To Study Patient Discharge And Billing Process at B L K Hospital

A Dissertation submitted in partial fulfillment of the requirements for the

award of

Post-Graduate Diploma in Health and Hospital Management

By

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Under the guidance of

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New-Delhi-110075

May 2015

Certificate of Approval

The following Dissertation titled " Study on Time Management of the Discharge Process and Billing at BLK Super Specialty Hospital " is hereby approved as a certified study in management carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite for the award of Post- Graduate Diploma in Health and Hospital Management for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

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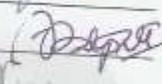
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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **"Study on Time Management of the Discharge Process and Billing at BLK Super Specialty Hospital"** and submitted by Col Devavrat Chhikara Enrolment No. PG\13\015 under the supervision of Dr. L P Singh for award of the **Post- Graduate Diploma in Health and Hospital Management** is my original work and has not formed the basis for the award of any degree, diploma in this or any other institute or other similar institution of higher learning.

Signature

Date : 30 May, 2015

FEEDBACK FORM

Name of the Student: Col Devavrat Chhikara

Dissertation Organisation: BL Kapur Hospital

Area of Dissertation: Time Management of discharge and Billing Process

Attendance: 95%

Objectives achieved: Complete satisfaction as per dissertation.

Deliverables: Improve discharge and billing process

Strengths: Eye for detail, excellent co-ordination skills & analytical skills.

Suggestions for Improvement: Reduction in wastful activities in discharge and billing process.

Signature of the Officer-in-Charge/ Organisation Mentor (Dissertation)

Date: 18 May 2015
Place:

DLЛ
Super Speciality Hospital

Radiant Life Care ®
Private Limited

Ref: - BLK/HR/2015/MAY/185

Dated: 23.05.2015

TO WHOMSOEVER IT MAY CONCERN

Sub: - Dissertation Completion Letter

This is to certify that **Col. Devavrat Chhikara** has undertaken dissertation at BLK Super Speciality Hospital from **13th February, 2015 to 18th May, 2015** in the department of HR Department.

During his tenure, his conduct was found to be excellent.

We wish him all the best for his future.

Yours Sincerely,
For BLK Hospital

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Certificate of Dissertation Completion

Date: - 18/05/2015

TO WHOM IT MAY CONCERN

This is to certify that **Col Devavrat Chhikara** has successfully completed his three months Dissertation in our organization from Feb 13, 2015 to May 18, 2015. During this tenure he has worked in the HR Department on the **"Study on Time Management of the Discharge Process and Billing at BLK Super Specialty Hospital"** under my guidance and my team's supervision .The candidate has successfully carried out the task assigned to him and his approach has been sincere, scientific and analytical.

Col Devavrat Chhikara has done a good work and has produced a quality report during this period.

We wish him/her good luck for his/her future assignments

(Signature)
Mr. Puneet Gupta
Manager
Learning &Development
BLK Super Specialty Hospital

Ref: - BLK/HR/2015/MAY/185

Dated: 23.05.2015

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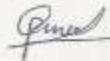
TO WHOMSOEVER IT MAY CONCERN

This is to certify that Col D Chhikara student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone internship training at 13 FEB 2015 from _____ to 18 May 2015 at BLKHosp.

The Candidate has successfully carried out the study designated 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 all success in all his future endeavors.
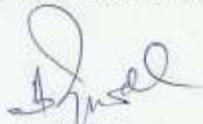
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Dissertation Writing

<u>Certificate from Dissertation Advisory Committee</u>

This is to certify that **Col Devavrat Chhikara** a student of the **Post-Graduate Diploma in Health and Hospital Management**, has worked under our guidance and supervision. He is submitting this dissertation titled " **Study on Time Management of the Discharge Process and Billing at BLK Super Specialty Hospital** " in fulfillment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management.**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Dr LP Singh
Director
IIHMR
New Delhi
Date-   May 2015

Mr Puneet Gupta
Manager
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BLK Hospital
Date-   May 2015

