is sent back to the respective IPD floor through the GDA staff.

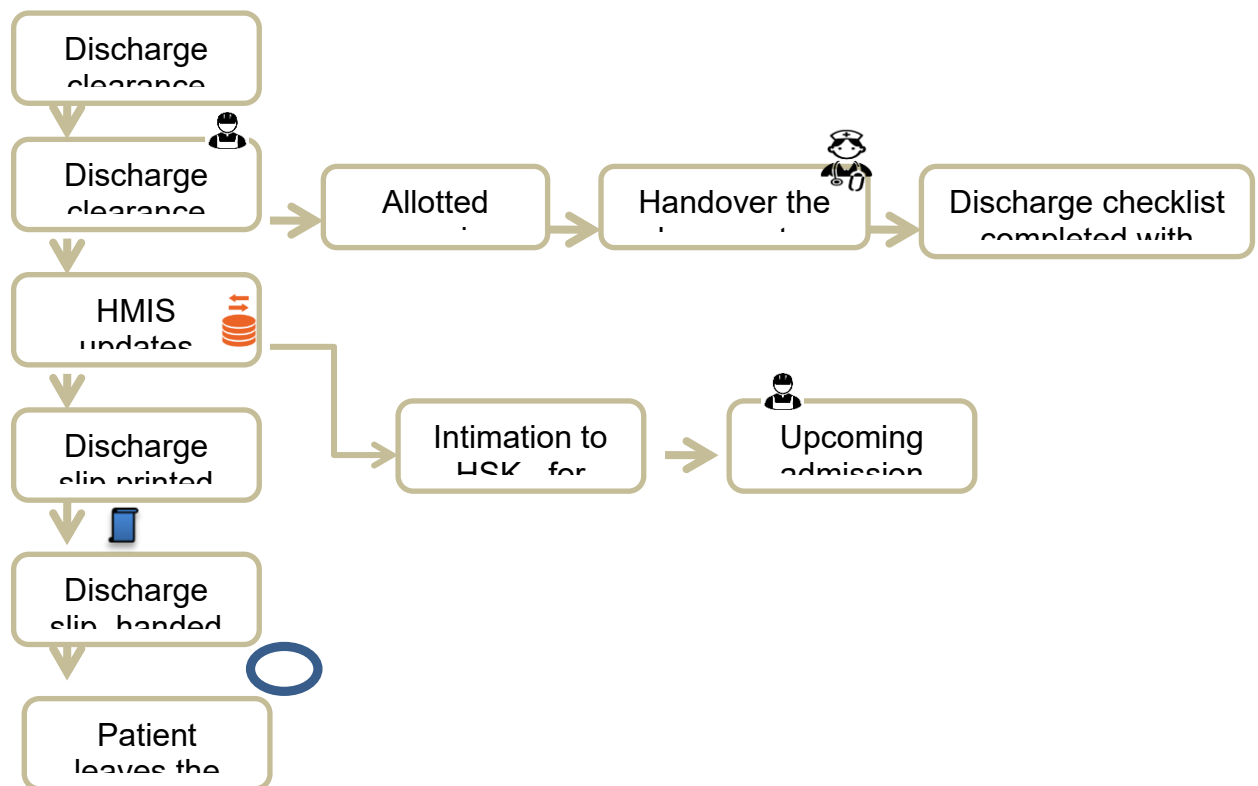


Fig 7: Sub-Process Final Billing to Physical Discharge

The last sub process involves the payment settlement as final billing and handing over of the discharge clearance slip and final bill with all the expense details of the course in hospital to the patient attendant by the billing executive. The discharge slip is then handed over to the nursing staff at the nursing station of the respective floor by the attendant. Thereafter the allotted nursing staff prepares the patient for the discharge by removal of cannula, checking

for the vitals and education about the post discharge care followed by the document's handover and completion of discharge checklist.

At this step the patient attendant is contacted through the contact number provided at the time of admission to settle the outstanding amount. The attendant is explained the provisional bill details and queries are addressed, in case of any disconnect or availing the discount the Billing head is contacted and approval from the finance department is taken. If the initiation of discharge process is after 12:00 P.M the patient is charged for the half day till 6:00 P.M. and full day if time extends beyond 6:00 P.M.

The attendant receives the financial clearance slip which is handed over at respective nursing station and allotted nurses then gives the handover and post-operative instruction to patient art , the GDA staff changes the patient clothing and physical discharge is done.

The process sigma level was calculated for the discharges made in month of February. As shown below:

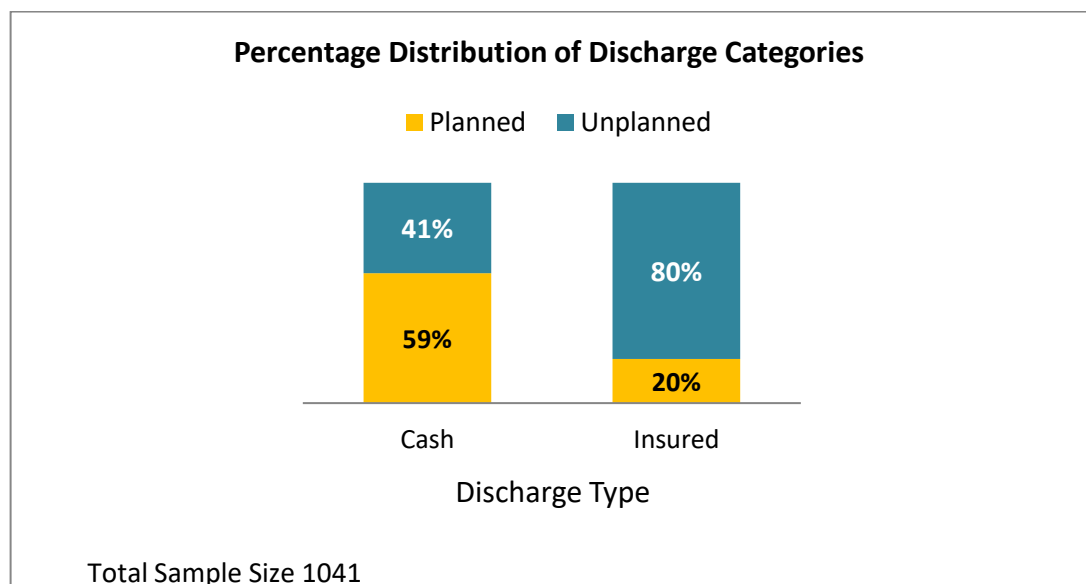
S. no	Process sigma components	Result	
		Cash (120 mins.)	Insurance (240 mins.)
1	No. of defects opportunity per unit (O)	O = 1	O = 1
2	No. of patients discharged during month of February (N)	N = 680	N = 361
3	No. of patients not discharged within specification limits (D)	D = 515	D = 192
4	Defects per opportunity DPO= D/O*N	0.757	0.531
5	Defects per million opportunities	750000	530000
6	Yield (1- DPO) *100	24.3 %	46.9%
7	Process sigma	0.80	1.42

Table 4: Six Sigma Level for As -Is Discharge Process

It was seen that in month of February a total of 1041 discharges were done out of which 680 were cash patient and 361 were insured. Out of 680 discharge 515 discharge were exceed the specified time limit of 120 minutes and out of 361 insured category discharge 192 exceed the time limit of 240 minutes. The DPO was calculated by dividing the defects (D) by the no of patient discharge multiplied with opportunities (O*N). The defect per opportunities was multiplied by million to get the Defect per million opportunities (DPMO) 750000 for cash and 530000 for insured category patients.

The yield was then calculated in percentage which represents the process without the defects which was found to be 24.3% in cash and 46.9% in insured category discharge.

The six sigma methodologies used to measure the current performance level showed that the current discharge process of the hospital stood at 0.80 process sigma levels for cash patient and 1.4 for those covered by insurance.



