

# LEAN MANAGEMENT IN HOSPITAL BILLING

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*Abstract:* Billing process is the final step in hospital, which is directly proportional to patient satisfaction. Billing plays a vital role in the discharge process and billing documents are even legally important. The hospital billing process is mainly to ensure remuneration for the services and materials provided by hospital to patients. The objective of the study is to evaluate the functioning of billing department in a tertiary care hospital as it plays an important role, as liaison office between the management and the patients. An observational and descriptive study was conducted by using flow chart, bar charts and root-cause analysis for analysing and understanding the billing process in detail and to identify the factors influencing delay in process of billing for insurance patients' and cash patients. Lean principles were applied to the process and various elements of possible waste were identified. The study is based on random samples of 140 bills. The results show that there is a delay in the preparation of bills and the reasons for delay in submission are due to reporting of investigations, files kept in ward without dispatching, incomplete file, and absence of process monitoring, lack of training, resubmission of documents or bills, shortage of manpower and so on. Some of the ways for optimizing the billing process have been suggested like, increasing the manpower, responsibility and authority matrix, control chart, training and key performance measures for analysing the overall department. The study concludes that it is important for billing personnel to understand and continuously review billing process in detail to have an effective billing process in healthcare organization.

**Key Words:** Lean Management, Process, Turnaround Time (TAT), Third Party Administrator (TPA), Value Stream Mapping (VSM)

## INTRODUCTION

In this highly developed international economic world, service has always been important and significant. Healthcare is a service provider organization. The pressure on the healthcare sector is growing all over the world. The quality of the delivered service is as important as the service itself, and the satisfied customers is always the goal. Billing is one of the important processes both for patient and hospital as well. Billing is mainly to obtain remuneration for hospital through patients. Remuneration is obtained from different categories of people, such as insurance providers and government aided programs. Billing process starts from when the patient enters for initial diagnosis till complete treatment.

In order to meet customer expectation companies and practitioners have developed many methods and processes. Lean theory is one of these theories that have proved its effectiveness in both the manufacturing and service sectors. "Lean thinking is not a manufacturing tactic, nor a cost-reduction program, but rather a management strategy that is based on improving processes in a system." (Nelson-Peterson & Leppa, 2007). Although Lean thinking started as a manufacturing tactic it soon became clear that it could be used for more than that, and in understanding this it also became easier to apply Lean thinking to other areas. The main reason however, that Lean thinking spread and especially into new areas of interest was that *Womack and Jones* in 1996 scaled Lean thinking into five main principles that described the intentions and the way to work with Lean thinking on a more abstract level that was no longer specified to the manufacturing industry. These five principles are: *specifying value, identifying the value, stream, flow, pull and pursue perfection.*

*The central idea of Lean thinking is to eliminate waste, Waste is all those actions or steps found that do not immediately add value to the process.*

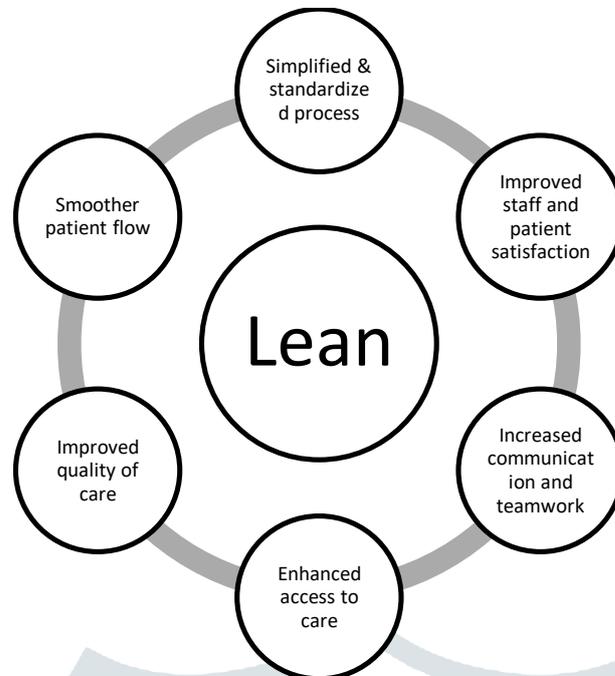
*Problem statement*

*To study the in-patient billing process in detail and observe time taken by each step, and suggest the unnecessary or waste processes by applying lean principles to it.*

*Significance of the study*

Nowadays the process of paying bills has become more concerned than availing services for patients. Currently it comprises approval and certification, documentation of medical records, coding agreements, private insurance guide lines and various remuneration systems. Due to its importance in hospital system it is a requirement to make the billing efficient so that both patient and hospitals can be benefitted out of it.

Implication of lean principles and practices in healthcare settings can dramatically change the delivery of patient services and the quality of patient care. Lean initiatives can also provide important business advantages in billing process for an organization. Following are the benefits:



### Objectives

1. To map the billing of an In-patient and information flow
2. To compare billing cycle time, interval time, wasting time and turnaround time for each in-patient and to identify the critical delays of billing process.
3. To identify the activities where activity cycle time is under/over with mean cycle time.

### Scope of the study

The study is limited to the in-patient billing of the hospital, focused only on cash and insurance billing. A few steps of discharge are taken into account as they are strongly influencing the billing process. The study also deals with segregation and evaluating of productive and unproductive steps in billing.

### Research Methodology

The sample size for the study was 140 In-patients for cash and credit bills. Selection was based on the In-patients who are ready to discharge.

### Sources of data

Primary data is collected through observation and check list also interviews with staff nurses and billing personnel. A checklist was prepared for the steps in billing and time for each step was noted either from the system or by observation. Secondary data was obtained from In house reported data and medical records.

### Tools of Analysis

Value stream mapping of cash and credit billing by flowcharts, Fish bone analysis and also Five principles of lean management are used for analysis of data.