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ABSTRACT

 1. Background . Discharge and Billing process being the final step in the hospital experience is likely to be well remembered by the patient. Even if everything else went satisfactorily, a slow, frustrating discharge process can result in low patient satisfaction. Thus this study was carried out with the aim to ascertain the average time taken for the patient to be discharged in B L Kapur Hospital Delhi

2. Method .The data available on hospital records was obtained for month of January 2015 for preliminary assessments and on finding it supportive of hypothesis data was expanded to cover the quarter ending March 2015 . The statistical analysis was made to ascertain the average time taken for discharge. Suitable tables and graphs are used for representing various findings and results.

3. Results and Conclusion. The average time taken for the whole discharge process i.e. Intra processing time + Inter processing time of an individual patient is 04 hours 50 minutes. It has scope for improvement in reducing wasteful activities.

LIST OF ACRONYMS

ADL: Activities of Daily Living Adm: Admission
APACHE: Acute Physiology and Chronic Health Evaluation
Appl: Application Sent
C-Diff: Clostridium Difficile
CCC: Complex Continuing Care
CHT: Canada Health Transfer
CIHI: Canadian Institute of Health Information
CI: Confidence Interval
CMG: Case Mix Group
CRN: Clinical Resource Nurse
D/C: Discharge
DPQ: Discharge Planning Questionnaire
ED: Emergency Department
ELOS: Expected Length of Stay
GD: General Duty Person
IADL: Instrumental Activities of Daily Living
LOS: Length of Stay
LTC: Long Term Care
MRSA: Methecilin Resistant Staphylococcus Aureus
NEU: Neurological Unit
OPR: Operating Room
SOT: Staff Occupational Therapist
SOT: Staff Physiotherapist
SW: Social Worker
PACU: Post Anaesthetic Unit
PIP: Patient in Process
PT Physiotherapist
QFD: Quality Function Deployment
RefSW : Referral to Social Work
RIE: Rapid Improvement Event
RN: Registered Nurse
TBM: Time Based Management
TEL: Telemetry Unit
VRE: Vancomysin Resistant Enterococcus
VSM: Value Stream Mapping
WIP: Work in Process
WN: Ward Nurse

LIST OF FIGURES

LIST OF TABLES

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

1.1   General Overview

The institution that we know today as a '**Hospital**' is a twentieth century phenomenon. The early institutions from which it developed bore little resemblance to **modern hospitals**. The first hospitals in the new world were built by the Spanish in Mexico City (1524) and the French in Canada. In 1751, the first general hospital opened in Philadelphia, which is still in existence today as the Pennsylvania Hospital. While these earlier hospitals came to be devoted rather generally to the care of sick, it was the homeless sick for which they were operated in the initial period. At that time hospitals were considered as a last resort and death rate was terribly high. Technological advancements in diagnostic services have brought a revolution in the health-care industry in the late 19th and 20th Centuries.   Hospitals have become more and more complex with the enormous progress of medical sciences in all dimensions. As per the requirements of the country, the role of the hospital is to function as the hub of the whole system of health care, linking the preventive and the curative medicine. Besides programme management within the hospital, including its fiscal, material and personnel administration, the hospitals have to provide effective leadership for the organisational development and community participation so as to improve the quality of life with a healthier total population.

Administration of hospitals is very complex responsibility for all managers as it involves clinical and non-medical services and their interwoven tasks and responsibilities. While clinical management is effectively carried out by physicians and nurses, the support (non-medical) services are mostly provided by non-medical resource managers. Administrative functions are normally considered as "nuisance functions" and do not enjoy high status within a hospital system. The accountants and administrator also do not generally perform any extensive medical function. Therefore, hospital tends to develop only the 'medical services' to keep pace with the growth in size and complexity. The study of non-medical administration departments in a Super Speciality Hospital gives an overview of the enormity of their tasks and how important these services/departments are to support the main hospital functions in the Healthcare Industry.