**Fig 8: Distribution of the Planned and Unplanned Discharges
Across Cash and Insured category patients**

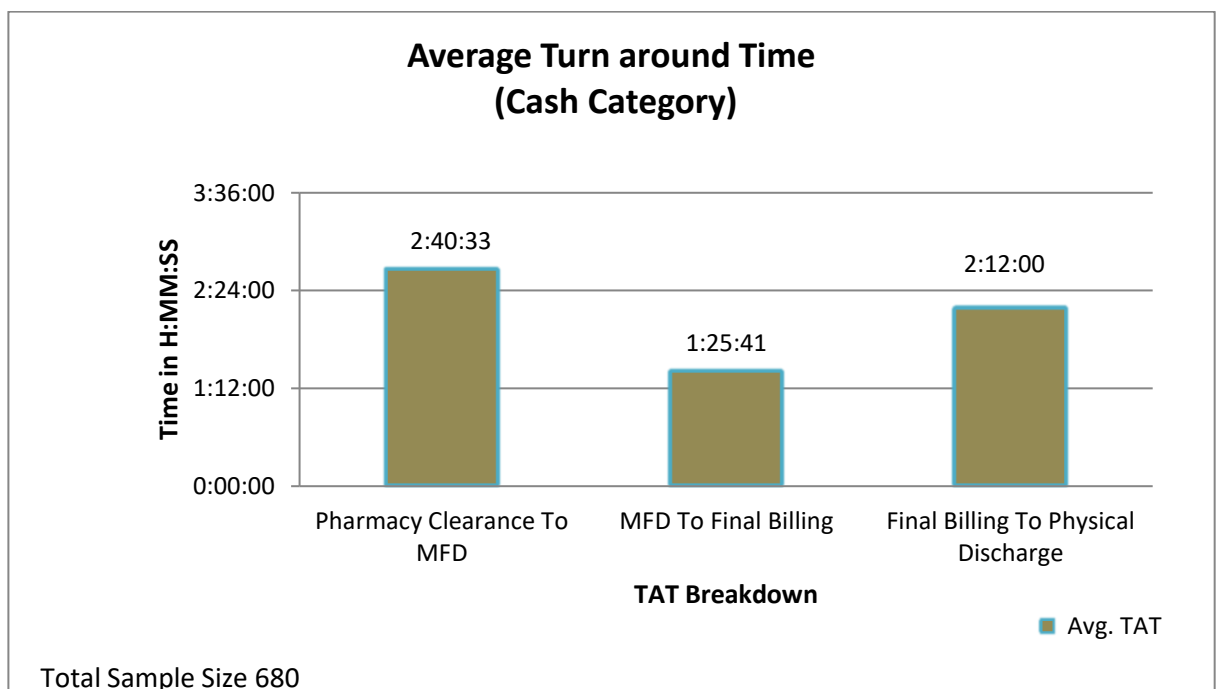
It was analyzed that out 1041 discharge done in month of February the planned discharge formed 45% of total discharges, while 55% discharges were unplanned; which on further breakdown into payment categories as cash and insured showed that the distribution of

planned discharges was 59% in cash paying patients and 20% in insured category patients. The unplanned discharges were 41% across the cash patients and up to 80% in insured patients.

It is laid down that the planned discharges should comprise up to 90 % of the total discharges of the month, since in case of planned discharges the pre discharges activities like pharmacy return, draft compilation of discharge summaries and pending investigation orders and cross checking of the bills are done on prior basis and are completed in the evening before the day of planned discharges. However if the patient and attendant could be apprised for the next day requirements for smooth processing of the discharge it will be more beneficial.

Next with the help of process mapping the average time taken for the sub processes were analyzed to be as follows:

- Pharmacy clearance to Marked for discharge (MFD)
- Marked for discharge (MFD) to final billing
- Final billing to physical discharges.



**Fig 9: Average Turnaround Time for the Discharge Sub-Processes
(Cash Category)**

The average turnaround time for the Cash Category Patients was 6 hours 18 minutes and 14 seconds. Which on examination of sub processes, showed that the pharmacy clearance to MFD step took 2 hours 40 minutes on an average and Marked for discharge (MFD) to final billing took 1 hour 25 minutes and final billing to physical discharge of patient took 2 hours 12 minutes.

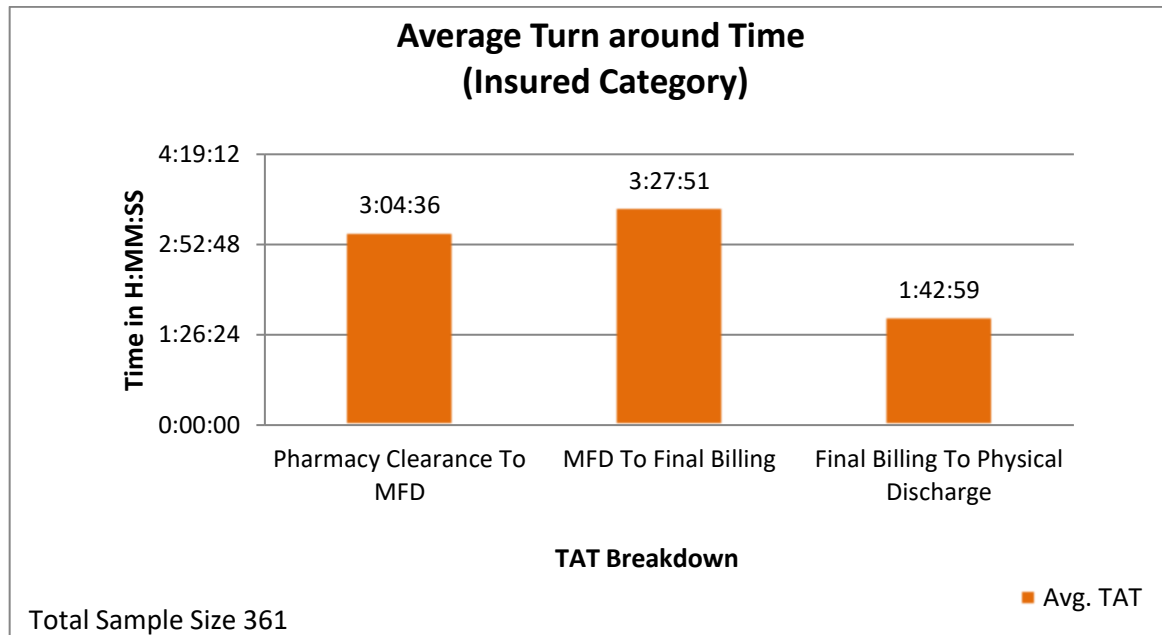


Fig 10: Average Turnaround Time for the Discharge Sub-Processes (Insured Category)

The average turnaround time for the Insured Category Patients was 8 hours 15 minutes and 26 seconds. Analysis of the sub processes showed that the pharmacy clearance to MFD step took 3 hours 04 minutes on an average and Marked for discharge (MFD) to final billing took 3 hour 27 minutes and final billing to physical discharge of patient took 1 hour 42 minutes.

It was analyzed that pharmacy clearance to MFD step in cash category patient have 42% contribution to discharge cycle time, followed by the final billing to physical discharge 35% and then MFD to final billing.

In case of insured patient the MFD to final billing step contributes to 42% and followed by pharmacy clearance to MFD and final billing to physical discharge 21%.