### Data Analysis and interpretation

Billing is the process of generating an invoice to recover sales/service price from the customer. Billing documents are important for any hospital; its operation encloses clinical aspect, financial aspect and administration for better functioning and decision making. The various categories of bills generated are Cash, Insurance, Aarogyashree, Corporate and EHS.

### Value Stream Mapping

Value stream mapping (VSM) was applied and complete process was studied to identify the value-added activities in the process. VSM is a tool to represent visually what is going on in the value stream. It gives one-page picture of the process that occur in a function from the time a customer places an order for the service, until the customer has availed that service and is shown in figure 1.1

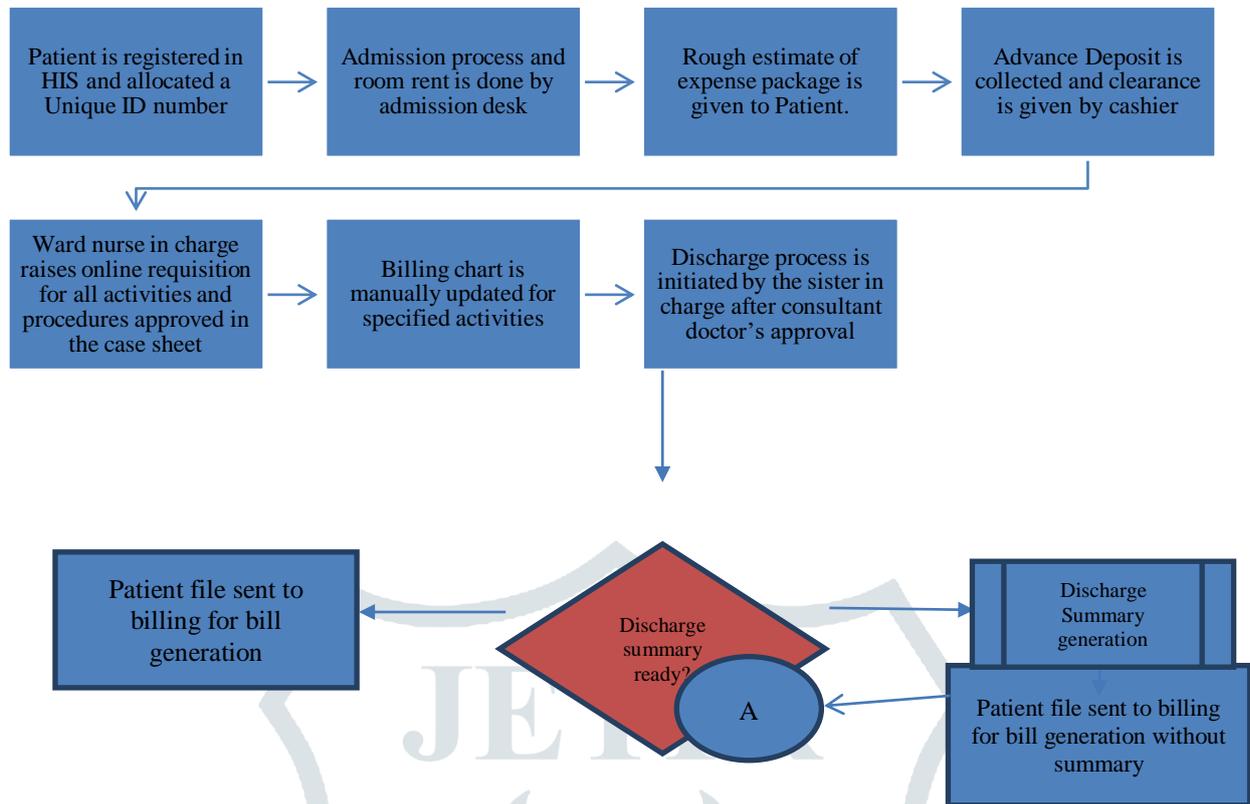


Figure 1.1 VSM FOR CASH BILL

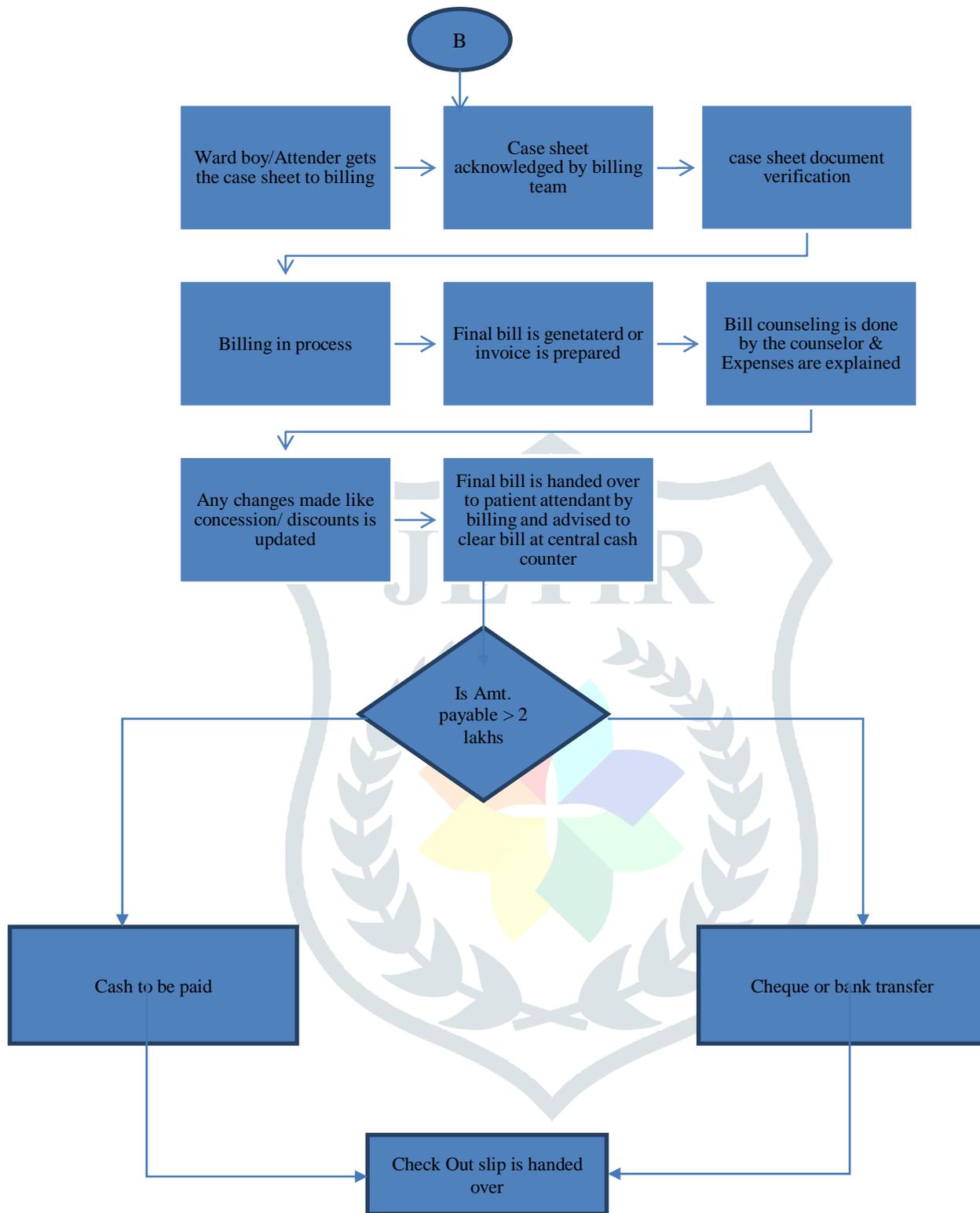
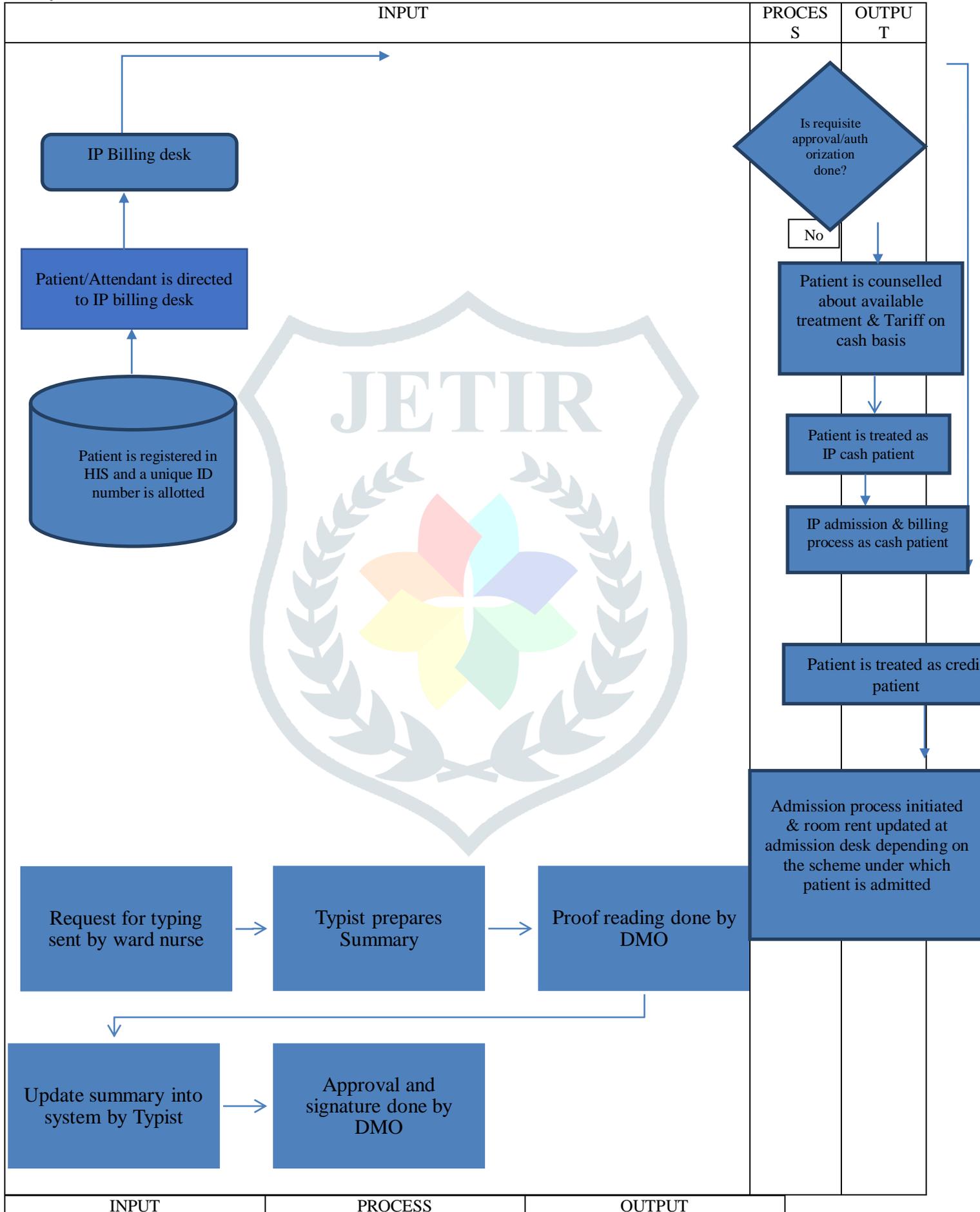
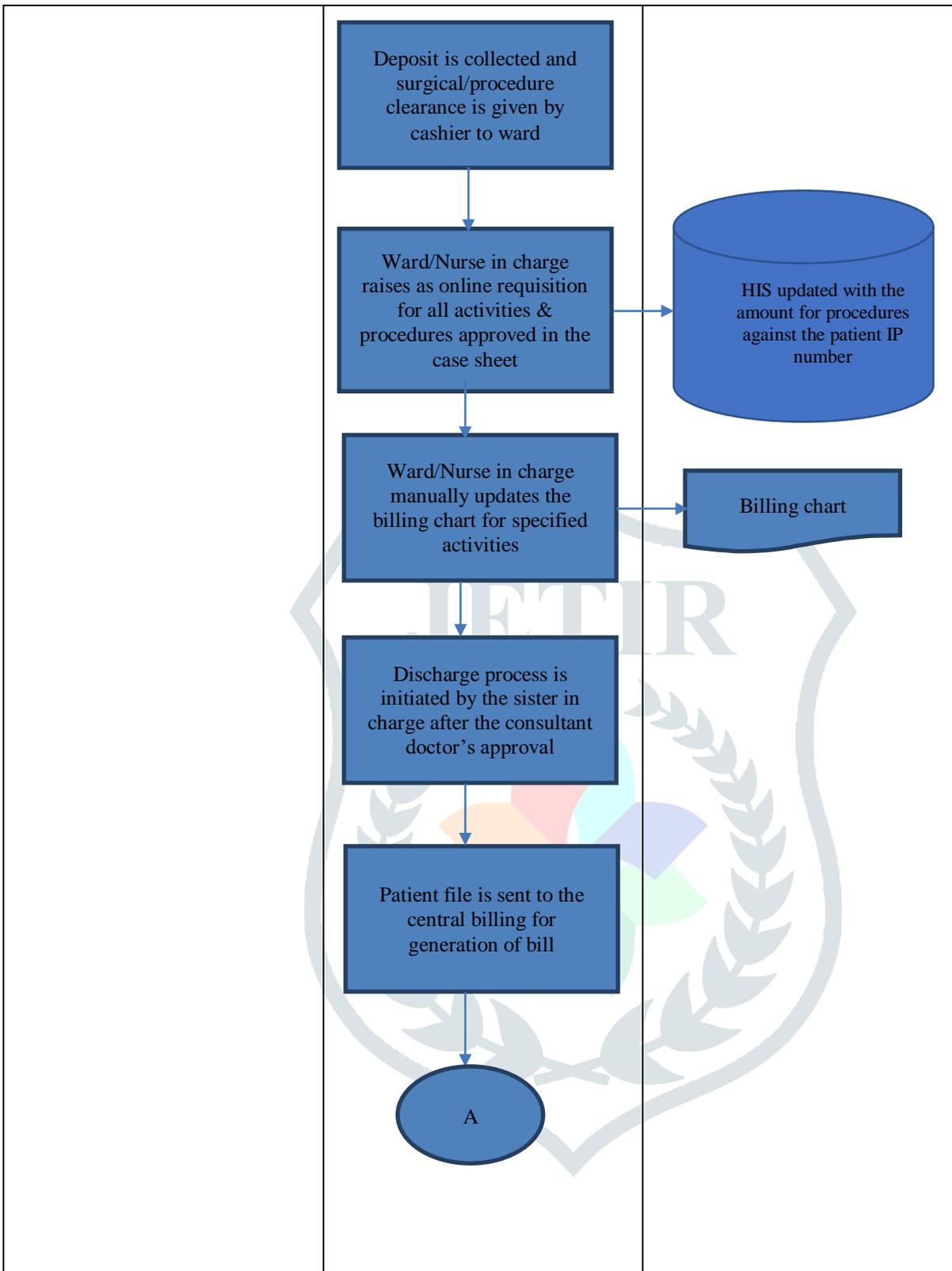