1.1.1 The Healthcare System - Recent Trends

People require healthcare services from the moment they are born, and the demand for those services varies during their life time, therefore the volume of demand is almost the size of the human population. The complex nature of the human body and the potential ailments it might suffer add to the complexity of what is expected from healthcare Service providers. A healthcare system can be defined as a set of facilities and organizations that participate in providing services that relate to individuals' health and wellbeing. The structure and functioning of the healthcare system is largely shaped by the country or territory it is serving. In India, the healthcare is state subject and all programmes and policies are implemented through the health care machinery of states. The type of care right from primary to tertiary level is provided both by governmental institutions and

privately owned/ corporate hospitals, clinics, diagnostics and other such health care facilities. In some of the developed countries government caters to the health care needs of providing physicians, hospitals, clinics, long term care facilities, rehab centre's, etc, [1]. When studied developments taking place in health care system of Canada some interesting learning's emerge. The publicly funded healthcare system is claimed to reflect the nation's beliefs of equality and complete accessibility. Canada's national health insurance program (Medicare) is responsible for universal access to healthcare services across the country [2]. The 13 provincial and territorial plans have common coverage features and standards and together form a national program. These plans are funded through a federal cash contribution under the Canada Health Transfer (CHT). Qualifying to receive their maximum share requires compliance with the federal health insurance legislation, criteria and conditions. According to Health Canada, Canada Health Act is "Canada's federal legislation funded healthcare insurance." It is this act that dictates the criteria and conditions that each plan must account for [3]. Typically, Canadians seek primary care as a first step in trying to solve their health problems. Very often, individuals receive their proper diagnosis and treatment (or intervention) and have their medical or health concern taken care of. While they come at the front line of the system, this step also includes; doctors, nurses, pharmacists, and therapists among many others. When found necessary, patients are passed on to specialised hospitals, long term care facilities or home care services [4]. The Canadian healthcare system has been and is still experiencing immense pressure due to "changes in the way services are delivered, fiscal constraints, the aging of the baby boom generation and the high cost of new technology"[4]; factors that will not recede anytime soon. Possibly seen as a way

to alleviate some of that pressure, the Canadian healthcare system follows a trend of encouraging the reliance on "clinics, primary healthcare centres, community health centres and home care; treatment using medical equipment and drugs; and public health interventions" [4]. Accordingly, Health Canada has reported a decrease of 10% in the number of nights spent in acute care at hospitals, along with a decrease in the number of hospitals themselves. Rationally, advances in technology and increases in minimally invasive procedures have contributed to shortening acute care requirements. Canadian healthcare spending rose from 7% to 10.4% of the Gross Domestic Product from the year 1975 to 2005. During the same period a significant share of expenditures has dropped from physicians and hospitals, but rose for prescription drugs. Waiting time issues for accessing healthcare services have surfaced with studies carried out in the 1990's [5]. However only in 2004 did Health Canada report initiating a plan to improve "access to quality care and reducing wait times" in a 10-Year Plan to Strengthen Healthcare [4].

1.1.2. Industrial Engineering in Healthcare. Healthcare facilities are most generally places where services are being provided to customers utilizing material and equipment by a team of professionals. This sounds very similar to any facility or organization in any given industry. Keeping track of the quality of service being delivered to the patient requires quality management and control tools. Ensuring the ability to respond to patients needs on time while maintaining the lowest possible cost, calls for optimization tools. Implementing changes in such a sensitive environment that can never be paused or put to a halt, are extremely challenging. Therefore, having the ability to test and evaluate those

changes before confirming their feasibility require the deployment of simulation tools. All of these and more are in the industrial engineering discipline toolbox. The modelling concept is one of the key characteristics of approaching problems in industrial engineering. Several types of models exist and each of them targets different outputs [6]. Project Management models are the ones that help manage large projects with many activities that occur sequentially, dependently or independently [7]. The list of activities to complete a project is defined with their expected duration and cost. Using the critical path method and the project evaluation and review technique, the paths that lead most efficiently to the finishing point of the project are identified. The strict timeliness of critical paths is highlighted, while the tolerances than can be afforded in other paths also