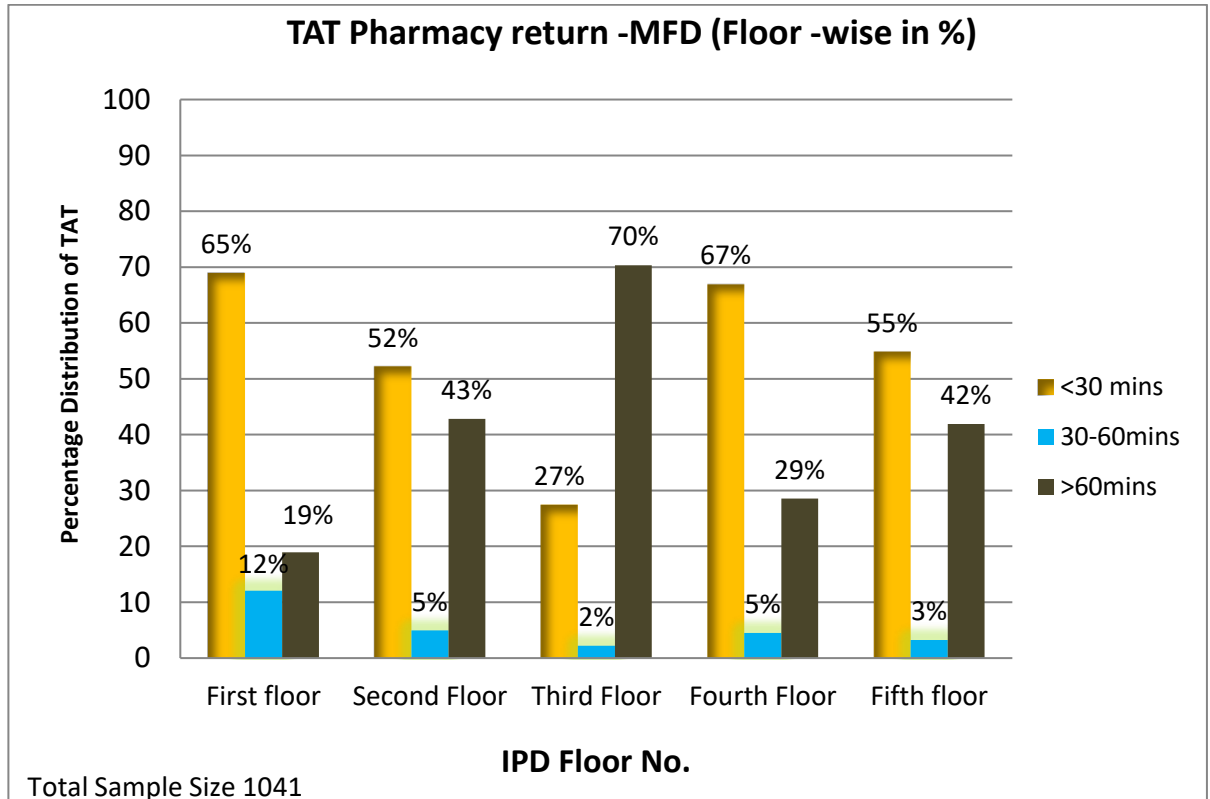


Fig 11: Floor wise distribution of the Pharmacy Return to MFD TAT

The time taken from pharmacy clearance was further segregated as IPD floor wise into three categories of less than 30 minutes, 30 to 60 minutes and above 60 minutes. On third floor nearly 70% of the pharmacy return requests took more than 60 minutes followed by second floor 43%, fifth floor 42% and fourth floor 29%

The second sub process from MFD to final billing was segregated in to 3 categories as; less than 30 minutes, 30-60 minutes and above 60 minutes.

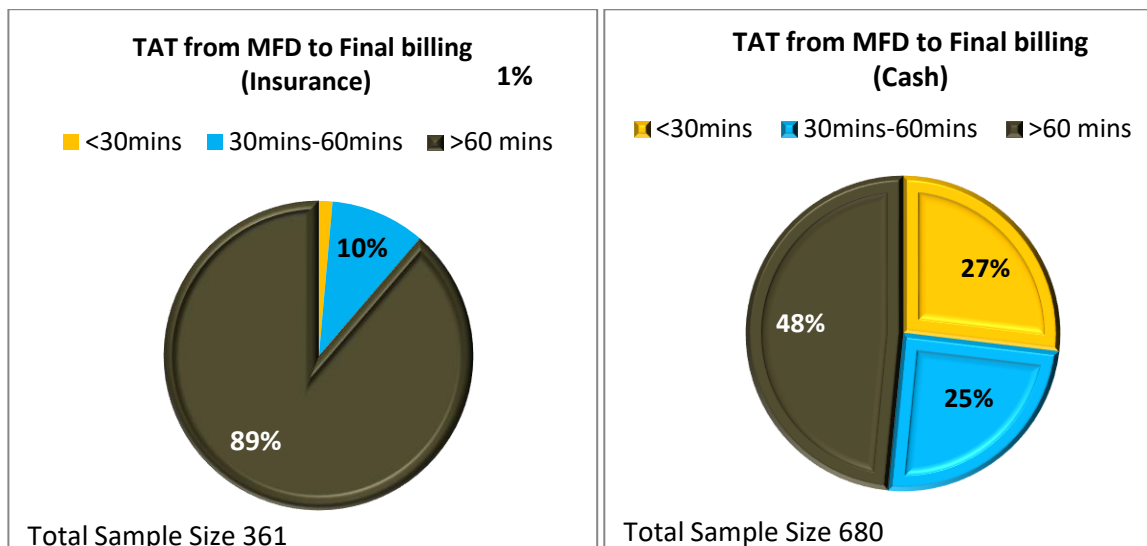


Fig 12: Percentage distribution of MFD to final billing TAT

In insured category the time taken from MFD to final billing took more than 60 minutes in 89% cases followed by 10% taking between 30 minutes to 60 minutes and 1% cases taking less than 30 minutes.

While in cash category the time taken from MFD to final billing took more than 60 minutes in 48% cases followed by 25% taking between 30-60 minutes and 27% cases taking less than 30 minutes.

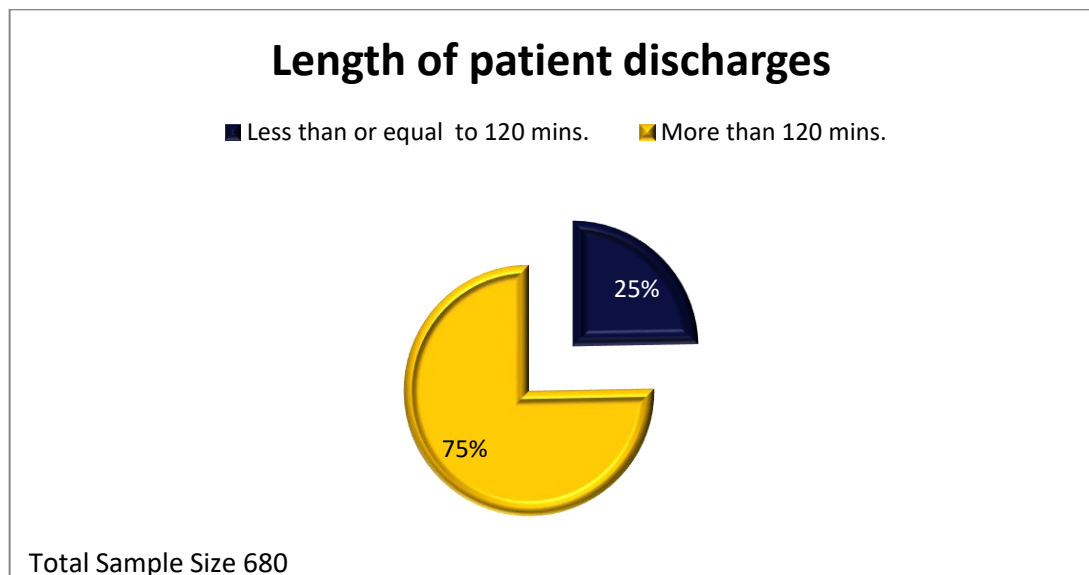


Fig 13: Cycle Time for the Discharge Process

Since the cash paying patient formed the more than half of the total discharges; the cycle time for processing these discharges was noted which was observed to be within the specification limit of less than or equal to 120 minutes in only one fourth (25%) of the cases, while it was more than 120 minutes in nearly three fourth of the cases (75%) out of total sample 680 via secondary data through HMIS. The average time taken for completion of discharge cycle in outliers was 315 minutes or 4.75 hours.

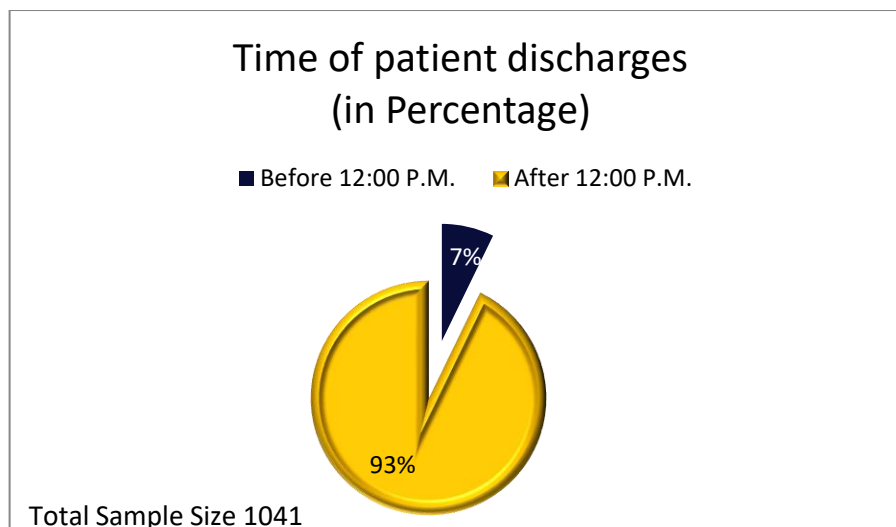


Fig 14: Timmings of Patient Discharge

The target for cycle time of planned discharges was laid down to be before 12:00 p.m. for atleast 75% cases. The study found that only 7% of patients scheduled for discharge were able to leave the hospital by 12:00 pm. While in 93% cases the discharge was delayed and done only after 12:00 p.m.