Fig 1.2 cash billing process mapping

Fig 1.3 Discharge summary process mapping

VSM for Insurance Bills





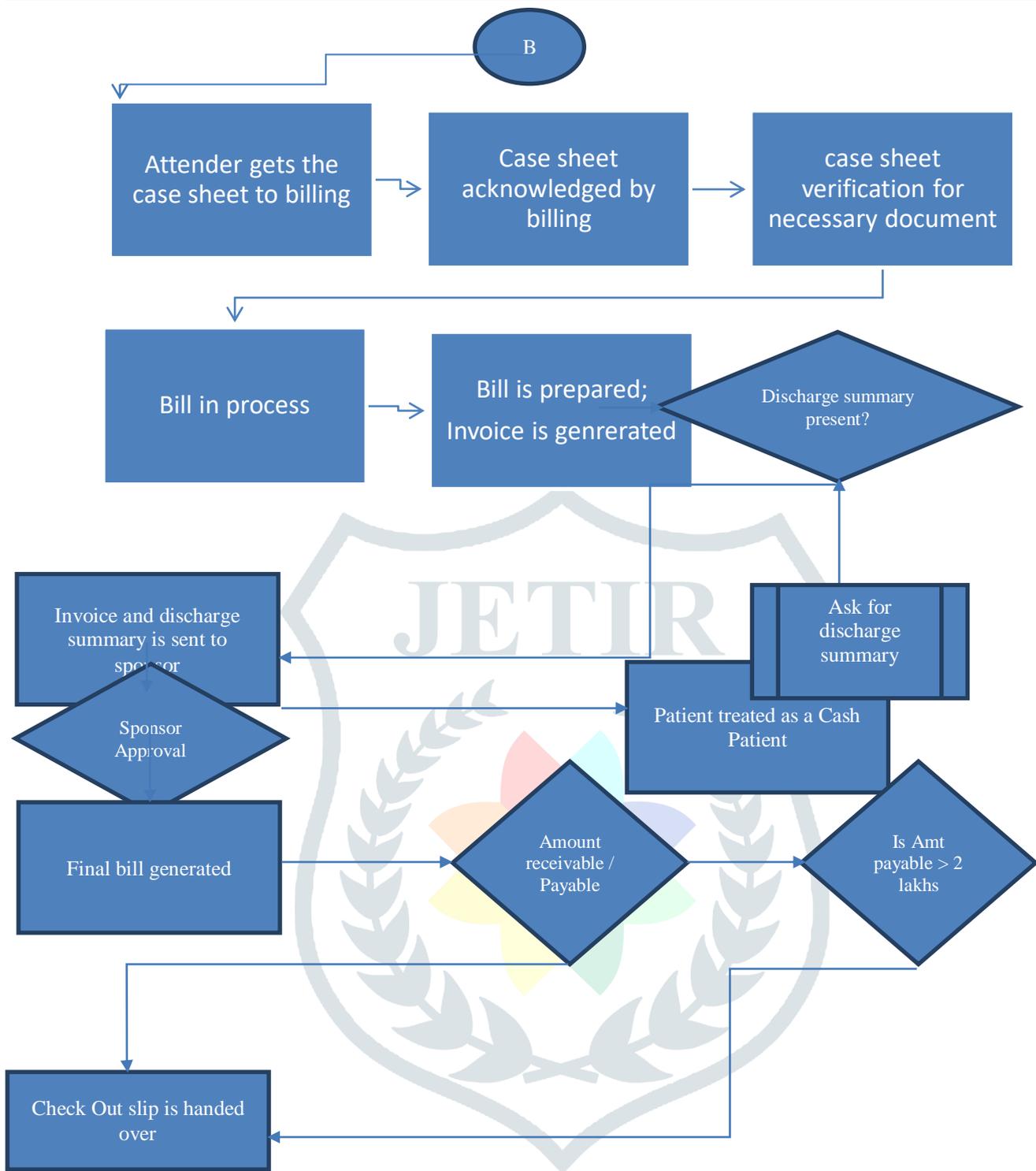


Fig 1.4 VSM insurance

*Time Determinants of Billing Process*

Diagram representation of turnaround time of each bill in different time ranges is represented below. Separate data analysis is done for both cash and insurance bills to study each category in detail.

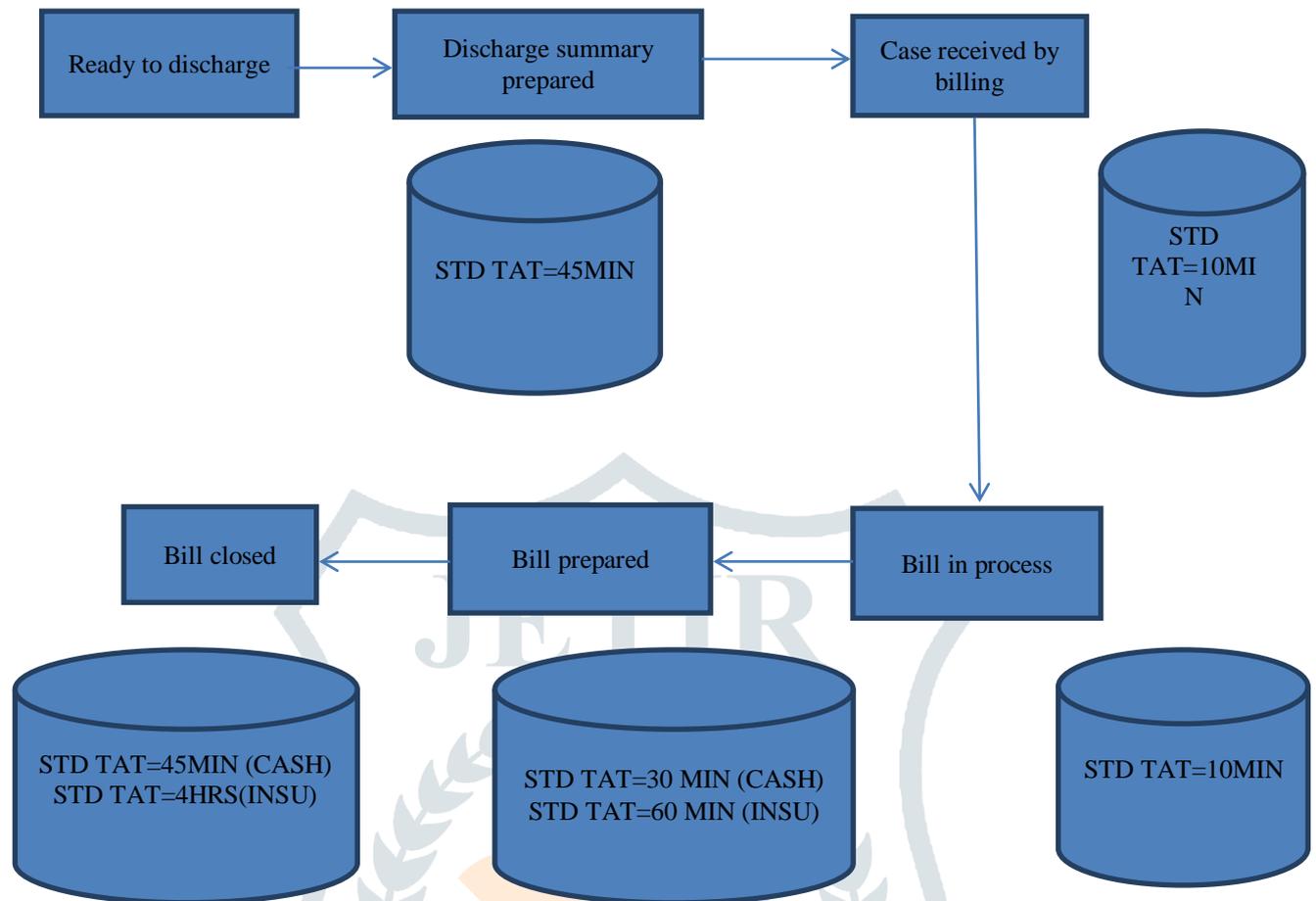


Fig 1.5 time determinant of each step in billing

## Analysis of Cash bills for different categories of TAT of each process

The following tables represent the billing process in different time ranges for each critical step.