appear. HealthCare reform is a term that has frequently been mentioned by United States and Canadian governments as a promise to the public that efforts have been, are being, and will be spent to improve the performance of healthcare delivery. Hospitals form a large part of the healthcare sector, which means they are going subjects of an equally large share of that reform. Reform can be another way of saying 'changing for the better,' and individuals working in this sector should know that change requires effort and commitment. While changes on such a large scale are being planned, they will be carried out through different sized projects. Hence, project management can be one of the tools in bringing about this reform. Another modelling technique that can be used is statistical modelling which includes regression analysis, design of experiments, and quality control under its umbrella [7]. This avenue is usually meaningful after relevant data collection takes place. Outputs of this model can produce very powerful metrics that can be used for direct decision making, or as input to other equally influential modelling

techniques. Statistical Analyses are widely used in both engineering and healthcare disciplines, process performance can be described by its measured statistical parameters (such as means, medians, variances and probability distributions). Only after the thorough understanding of those parameters a meaningful intervention can be introduced to the process to improve its characteristics. Very often, changing a process variable causes a change in many other dependent variables. This might work to the benefit of the intended intervention or vice versa. In these particular situations, statistical correlation and regression (linear, non-linear or logistic) become very feasible. Regression can be applied in healthcare to predict – for example - how long a patient may remain ill, and determine which variables contribute most to this length of time [8]. If, for example, it turns out that invasive surgeries cause prolonged states of weakness or poor recovery, then efforts will be directed towards this matter to help design tools for minimally invasive surgeries. Statistical tools can be useful in identifying probability distribution parameters that are used as inputs in simulation modelling. A large body of research literature exists on the applications of simulation in healthcare. The approach can be used in scheduling hospital operations, allocating resources, predicting admissions, studying risk-management, and many others. Value stream mapping is a method that models all the steps of the process from start to finish. The map is described as one that "captures processes, material flows and information flows of a given product family and helps to identify waste in the system" [9]. In modifying what has been said to a service sector industry, and in particular the healthcare industry, the map would have to capture all the elements of the processes, material flows and information flows of a given patient group to identify which of them add value to the process

and which do not. Value stream maps and patient flow process modelling can be the patient-cantered way of observing process mechanisms. Table 1 lists a summary of examples of industrial engineering tools used in manufacturing and healthcare applications, along with possible similarities and differences. The following section will converge in relevance to the research focus in explaining what is meant by 'discharge' in the healthcare industry, and how it can be identified as a process just like processes in manufacturing and service industries. Being a process, discharging a patient involves several steps which will be briefly mentioned in this section, along with the introduction of the term discharge planning.

1.1.3 Discharge and Discharge Planning. In manufacturing industries, the output in rough terms is usually considered to   be equivalent to the final product. However, that is not entirely comprehensive; the   final product does not resemble the completion of the manufacturing process. In some common cases, the product might still need to be packaged, inspected, have some instruction manuals added to it, and have the most suitable routes and transportation modes prepared for delivery. Numerous software solutions, technologies and optimization models have been created to alleviate the complexity of these activities that come after the completion of the final product. The effort and resources put to this service cannot be separated when measuring the organization's performance.

Table 1.1

Examples Of Industrial Engineering Tools In Manufacturing And Healthcare

Tool	Manufacturing Application Example	Healthcare Application Example	Similarities / Differences
Project Management	Managing the construction of a warehouse	Managing a healthcare reform project	Similar techniques used to keep the work within time and budget constraints. Different in that some Health care improvement projects have to be run in a way the system is not put to a halt.
Simulation Modeling	Simulating a production line	Simulating patient flow	In healthcare systems there is usually large variation due to unpredictable human behavior, and wide range of provided services.
Optimization Modeling	Creating the optimal network for distributing goods	Optimizing the usage of operating rooms	Similar in the sense of defining an objective to be accomplished within certain constraints, however the nature of the healthcare environment is challenging due to the occurrence of