Further the outliers to discharge timings of 12:00 pm (93%) were analysed for the MFD timings, as a proxy measure of discharge initiation process in HMIS, which showed that in nearly 62% cases the MFD was done post 11:00 A.M. in morning after the consultant rounds, in 13% cses it was marked upto 10A.M and in 25% cases it was done between 10 A.M. to 11 A.M.

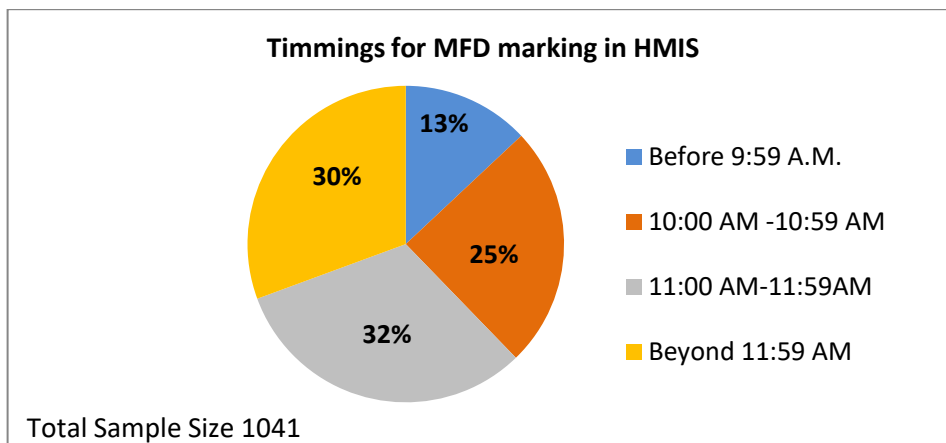


Fig 15: Timmings for Marked For Discharge in HMIS

The discharge summary is a documented evidence of the hospital care rendered to the patient which included information on components like:

- Reason for admission
- Relevant medical, personal, and allergy histories
- Significant findings
- Diagnosis
- Procedures performed
- Significant medications administered
- Course in hospital
- Condition at discharge
- Post discharge medications, dietary intake, physical activity and other instructions
- Follow up visit
- Instruction about when and how to obtain urgent care.

The discharge summaries are important document which need to be submitted at time of patient discharge to the insurance company along with the bills and the investigation reports, and also need to be handed over to the patient in original copy. The timely availability of fully completed and accurate discharge summary serves important step for timely discharge.

From the observation of the typing pool component, entrusted with work of typing the discharge summaries, it was noted that there was round the clock availability of the typist for making discharge summaries.

The details of typing pool staff are as under:

Details of Medical transcriptionist (Typing pool)	
Total Typing Pool Staff	6 (in no.)
Total Female staff	1 (in no.)
Total Male staff	5 (in no.)
Average experience in hospital setup	5 years approx.
Seating arrangement	Decentralized
Medical background	None

Table 1: Details of medical transcriptionist

The decentralized seating arrangement of typing pool	
Floor No.	Workload distribution
On 3 rd floor	General ward, SBCU, NICU, Maternity ward, cardiac care, day care procedures, H.D.U., M.I.C.U, G.I.C.U and S.I.C.U
On 4 th floor	For Inpatient on 4 th floor (45 beds)) and 5 th floor (32 beds)

Table 2: Workload distribution typing pool

The workload distribution was accessed in order if there were any bottlenecks faced due to inequitable distribution of discharge summaries compilation. It was noted that on the fourth and fifth floor collectively 77 beds were present and on third floor the collectively 52 beds were present. The third floor typing pool also compiled an average of 10 discharge summaries from day care procedures.

The shift timings for the typing pool were as follows:

- 8am-2pm (morning shift)
- 2pm-8pm (afternoon shift)
- 8pm-8am (evening shift)
- 10am-4pm (night shift)

It was observed that first the rough draft of the discharge summary was prepared, there was one dedicated transporter (GDA) available for getting these draft discharge summaries checked corrected by the doctors and also getting them signed by them when finalized after corrections or any additions.

There are activities which determine the workload for each type of department such as number of: operations done, deliveries done, laboratory investigations completed. Thus it is possible to set the activity standard for each of these activities. An activity standard is the amount of time required by a well trained and motivated staff member to perform a given task in the specific conditions of the country. Hence a comparison of workload in the department with an activity standard of the personnel involved in these activities leads to determination of number of personnel required by the department. The activity standards need to be realistic and reflect the acceptance to the health care workers.

S.no.	Non working days per year	No. of days
1	Privilege leave	25
2	Sick leave	5
3	Holidays RH & GH	12
4	Casual Leave	10
	Total	52
TOTAL NON- WORKING WEEKS PER YEAR = 7 weeks		
WORKING TIME Total working weeks per year = 45 Total days working in a year = 270 Total working hours per year = 2160		

Table 3: Available Annual Working Time for the Typing Pool

For addressing the objective of knowing the bottlenecks and non value added activities, observation was done for the typing pool staff that helped in capturing the following insight:

- The activity time for each of the activities was noted for 2 weeks.

S no.	Activities involved	Description of activities	Time taken (H:MM:SS)		
			Mean	Max.	Min.
1	Fresh discharge summaries compilation	Time elapsed from receipt of patient file until rough draft is prepared	0:09:38	0:24:00	0:03:00
2	Corrections on draft summaries	Time elapsed from receipt of manually corrected draft summaries to till they are transcribed into soft copy	0:04:05	0:25:00	0:01:00
3	Phone calls	Time elapsed in attending the phone queries related to summaries.	0:02:14	0:13:00	0:01:00
4	Idle instances	Time elapsed when there was no work piled up.	0:13:34	0:37:00	0:01:00
5	Complete compilation of discharge summary	Time elapsed from preparation of draft summary till handover	2:16:06	5:07:00	00:10:00

Table 5: Average Turnaround Time for Typing Pool Activities

The discharge summaries were audited for noting the number of correction or additions made to rough draft before it was printed on the letterhead and signed by the treating consultant. The data for which is as follows:

<i>S no.</i>	<i>Discharge summaries</i>	<i>Sum total</i>
--------------	----------------------------	------------------

1	Total no. of summaries audited	36
2	Total no. of corrections done	144
3	Total no, of additions done	120

Table 6: Discharge Summary Corrections

It was found that the average number of correction made to a rough draft were four in number and the number of additions done for any missing notes was three in number. Thus a rough draft of the discharge summary can bear up to seven changes either due to corrections or additions for any missing information.

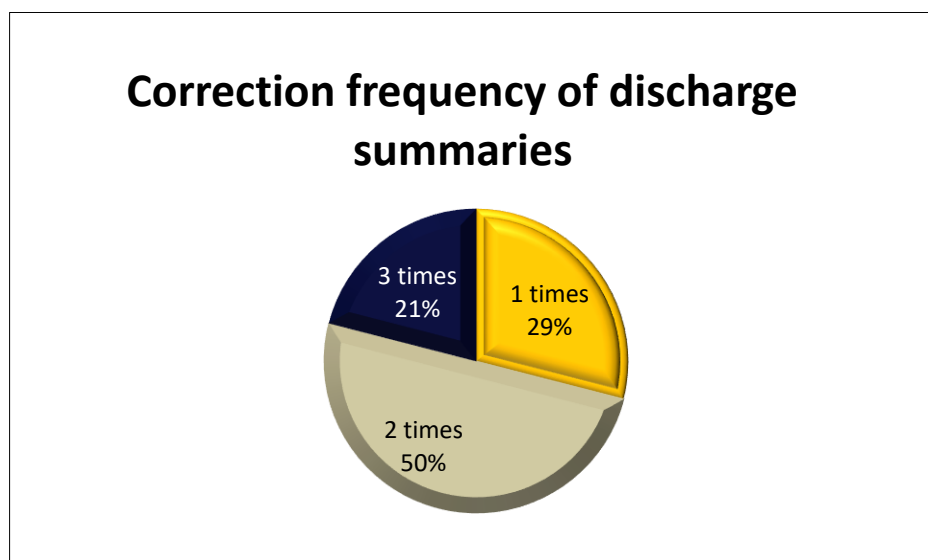


Fig 16: Correction frequency of discharge summaries

It was seen that out of 34 discharge summaries audited 50% of the summaries needed correction at least twice before the final approval and signature of the treating consultant, while 21% of the summaries were to be corrected thrice before the finalization.