**A) Cash Billing**

The total number of cash bills out of total sample of 140 bills is 81 bills. Following is the analysis of each bill of cash and it's TAT for various steps.

**1. TAT Ward to Billing****Table- 1.1 TAT for case sheet to receive from ward to billing department**

S. No	Time taken from ward to billing(minutes)	No. of patients	In terms of % patients
1.	T<10 (std. TAT)	25	30.8
2.	11<T<20	18	22.2
3.	21<T<30	06	7.4
4.	31<T<40	04	4.9
5.	40<T<50	02	2.4
6.	50<T<60	02	2.4
7.	T>60	24	29.6

The above table shows that

1. 30% of case sheets are received within standard. TAT of 10 minutes and 50% of case sheet goes to billing department within 20 minutes. The reasons for delay are given below:

1. Staff not available at given time for transfer of files
2. Wait for other case sheets to get dispatch
3. 70% of case sheets were received within one hour of status update. Reasons for delay are
4. Time taken for pharmacy return and other returns
5. Updating the tariffs in file and arranging all reports.
6. 29% of case sheets are received after one hour, reasons for delay are
7. Doctor advises for more observation
8. Discharge summary
9. Wait for certain reports to come

**Discharge Summary**  
**Table 1.2 Delays in Discharge Summary**

Time Duration	No of bills	% of bills
Less than 45 minutes	60	74%
45 to 90 minutes	11	13.5%
90 to 120 minutes	6	7.4%
Greater than 120 mins	4	4.9%
<b>Grand Total</b>	<b>81</b>	

The above table reveals that

1. 74% of the discharge summaries were completed on time for cash patients.
2. Only 4.9% of discharge summary took more than 120 minutes
3. Reason for delay in discharge summary preparation
  1. Time taken for proof reading and retyping
  2. Authorization of discharge summary by doctor in charge

**4. TAT of bill received to bill process to start**

The below table 1.3 shows the delay in TAT bill received to bill process

Time Duration	No of patients	In terms of %
Less than 10 minutes	56	69.1
11 to 20 minutes	10	12.3
21 to 30 minutes	9	11.1
31 to 40 minutes	4	4.9
50 to 60 minutes	1	1.2
Greater than 60 minutes	1	1.2
<b>Grand Total</b>	<b>81</b>	

From the above table it is analysed that:

1. Within 10 minutes of reaching the department, 70% bills are processed.
2. Only 1% of total cash bills take more than one hour to go for processing.
3. Almost 82% of total bills are processed within 20 min of reaching the department. This small delay is due to occasions when billing personnel is busy or occupied with some other billing.
4. Delay can also be in lunch hours or when there are less staff in billing.
5. Only 1% bills are processed after one hour which happened due to system failure on that day

c ) TAT bill processing to bill prepared

The below table 1.4 represents the data for “Delay in TAT billing process to Finish billing”

Time Duration	No of patients	in %age
Less than 30 mins	57	70.3
31 to 60 minutes	18	22.2
Greater than 60 minutes	6	7.4
<b>Grand Total</b>	<b>81</b>	

From the above table it can be analysed that:

1. 70% bills are prepared in 30 minutes.
2. 22% of bills prepared within range of 30-60 minutes and the reasons for delay observed are
  1. Packages of patients not confirmed.
  2. Case sheet not updated.
3. Check out slip preparation of other bills.

**TAT FOR TOTAL TIME TAKEN FOR BILL TO PREPARED (FROM READY TO DISCHARGE)**

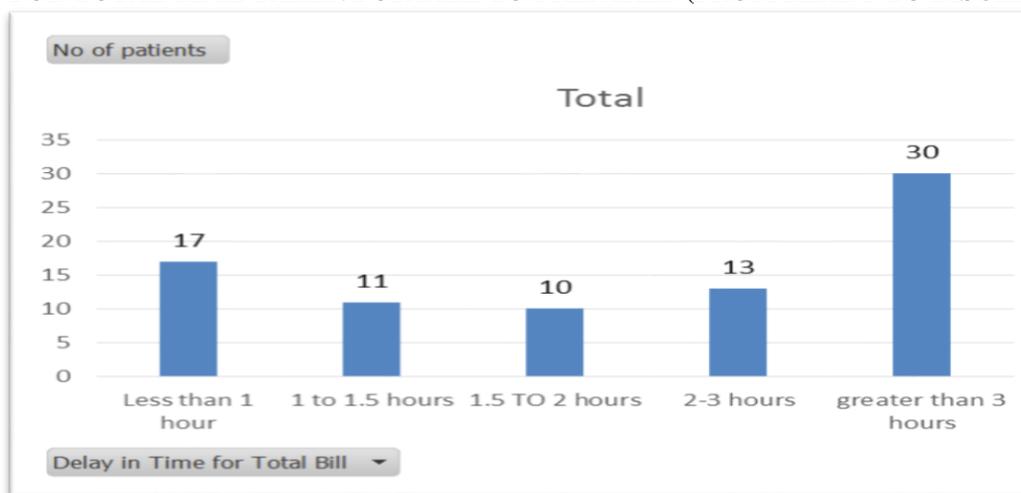


Fig.1.6 TAT for total time taken to close the bill

1. 28.33% bills get closed in std. time of one hour.
2. 50% of bills take more than three hours to get close.
3. Reason for delay can be
  1. Arranging cash by patient.
  2. Concession procedure.
  3. Discharge summary.
  4. Arranging cheque or bank transfer

*Analysis of Insurance Bills for each process*

Total 59 insurance bills were studied out of a sample of 140. The bills were sent to various TPA’S for authorization. For authorization of invoice generated by billing department it is mandatory to send discharge summary along with invoice. Given below is the table which shows the TAT observed when the case sheet is sent from the ward to the billing department.