			Emergencies.
Quality Control	Keeping a certain product size within specified dimensions.	Maintaining air quality of hospital operating rooms	Quality control in healthcare tends to be less tolerant due to the criticality of the patient's well-being
Statistical Analysis	Contributors to better customer satisfaction	Contributors to length of stay at a Hospital	Factor analysis can be similar in both disciplines.
Value stream mapping	Mapping the process of assembling an engine	Mapping he process of patients going through ED	In both disciplines, value added verses none value added elements will be Highlighted. In healthcare some services are still not done as standard work and the VSM might not be Representative of all cases.

Now moving to the healthcare industry, and precisely to the delivery of care in hospitals, one may in rough terms associate between the act of improving the patient's health   or curing their ailment with the act of completing the final product in a manufacturing industry. Yet in this case as well, a lot needs to be done to get the patient out of the system i.e., to leave the hospital. It goes beyond the   activities   completed   done   within the treatment phase. "An "inpatient" is a person who has been admitted to a hospital for bed occupancy for purposes of receiving inpatient hospital services. A person is considered an inpatient if formally admitted as an inpatient with the expectation of remaining at least overnight and occupying a bed, even if it later develops that discharge or transfer to another hospital is possible and a hospital bed actually is not used overnight" [10]. In the simplest form possible, and for any inpatient, their total hospital experience can be divided described into three distinct phases; admission, intervention, and discharge. Even though they occur in that sequence, these phases do tend to overlap. Within each phase come many administrative, medical, clinical and psychological aspects that have to be achieved to complete patient care. Focusing on the end of a patient's episode, one recognizes that it finishes with the patient leaving the hospital. The very final step in that would include having a porter or a nurse accompany the patient outside the hospital door. In between the completion of the intervention or treatment stage of the hospital stay and the time when the patient is actually leaving the hospital, several procedures have to take place, by engaging various staff members. And in linking back to manufacturing industries, the inspection here can be seen as the assessments carried out by a physician, social worker and other allied healthcare professionals to clear the patient for discharge. Things like instructional manuals

could be translated here as a sheet that is filled out and given to the patient containing physician's orders, prescriptions, and case specific post discharge instructions. When properly and accurately defined, processes in all industries can be studied and evaluated utilizing familiar methods. This allows for the discovery of flaws, complexities and inefficiencies. It allows for assessment and modification. The establishment of process standards also facilitates consistency, efficiency and accuracy. Continuous monitoring of the process is always essential in staying on the right track, despite changing demand and other key variables. Therefore, identifying patient discharge as a process and completely understanding how it is being accomplished exposes all those characteristics and improvement opportunities. Healthcare practitioners have come up with a concept that aims to organize the different tasks performed under the discharge process with the objective of allowing it to flow more smoothly. It is referred to as 'discharge planning', defined as "... an on going process that facilitates the discharge of the patient to the appropriate level of care. It involves a multidisciplinary assessment of patient/family needs and coordination of care, services and referrals" [11]. The relation of a plan relies greatly on communication between the nurses, physician, patient, family, other healthcare professionals and any necessary long term care facilities. In studying the discharge process, through observation, staff meetings and data collection, this thesis was completed with substantial collaboration and support from management and staff of B L Kapur , multi-speciality and tertiary care hospital ,Delhi.

1.2   About the Hospital

1.2.1 Background. Dr. B L Kapur, an eminent Obstetrician and Gynaecologist, set up a 200 bed hospital in Delhi which was inaugurated by the then Prime Minister, Pt. Jawahar Lal Nehru on 2nd January, 1959. By 1984, the hospital had become Delhi's premier Multi Specialty institute offering General Surgery, Ophthalmology, ENT, Dentistry, Pulmonology, Intensive Care and Orthopaedics, apart from Mother & Child Care. In the late 1990s, the Trustees of the hospital felt the need to upgrade it to a Tertiary Care Hospital and tied up with Radiant Life Care Private Limited to re-develop and manage the facility. The attainment of NABH & NABL accreditation in the very first year of operations is testimony to the hospital's commitment for patient safety and quality.