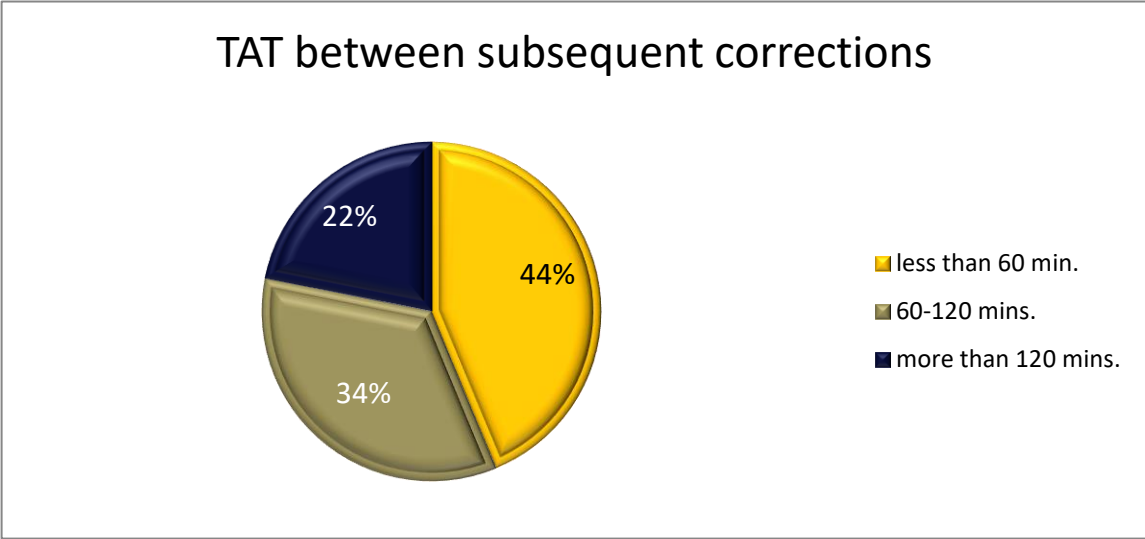


Fig 17: Time interval between subsequent corrections of discharge summary

It was observed that the time elapsed between the subsequent corrections also played an important role in increasing the overall cycle time of the discharge process. Out of 32 summaries tracked it was more than 120 minutes in 22% cases while in 34% of instances it remained between 60-120minutes. In less than half of the instances the time elapsed between the subsequent corrections was less than 60 minutes.

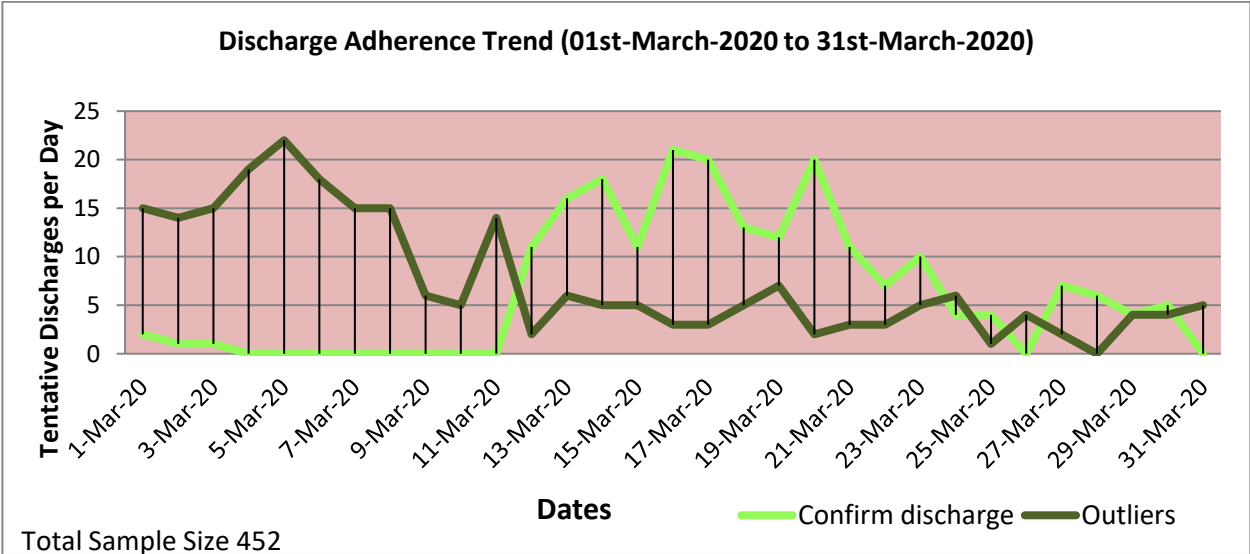


Fig 18: Discharge Adherence Trend for Planned Discharges

Keeping in mind the billing activity, the tracing of the discharge adherence was done was the month of March. The discharge adherence applies to the planned discharges. Discharge adherence was a means to check whether the discharges which are planned are actually being discharged on the planned day or not. The list of tentative discharges was checked on per day basis to find the number of confirmed discharges. This was done in order to find out the repetition of the work (NVA) done by billing staff for rechecking the bills for patient which were not discharged on planned date.

Of the total sample taken of 452 tentative discharges for the month of March (Primary data) it was seen that the confirmed discharges showing adherences the date of planned discharges was 45% and the proportion of outliers was more than half of the total sample taken which stood as 55%.

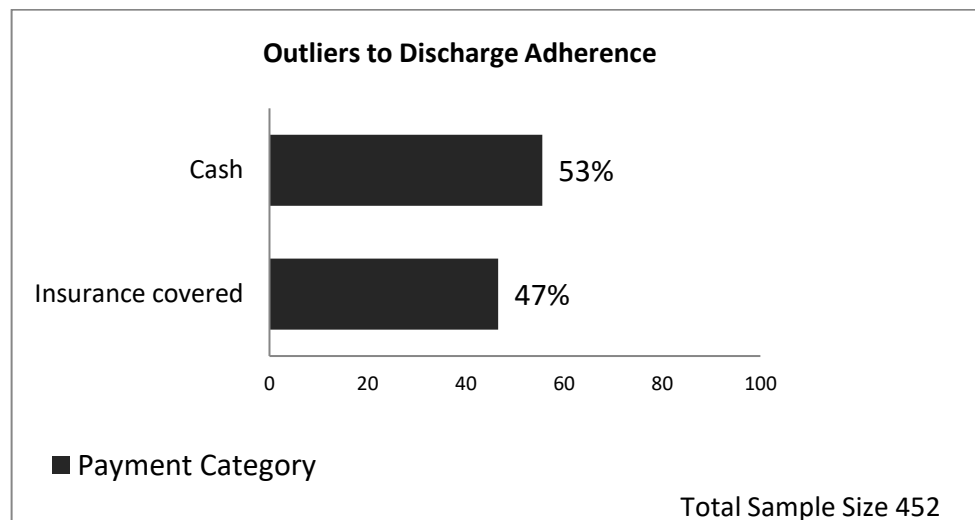


Fig 19: Payment Category Wise Outliers to Discharge Adherence

On doing the further analysis of 452 tentative discharges, it was shown that the non conformance to discharge adherences was more amongst the cash paying category of patient nearly 53% while the outlier in case of insurance covered patient was 47%.