1. **TAT from ward to Billing**

**Table 1.5 TAT from ward to billing department**

S.no	Time Duration	No. of bills	Percentage
1.	Less than 10 min	6	10
2.	11 to 20 min	8	13.3
3.	21 to 30 min	7	11.6
4.	31 to 40 min	7	11.6
5.	41 to 50 min	2	3.3
6.	50 to 60 min	3	5
7.	Greater than 60 min	27	45

It can be analysed from the above table that:

1. Only 10% of bills are received in the standard TAT of less than 10 minutes

2. 45% of bills are received after one hour. The reasons cited for this delay are
  1. Incomplete files in terms of reports, tariffs and other medical updating.
  2. Formalities and documents related to the insurance.
  3. Discharge summary typing.
  4. Pharmacy return and other return process.
5. The other TATs are due to following reasons: -
  1. Pharmacy returns.
  2. Staff not available for transportation of files.
  3. Files are kept without dispatching
4. **TAT bill received to bill process initiation**

Given below is the TAT observed for Bill received to Bill process initiation

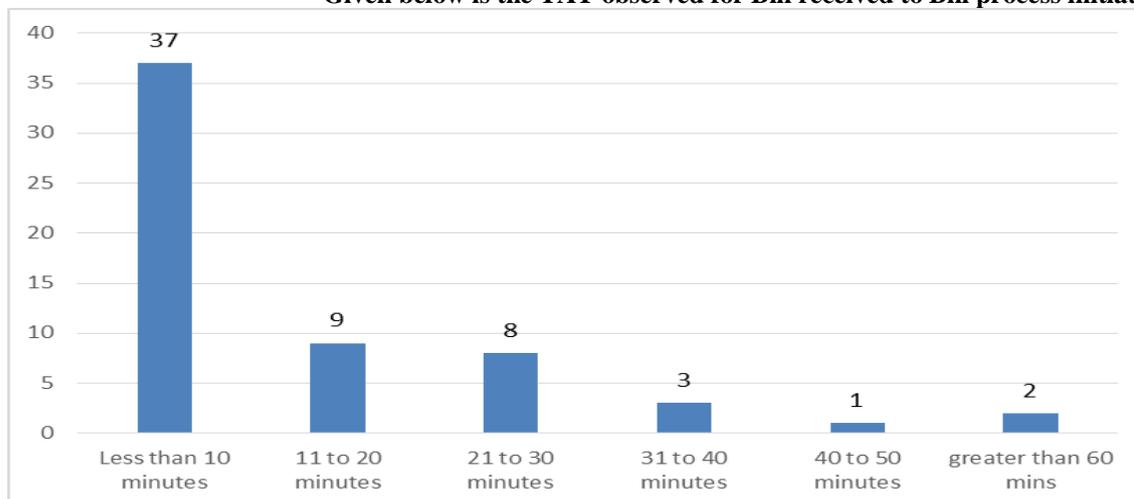


Fig 1.7 TAT of bill received to bill in process

1. 61% of bills are processed in standard. TAT of 10 minutes after receiving the case sheet.
2. 90% of bills are processed within 30 minutes of their arrival to the department. This delay is due to
  1. Bills not processed in the order they come.
  2. Billing personnel busy with processing of some other bills.
  3. Bills came during lunch hours gets delayed for a period of 10 to 20 minutes.

(c) TAT for preparing final invoice

Table 1.6 TAT of final invoice prepared

S.no	Time duration	No. of patients	In %
1.	Less than 30 min	34	56.6
2.	31 to 60 min	20	33.3
3.	Greater than 60 min	6	10

It can be observed from the above table that:

1. 56.6% final invoice of bills is generated within standard TAT of 30 minutes.
2. 90% of final insurance invoice are generated within one hour. Reason for this delay might be attributed to the following factors
  1. Incomplete documents
  2. Some required reports missing.
  3. Improper attachment of documents
  4. Delay in collecting and organising the required documents.

d) TAT for discharge summary preparation

Table 1.7 TAT for discharge summary

S.no	Time Duration	No. of patients	In %
1.	Less than 45 min	30	50
2.	45 to 90 min	13	43.3
3.	90 to 120 min	4	6.6
4.	Greater than 120 min	13	43.3

It can be observed that:

1. 50% of the discharge summary is completed within standard TAT of 45 minutes.
2. 43.3 % of discharge summary take more than 2 hours to complete. Reasons for this delay can be attributed to
  1. Discharge summary typing.
  2. Proof reading and retyping of discharge summary.
  3. Time taken for authorization of discharge summary.
  4. 43.3% is delayed by time range of 45 min because
    1. Discharge summary not typed according to the sequence they have been received.

e) TAT for the authorization received from TPA

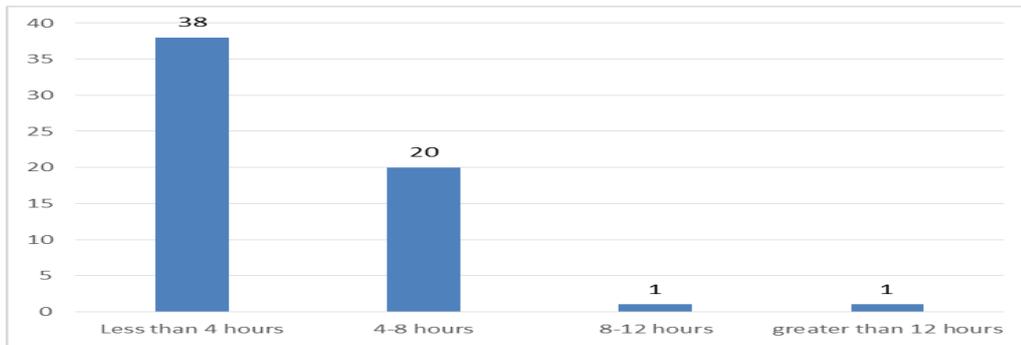


Fig 1.8 TAT for authorization from TPA

It is observed from the above chart that

1. 63.3% final invoice of insurance bills gets authorization within 4 hours of submission.
2. 33.3% authorization are received within 8 hours reason being
1. Delay in receiving of discharge summary

f) TAT of ready to discharge to bill closure

Table 1.8 TAT of ready to discharge to bill closure

S.no	Time Duration	No. of bills	In %
1.	Less than 4 hours	10	16
2.	4-8 hours	37	61.6
3.	8-12 hours	11	18.3
4.	More than 12 hours	2	3.3

1. Std. time for insurance bill closure is 4 hours. Only 16% of bills get closed in the standard time allotted.
2. Most of the bills get closed within 8 hours of its initiation.