1.2.2 Journey.   The hospital has gone from strength to strength over the last few years. Today, BLK offers one of the most comprehensive bouquets of services for Tertiary and Quaternary Care, at par with country's most renowned institutes like AIIMS and Tata Memorial in Mumbai. BLK has India's largest Bone Marrow Transplant centre which is amongst the biggest in Asia. BLK Cancer Centre is amongst the most comprehensive cancer centres of its kind, with over 100 beds dedicated for Oncology services. The Bariatric program is the largest in North India. Besides the domestic patients, Hospital's international patient base has grown significantly over the last 12 months, owing to it being one of the most advanced healthcare facilities in the region.

1.2.3 Vision & Mission

Vision.   To create a patient-centric, Tertiary Healthcare Organization focused on non-intrusive quality care utilizing leading edge technology with a human touch.

Mission.

(a)   Achieve Professional Excellence in delivering Quality care.

(b)   Ensure care with Integrity and Ethics.

(c)   Push frontiers of care through Research and Education.

(d)   Adhere to National and Global Standards in Healthcare.

(e)   Provide Quality Healthcare to all sections of the society.

1.2.4 Infrastructure & Facility . BLK has a unique combination of the best in class technology, put to use by some of the best names in the professional circles to ensure world-class health care to all the patients. BLK is one of the biggest stand alone private hospitals in the NCR with a capacity of 700 beds including 125 critical care beds. The OPD services are spread on two floors with 57 consultation rooms. All ambulatory services have been designed with the intent to create dedicated areas for all specialities with their interventional services in close vicinity. The infrastructure speaks about BLK's commitment for **'A'**

1.2.5 Passion For Healing.

(a)   The Hospital has 17 state of the art well equipped modular OTs, which have three stage air filtration and gas scavenging systems, so as to ensure

patient safety. All the OTs are fitted with best in class pendants, operating lights, anaesthesia work stations and Advanced Information Management System.

(b)   BLK has one of the biggest critical care units in the region with 125 beds in different ICUs. All critical care beds are in the close vicinity of the OTs for easy accessibility and continuity of care. Each area is equipped with high-end patient monitoring services, ventilators and dedicated isolation rooms. Facilities for haemodialysis, CRRT, SLED, Endoscopy and Bronchoscope are available 24x7 by the bedside.

(c)   The hospital has Specialised Birthing Suites with Telemetric Foetal Monitors to follow the progression of labour and also the facility for the family to stay with the patient during the labour. A dedicated OT earmarked adjacent to the labour room helps in shortening the response time to conduct the delivery through surgical means, if needed

(d)   The Hospital's IVF centre is one of the best in its kind in India. It has a modular culture lab and a dedicated OT to provide highly personalized and cost effective services to those who need the IVF services.

(e)   The hospital has the largest Bone Marrow Transplant Unit in the country and amongst the largest in Asia. The unit offers both Allogenic and

Autologous transplant services under highest standards of infection control practices. The BLK Cancer Centre is one of the most modern and comprehensive cancer centre with over 100 beds dedicated for oncology services.

(f)   The hospitals advanced BMS features multi-tiered access control, electronic security systems including CCTV, highly advanced fire management system and specific BMS for utilities. The Hospital is the first in NCR to install and start using the Automatic Pneumatic Chute System which increases the efficiency and efficacy of health care delivery.

(g)   The hospital follows robust quality and infection control practices with an emphasis on patient safety and comfort of patients, their families and our employees. BLK Super-specialty hospital is both NABH and NABL accredited, certifying the quality and standard of care and the processes that have been put in place for healthcare delivery. Department of Academic Affairs, Research and Continuing Education (DARCE) emphasizes focus on academic activities and continuous quality improvement in terms of patient care.