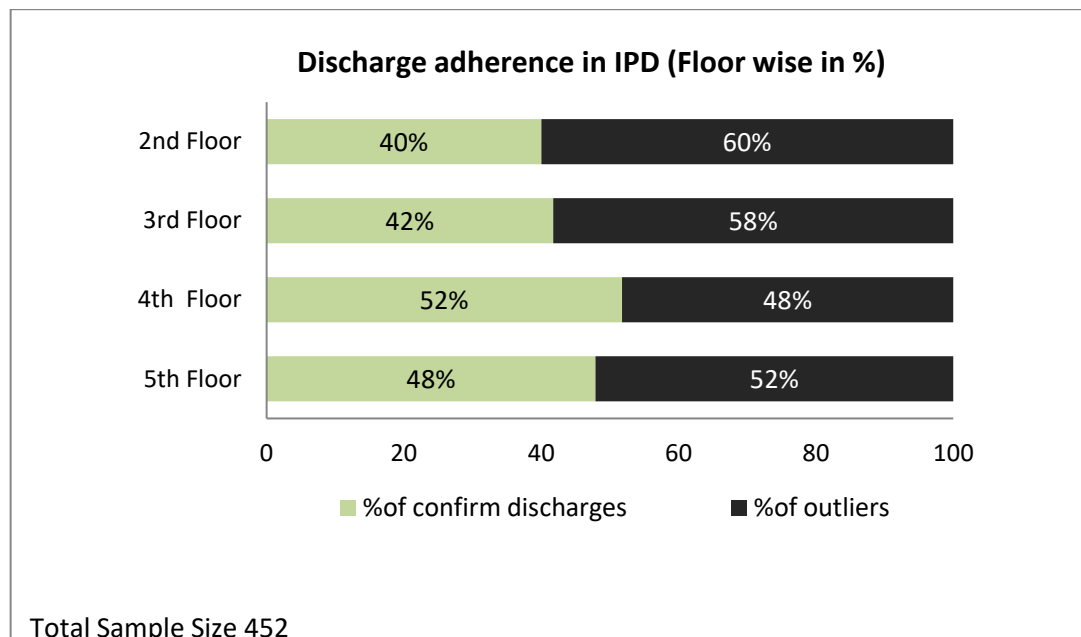


Fig 20: Floor Wise Discharge Adherence in IPD

The floor wise breakup of the discharge adherence was also done which showed that the second floor had the maximum number of the outliers to discharge adherence 60% in which the general ward is situated, followed by the third floor 58%, which caters to maternity and cardiac care patient predominantly and are often admitted on the package basis and then the fifth floor with 52% of non conformance to planned discharges and approximately half 48% of non conformance from the fourth floor IPD.

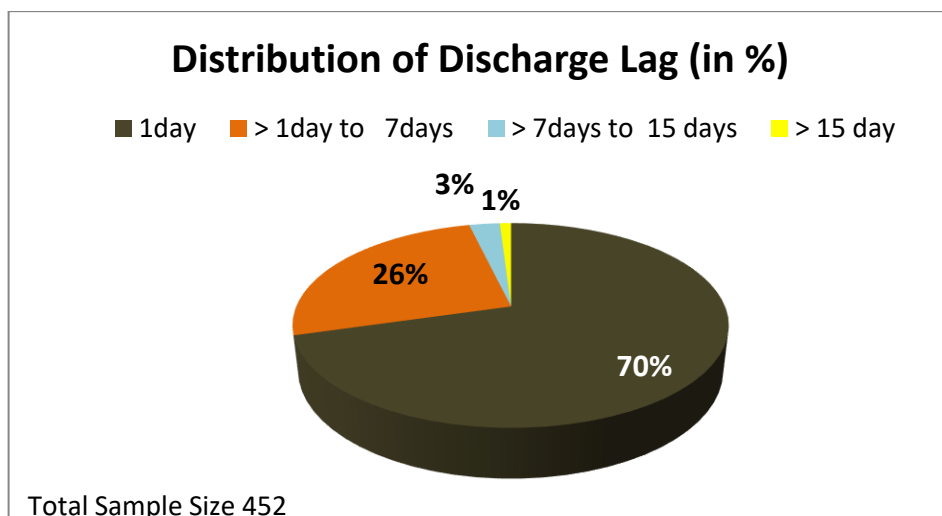


Fig 21: Percentage distribution of discharge lags in days

Of the 452 sample the tentative discharges, the number of days the discharge was delayed was calculated, it was analyzed that in 70% cases the lag was only of one day followed by 26% for up to a week and in 3% cases the lag was more than a week but less than 15 days and 1% cases the lag exceeded 15 days.

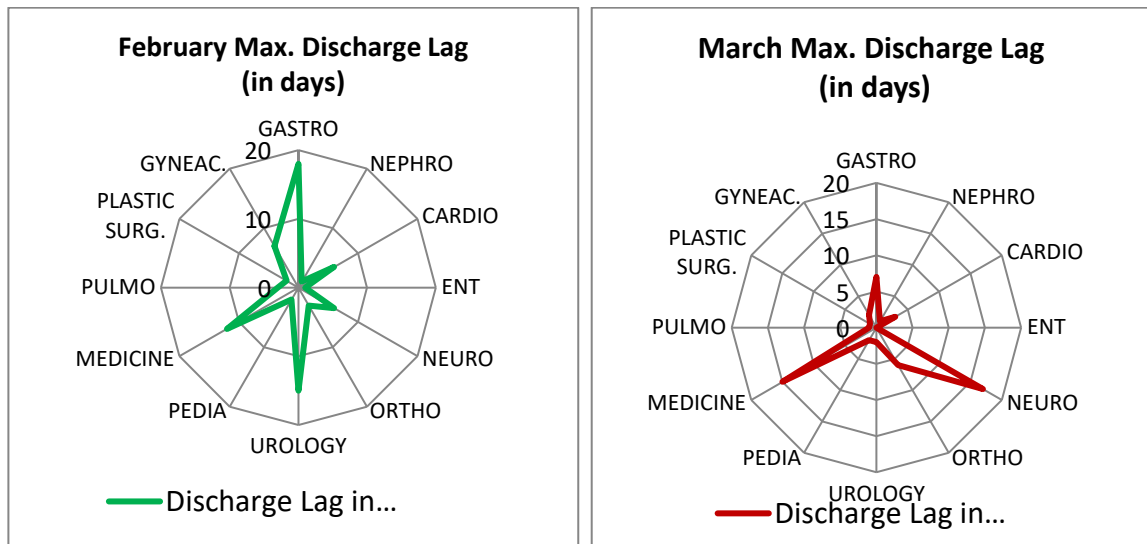


Fig 22: Comparison of Specialty wise breakdown of discharge lags (in days)

The speciality-wise comparison of tentative discharge lag was made for month of February and March in order to know the the speciality breakup in which maximum discharge lag was noted. It was found that top three specialites for month of February were; Gastrology (18 days), Urology(15 days) and medicine (12 days). Similarly in month of March it was found that top three specialites for month of February were; Neurology (17 days), medicine (15 days) and Gastrology (7 days)

Discussion:

The specific tasks of the present study conducted on hospital inpatient department for the discharge process were:

1. Observation and mapping of the discharge process steps
2. Observation and noting the activities of the various stakeholders
3. Identification of the bottle necks in the timely execution of the process
4. Give appropriate countermeasures for the improvement.

It was found that the mean time taken for the discharge of the patient in insurance category was 495 minutes (8 hours 15 minutes) and that for cash category was 378 minutes (6 hours 18 minutes).

From the process mapping and studying each sub process through observation and day to interaction with the relevant staff it was found that the major areas that may delay timely discharge were firstly at consultant end in timely execution of the IPD rounds and hence timely intimation to the floor nurse in charge. Secondly delay occurring at nursing station due to interruptions in getting the pharmacy clearance and in getting investigation reports. Thirdly delay in getting final discharge summaries handed over at nursing station after repeated correction and additions by treating doctors and manual transportation by transport pool. The next source of delay at typing pool desk due to piling up of patient file in rush hours, even if the draft summary is prepared it gets caught up at the consultant chambers for his final approval and signatures. Finally there is delay at the billing desk in getting approval from the insurance company or in deposition of the amount due at the patient end and the last moment arrangements done for it.

The pharmacy return is done in slots since the attendants packs the medicines along with his belongings and which are returned later assuming that those are post discharge medications, hence proper counseling is must by two way communication. Also there is dependence on the human counterpart for the timely delivery of the returned medications to IPD pharmacy and the certain amount of cognition in order to recall the codes while raising the drug return request via HMIS.

There is a pre installed pneumatic-chute system which is currently non functional which can be harnessed to expedite the pharmacy return process and reduce the dependence on the human counterpart

The medicines ordered from local vendor are charged manually which are then uploaded in system and is included in patient bill but this process takes at least a day and hampers the

discharge if planned the next day. Alternatively a popup for displaying the pharmacy clearance can be integrated in to HMIS in order to allow easy visualization for step completion to nursing staff and save the labor of repeated checking.