FISH BONE DIAGRAM

The pictorial representation of various causes of delay in billing process (both in insurance and cash) are represented in fish bone diagram (Ishikawa diagram).

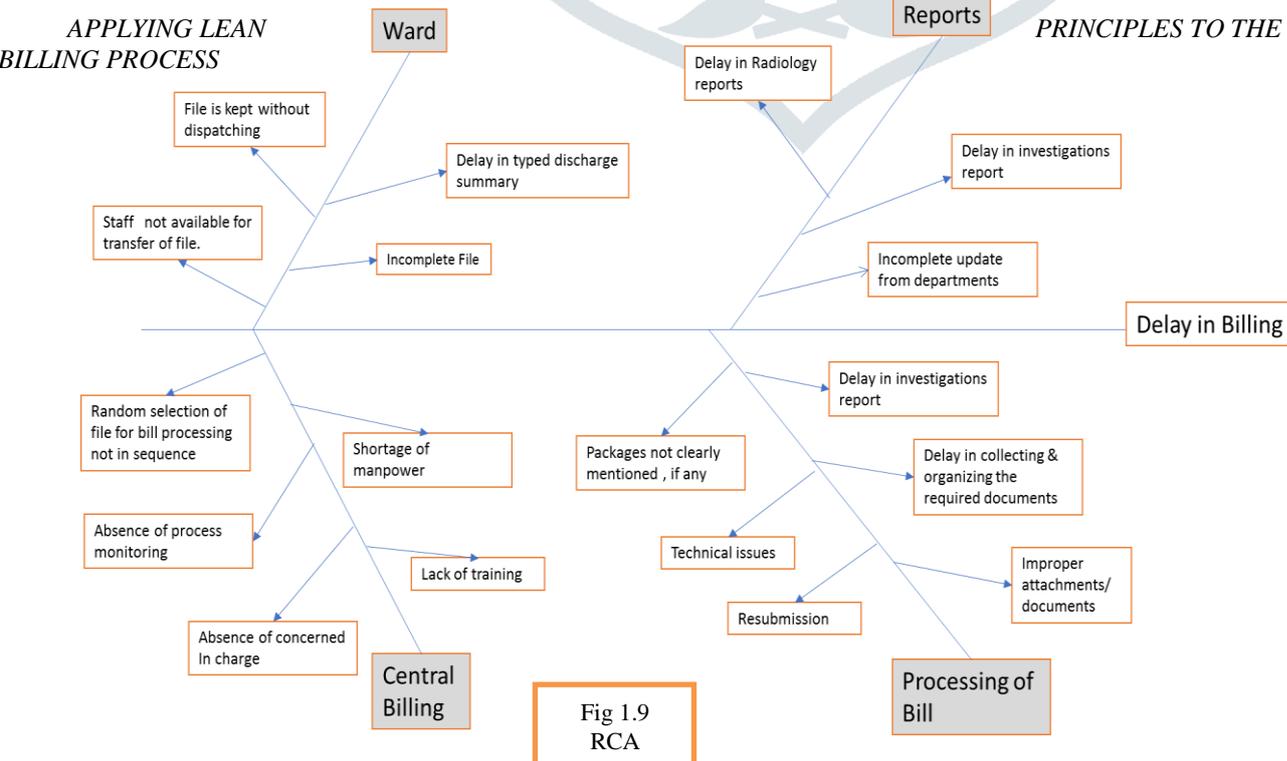


Fig 1.9 RCA

Through value stream mapping total six steps were identified in billing. Two were ward based and others were department based. Although Six Sigma itself doesn't target time delays, Lean Six Sigma, and its adaptations, does and one of its principles is that "on-time delivery equals quality." Time delays are chief among the problems of waste in healthcare industry, and certainly in the healthcare revenue cycle. Below is the list of all type of waste and observed causes in the billing process.

Table 1.9 Application of Lean management principles in hospital revenue cycle.

Type of waste	Definition	Observed cause
Waiting	Idle time created when material information and people are not ready.	Discharge summary is not ready. Idle time in insurance due to less staff. Sending invoice to TPA in post lunch or evening hours.
Transportation/ material movement	Movement of material or information that does not add value.	Transportation of files from ward to billing. Transportation of discharge summary. Discharge summary authorization process.
Over-processing	Efforts that create no value from the client's stand point.	Checking for lab reports attached which is already updated in ward. Discharge summary re- typing and authorization.  Re-submission for insurance. Applying concession after final invoice is prepared.
Inventories	More information / material in hand than needed.	Piled up files in department leads to confusion.
Motions/movements	Movement of people that does not value	Discharge summary transportation. mi
Defects	Work that contains errors, rework, mistake or lack of some -thing necessary.	Checking codes. Checking updates by various department (blood bank). Confirming packages of patients. Discharge summary not on time. Other documents not complete. Applying wrong codes
Reprioritization	Starting one task being interrupted (phone call, e-mail, and changing one task before the first task is completed.	Issuing check out slips when another bill is in process. Lama cases interrupt the priority. Post lunch hours' bills closure and new invoice generation clashes.

### Conclusion

Discharge summary is one of the important causes for delay, especially in insurance billing. Unlike other quality initiatives, improvement efforts, lean principles are not capital intensive. Instead, they are built on alignment of an entire workforce focused on continuously improving patient value. Successful lean initiatives stimulate service improvements that benefit patients as well as the healthcare institution and its employees, often with little or no direct financial investment.

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