1.2.6. State-Of-The-Art-Equipment

(a)   **Cyberknife VSI-** The Cyberknife VSI System is a non-invasive radio surgery for the treatment of both cancerous and non-cancerous tumours anywhere in the body, including the head, spine, lung, prostate, liver and pancreas.

(b) **PET/CT Scan-** PET / CT imaging are an invaluable diagnostic tool for monitoring cancer treatment. It also holds the promise of helping you tailor a regimen of therapies to fit your patient's individual needs.

(c) **A Triology Linear Accelerator with Cone Beam CT for Radiation Oncology-** Is a very versatile equipment which is used for providing. Image Guided Radiotherapy (IGRT), Intensity Modulated Radiotherapy (IMRT) and Gated Radiotherapy.

(d) **MRI-** The hospital has procured and installed 1.5 Tesla volume MRI, which is the first of its kind in India. The special feature of this MRI is its ability to generate 3D images, cut the acquisition time by half and increase the efficiency of the machine.

(e) **CT-** An 64 Slice Volume 3D CT Scan has been installed in the Hospital.

(f) **Bone Mineral Density (BMD) -** Whole body mineral scan capable of giving instant reports.

(g) **Ultrasound-** Ultrasound machines with 3D and 4D imaging and whole body Doppler.

(h)   **Mammography-** It is a low radiation Digital Imaging and Stereotactic (3D) Biopsy System.

(j)   **Cardiac Cath. Lab-** Flat panel combo cath. Lab with 3D reconstruction, DSA and Electro physiological EP facility. Reduced processing time of the input leads to higher efficiency.

(k) **Nuclear Medicine-**The hospital has a first of its kind dual head Spectrum CT, with variable angle Gamma camera. This enables the doctors to trace physiological pathways of various organization systems early in the disease process, in a non-invasive manner.

(l)   **Laboratories-** The hospital has one of the best equipped labs in the NCR for Haematology, Biochemistry, Microbiology, Molecular Biology and Histopathology.

(m) **Blood Bank-** A state-of-the-art blood bank meeting all standards has been set up with facilities like Aphaeresis, Blood Component Separation and Stem Cell Harvesting.

(n) **X-ray -** with high frequency low radiation digital radiographic units.

(o) **Gastroenterology-** The hospital has dedicated Endoscopy Suite with facility for advanced procedures including Capsule Endoscopy.

(p) **Ambulance services-** The hospital has fully equipped Advance Cardiac Life Support System (ACLS) ambulances for all kind of emergencies.

1.2.7. **Technology to Enhance Efficiency**

(a) Hospital had put in place Delhi's First Automated Pneumatic Chute System for immediate transfer of samples, medicines and documents minimizing delays and ensuring safe and hygienic transfer.

(b) BLK is WI-Fi enabled hospital with the vision of becoming the first paper-less hospital in the country.

(c) The Hospital has top of the line HIS system with Electronic Medical Records (EMR), accessible to doctors from anywhere.

(d) **Barcode Technology-** Bar coding technology is used to ensure correct identification of blood samples and better asset management control.

1.2.8. **Specialities.** BLK is a state of the art hospital which provides high class specialities for the population of NCR as well as for International patients. The details of various Specialities are given below:-

1. Anaesthesia & Pain Management	a. Paediatrics & Neonatology
2. Bone Marrow Transplant	b. Nephrology & Urology
3. Cancer Care ,Cyber knife Centre	c. General Surgery
4. PET Scan	d. Plastic, Reconstructive & Aesthetic Surgery
5. Gastroenterology & GI Surgery	e. Internal Medicine
6. Liver Transplant	f. Kidney Transplant
7. Bariatric Minimal Access Surgery	g. Pulmonary Medicine
8. Cardiac Care	h. Endocrinology & Endocrine Surgery
9. Obstetrics & Gynaecology	i. Psychological Medicine
10. Neurosciences	j. Dermatology
11. Orthopaedics	k. Ophthalmology
12. ENT Surgery & Cochlear Implant	l. Dentistry Medicine & Dental Surgery
13. Vascular & Endovascular Surgery	m. Ayurveda
14. Laparoscopic Gynaecology & Foetal Medicine	n. Transfusion Medicine & Blood Bank
15. Infertility & IVF Treatment	o. Physiotherapy & Rehabilitation