Billing and TPA counterpart it was seen that presently in case of insurance covered patient the TPA representative goes to respective ward to get a scanned copy of medical reports on Cam scanner mobile app.. An e-medical report icon can be integrated into HMIS for sending and receiving the various investigation reports.

The doctor's visit is charged on bills by doctors signing the doctor's fee card on daily basis, the surgical procedure OT/ implant clearance is done separately. The billing is checked daily for the package patients and daily bill is updated. For the long stay patient it is checked every 3-4days.

In case of planned discharges (mostly package patient) the provisional bill is kept ready on priority basis, however at this point if the discharge is not executed on the planned day it adds up the repetitive work for billing staff. As indicated in discharge adherence Fig:18 that in month of March only 45% of cases the discharge adherence is realized.

The most commonly availed packages are for the Gynecology and the Cardiac care who are admitted on the third floor, which also turn out to have larger proportion of outliers to discharge adherence 58% and hence he repetition of work by billing staff to keep the bills updated.

From Fig 14 for the discharge adherence trend it was seen that in beginning 11 days of the month the outliers to discharge adherence clearly exceeded the actually executed planned discharges and followed by the reversal of the trend wherein the confirmed discharge of the planned discharges increases and the number of outliers decreased. The reason for which can be partly attributed to it the outbreak of COVID-19 which allowed the discharges of otherwise stable patient whose medical care needs could be adequately met by the home care and not necessarily requiring continued hospital admission.

To cater to delay on patient side for the payment on day of final settlement the hospital could adopt the positive balance policy as in taking 80% deposit before surgery and 20% post

surgery, at least in some highest running specialties like general surgery followed by gynecology/ obstetrics.

This study has also provided quantitative information about typing pool work flow. By observation Table 6: a typing pool takes 9 minutes 38 seconds to prepare a fresh discharge summary of one patient from entering the details till giving out printing command and according to that a typing pool can make approximately 33 fresh discharge summaries in the shift of 8 hours. And can process up to 65 -70 corrections of draft summary having an average of four correction and three additions per patient.

The study highlighted the fact that time consumed between the subsequent corrections of draft summary itself exceeds that TAT for completion of final discharge summary of 30 minutes from doctors intimation. Fig: 17

The centralized seating arrangement of the typing pool will proper signage's could be used as effective countermeasure to allow one collection and retrieval point of discharge summaries. As in case of 4th floor the typing pool deployed has to share the printer with the nursing station. One has to go to check if the letterheads are placed in the tray or take out and additional pages, also there are instances when one has to suspend the printing command if there are already document other than discharge summaries queued up for being printed.

Conclusion:

This study highlighted that more than half of discharge patients belong to cash paying category and in which 59% are planned discharges. However the adherence to planned discharge is realized in only 45% cases. Around 93% discharges are done post 12:00 P.M. since the discharge process is initiated late in afternoon for these cases. In 3/4th cases the hospital stay is prolonged by one day. The typing pool is utilized to only 33% of the capacity in total 6 working hours per shift.

Therefore discharge planning should be recognized as integral part of improving discharge process, with continual monitoring of adherence to discharge policy of hospital.

Limitations of the study:

- Accurate shadowing while mapping the activities of nurses and typing pool staff.
- Dynamics of each floor is different and hence making a standardized plan is a challenge.
- Revenue loss for the extended stay due to discharge lag in planned discharge.

Suggestions:

1. Increasing the percentage of planned discharges from current 45% to target of 90% by timely discharge intimation during doctors round and information dissemination to discharge stakeholders.
2. Providing the patient education for their role in discharge process.
3. Counseling the attendant at time of admission for the discharge timings and the half/full day charges in case of delay.
4. Assistance of junior residents or the second line representative of consultants for compilation and correction of discharge summaries. Since the typing pool lacks the medical background.
5. Keeping the discharge summaries ready in evening for the planned discharges and their acknowledgement to consultants in morning rounds.
6. Ensuring availability of trained GDA staff for manual transport and their shadowing by new joiners to get the grasp of process flow.
7. Fixating the timings for marking MFD at 10:00 A.M. positively for planned discharges which currently stands at 62% marked at/ after 11:00 A.M. to allow in time initiation of billing activities.
8. Integration of HMIS for shared viewing of DRR progress, discharge summaries as “care progression indicators”
9. Cash paying patient form 63% of the inpatient discharges, hence timely and frequent intimation via SMS could be given for deposition of dues.
10. IT training and refresher trainings could be provide to the nursing staff to allow ease of operating the HMIS
11. Displaying tent cards in patient rooms for constant reminder of discharge checkout timings.
12. A checklist for verifying complete documents are sent by the nursing staff to the typing pool could also be implemented.

13. The segregation of patient files with completed discharge summaries and the pending ones by separate file holders at typing pool desk.
14. Preprinted blank format for discharge summaries on used papers for writing the tentative discharge summaries by the resident doctors.
15. Adherence to timings of IPD rounds for the planned discharges by the treating doctors.
16. Ready reckoner for phone/ procedure codes in line of visibility for the staff
17. Positive balance policy/ collection up-to break even amount/ on prior basis. Especially in cases of Death/ LAMA

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Annexure:

Date	S.NO.	BED NO	MRN	D.O.A.	PATIENT NAME	DOCTOR NAME	CASH/TPA	Confirm Discharge	STATUS
01.03.2020	1	5411		02/02/2020	Mr BRIJ BHUSHAN BHASIN	Dr Sushil Kalra		2-Mar-20	NO
01.03.2020	2	5413		02/16/2020	Mrs RAJ SODHI	Dr Sushil Kalra		2-Mar-20	NO
01.03.2020	3	5418		02/14/2020	Mrs JAVITRI SHARMA	Dr Abhinav Sharma		2-Mar-20	NO
01.03.2020	4	5401		02/26/2020	Mr PAWAN MITTAL	Dr Lalit Kumar Modi		4-Mar-20	NO
01.03.2020	5	5430		02/28/2020	Baby ADIRA SHARMA	Dr Vivek Gupta		2-Mar-20	NO
01.03.2020	6	5408		02/26/2020	Mr MRIDULA PAREEK	Dr Rajiv Gupta		2-Mar-20	NO
01.03.2020	7	3407		02/28/2020	Mrs PRIYANKA VIJAY	Dr Shikha Gupta		2-Mar-20	NO
01.03.2020	8	3413		02/29/2020	Mrs MANJU CHOUDHARY	Dr Shikha Gupta		2-Mar-20	NO
01.03.2020	9	2213		02/29/2020	Mrs MANBHAR DEVI	Dr Mahendra Singh Punia		2-Mar-20	NO
01.03.2020	10	2222		02/25/2020	Mrs KANTI DEVI GURJAR	Dr Pushkar Gupta / Dr Dilip Na		2-Mar-20	NO
01.03.2020	11	4409		02/26/2020	Mr ANIL KUMAR JAIN	Dr Sushil Kalra		2-Mar-20	NO
01.03.2020	12	4408		02/25/2020	Mr SUMIT GIRYANI	Dr Puneet Gupta		1-Mar-20	YES
01.03.2020	13	4419		02/27/2020	Mrs RASHEM DEVI	Dr Lalit Kumar Modi		3-Mar-20	NO
01.03.2020	14	4426		02/28/2020	Mrs SUNITA BANG	Dr Vipin Jain		2-Mar-20	NO
01.03.2020	15	4421		02/26/2020	Mr KISHORE SINGH	Dr Anjani Kumar/ Dr Kapil Kha		2-Mar-20	NO
01.03.2020	16	4425		03/01/2020	Mrs RAMNA NANDAN	Dr Puneet Gupta		2-Mar-20	NO
01.03.2020	17	4442		02/29/2020	Mr CHHAGAN LAL MEENA	Dr Devendra K Sharma		1-Mar-20	YES

Format for recording the discharge adherence on per day basis

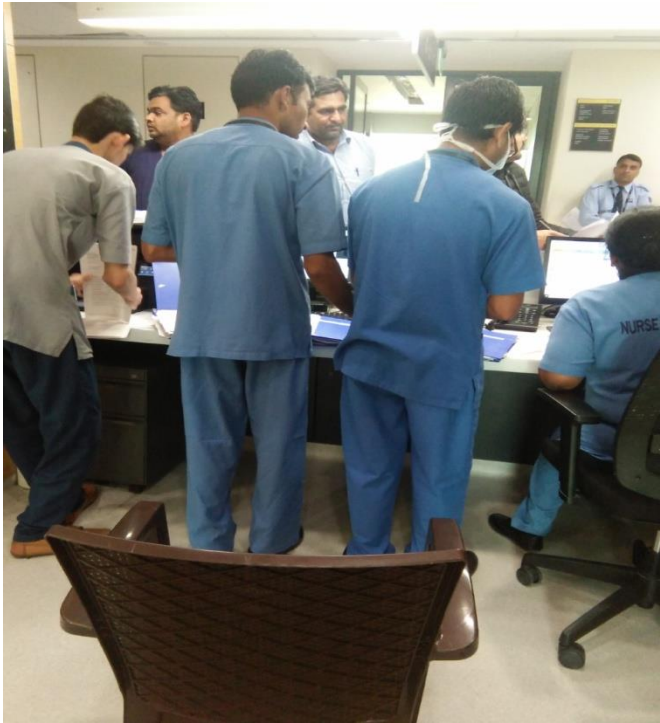
date	fresh d/c summ.		TAT fresh d/c	corrections		TAT correction
14-Mar-20	12:20	12:27	0:07	12:38	12:42	0:04
14-Mar-20	12:28	12:36	0:08	12:58	13:00	0:02
14-Mar-20	12:44	12:56	0:12	11:10 AM	11:17 AM	0:07
14-Mar-20	10:10:00	10:15:00	0:05	11:17 AM	11:19 AM	0:02
14-Mar-20	10:21 AM	10:24 AM	0:03	11:20 AM	11:22 AM	0:02
14-Mar-20	10:27 AM	10:49 AM	0:22	15:03	15:09	0:06
14-Mar-20	11:24 AM	11:31 AM	0:07	15:09	15:11	0:02
14-Mar-20	11:42 AM	11:47 AM	0:05	16:10	16:35	0:25
14-Mar-20	12:05 PM	12:26 PM	0:21			0:00
14-Mar-20	12:36 PM	12:58 PM	0:22			0:00
14-Mar-20	15:53	16:01	0:08			0:00
16-Mar-20	11:20	11:33	0:13	12:38	12:44	0:06
16-Mar-20	11:40	11:43	0:03	12:46	13:08	0:22
16-Mar-20	12:00	12:05	0:05	11:34	11:39	0:05
16-Mar-20	10:55	11:19	0:24	11:45	11:48	0:03
16-Mar-20	11:44	11:51	0:07	11:49	11:50	0:01
16-Mar-20	11:51	11:54	0:03	11:54	11:58	0:04

Format for capturing the time for discharge summaries compilation

	English	Hindi
	Bring your own clothes on the day of discharge	डिस्चार्ज के दिन कपड़े साथ लाये
	Discharge process is between 8 A.M. to 11 A.M.	डिस्चार्ज की प्रक्रिया सुबह 8 बजे 11 बजे के बीच में होती है
	Arrange for conveyance before 11 A.M. or ask for assistance	डिस्चार्ज के दिन 11 बजे तक अपना वाहन बुला लें अथवा किसी प्रकार की सहायता के लिए संपर्क करें
	Clarify and check your provisional bill on night before the planned discharge date	अपना अंतिम बिल डिस्चार्ज के एक रात पहले जान लें
	Arrange for cash/ payment accordingly for the financial clearance on day of discharge	अपने अंतिम बिल के अनुसार डिस्चार्ज के दिन 11 बजे से पहले पैसे जमा करा दें
	Discharge summary will be prepared before 11 A.M. on day of discharge	डिस्चार्ज के दिन आपका डिस्चार्ज सारांश 11 बजे तक तैयार किया जायेगा
	Unused medicine will be returned (full strip/ unopened bottle) on night before the planned discharge date.	आपकी अप्रयुक्त दवाइयां एक रात पहले फार्मसी में लौटा दी जाएंगी
	Details regarding diet will be provided by the dieticians	आहार सम्बंधित जानकारी डायटीशियन द्वारा डिस्चार्ज के दिन दी जाएगी
	Collection of all lab investigations reports will be done before day of discharge	सभी लैब व अन्य जांच की रिपोर्ट डिस्चार्ज के एक दिन पहले ही इकट्ठी कर ली जाएगी
	Counseling and consultation by doctor/ medical service provider	डिस्चार्ज के दिन डॉक्टर या अन्य स्टाफ के द्वारा परामर्श व जानकारी दी जाएगी



Patient information leaflet for discharge process



Nursing Station at time of consultant rounds in morning

DATE OF ADMISSION	03.03.2020	DISCHARGE WARD	General ward
DEPARTMENT	Neurosurgery	DATE OF DISCHARGE	09.03.2020
		LOCATION	RBH

FINAL DIAGNOSIS : C5-6 Fracture Dislocation + C6 Cord Compression - *ball*
considering spinal cord

CHIEF COMPLAINT: : This patient came with K/c/o - At with Operative right hip joints, h/o fall 3-4 days back. Presented with weakness of all four limbs - *admission was from 3 days*

CLINICAL FINDINGS ON ADMISSION : TEMP - 98.2° F, PR - 62/min, BP - 90/60mmHg, RR - 18/min.
 CVS - S1 and S2 Normal
 CNS - Conscious, Oriented & alert, *VC 2-3/5 of grip and forearm*
 RESP - B/L air entry present *slight crackles*
 PA - Soft, Non Tender *u-poorly spoken*

PAST HISTORY : Not Significant

SURGICAL HISTORY : Operated Right Hip Joint

FAMILY HISTORY : Not Significant

PERSONAL HISTORY : Smoker, Alcoholic *CT scan spine - spine*

ALLERGY IF ANY : Not known *few days in total*

INVESTIGATIONS : *# C5-6 disc bulge*
MRISK C5-6 cord compression
at C5-6 cord

2D Echo report on 04.03.2020 - LV Diastolic dysfunction present, Grade II, Trace MR, Trace TR, PASP= 30mmHg.

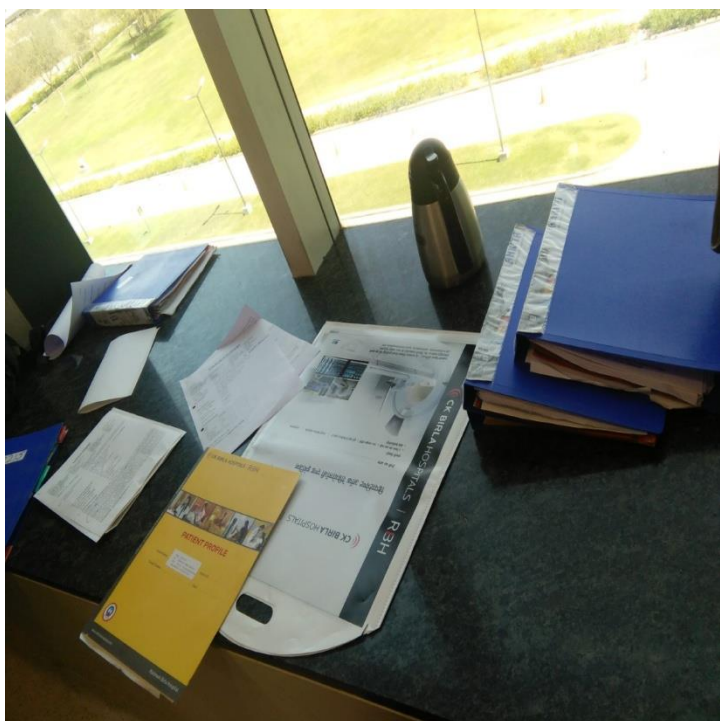
PROCEDURE: - C5-6 ACDF with post anterior and posterior spine cervical fixation done under GA on 05.03.2020.

COURSE IN THE HOSPITAL: - This patient came to RBH with above mentioned complaints and evaluated. Patient was examined, initial blood investigation was sent and admitted in general ward. After proper informed consent he underwent C5-6 ACDF with ~~posterior and~~ *anterior and* posterior spine cervical fixation ~~done~~ *done* under GA on 05.03.2020. Post-operative period was uneventful. He responded well to the given treatment. Now patient condition gradually improved and is being discharged in stable condition.

(Lat man) C5, C6 ACDF

INTERDEPARTMENTAL REFERENCE: - Dr. Sunil Beniwal (Cardiology)

Manual correction made to discharge summaries by the consultants



Discharge Summary Collection Point