1.3 Problem Definition

Technological advances enabled treating patients for ailments that were considered to be terminal in the past. This phenomenon increased discharge planning complexities in particular for older patients with multiple conditions. Due to shortened treatment procedure times, the time patients spent at the hospital are also shorter [17]. As a result, nurses now have shorter windows of opportunity to get to know the patients and their needs that are critical for discharge planning[18].

The increased demand for hospital beds is overwhelming, and freeing-up inpatient beds is a top priority. Therefore, delays in discharge planning and unsynchronized patient flows are not tolerable.. Due to such a complex nature, there is a challenge in predicting accurate information regarding the status of beds, in terms of the number of patients leaving after discharge. The admitting department is supposed to work with those predictions in preparing the admissions of that day. Less accurate information will aggravate the problems that are already occurring at the admission end owing to delays, and transfers resulting in cancellations of operations and admissions. This reinforces the previous arguments in describing the need for directing focus on the discharge process. Within the focus of this thesis reside two main problems.

1.3.1 Achieving Discharge of Patients Prior to 1200 AM. The hospital billing cycle is from 1200 AM of the admission day to 1200AM of the discharge date. That is to say that patients who get admitted in the time window of 1200 AM (Noon) till 1159 AM of next will be treated equally as regards counting of the days for billing or counting Average Length of Stay (ALS) are considered. So for a hospital it makes better sense to admit patients prior to 1200 AM and discharge them after 1200 AM. As regards patient it is more beneficial to get admission after 1200 AM and to secure his discharge before 1200 AM. However a balanced and judicious approach will suggest admission of patient before 1200 AM and release of patient before 1200 AM so that a patient does not feel cheated. In order to discharge patient before 1200 AM there is a need to study the pattern of timings of day in which discharge decisions / orders are taken / marked. For data analysis the time of decision has been considered as that time when it gets 'recorded' or 'marked'

by the physician in Hospital Management Information System (HMIS). Planning for admissions is that planning which is carried out to synchronize admissions in accordance to the expected discharges. There is lack of understanding in the sequence and structure of the discharge process, which results in lack of consistency, hidden inefficiencies, and difficultly in analysing and improving the process.

1.3.2 Process Delays. The second problem that belies the discharge process are delays that reoccur very frequently with each patient episode. Delays that occur in the discharge planning are believed to be treatable to some extent. The main discharge delay that this thesis aims is to analyse and understand the delay related to billing process. Is there a case to enquire the relationship of delayed discharge and billing process? Ideally a patient should take no more than bare 30 minutes to clear the premises of a hospital once final decision to discharge him has been taken as part of pre-planned discharge. However same may not be possible in case of transfers of patients to a higher level of care or to a similar care owing of medical condition of a patient.

CHAPTER 2: LITERATURE REVIEW

This chapter will review literature that emphasized the need for identifying delays occurring in hospital that impede patient flow process related to discharge phase. With relevance to inpatient units, it will introduce some of what has been said and done in terms of discharge planning. It declares the call for recuperating this aspect of the patient's hospital experience as an effort that partakes in improving patient flow.

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2.1 Patient Flow and Throughput. Hospitals are experiencing on going pressure to provide satisfactory care and the resources involved are having trouble realizing expectations. Researchers did not only go after the reasons for this increase in pressure, as they know that parts of it go back to the root changes in the nation's population's heath status. However, a special effort was spent in studying all sorts of delays that are occurring in hospitals based on observation [19]. It was meant to be affordable and simple to learn and use. By utilizing it, the study suggests that time-wise feasible real-time assessments can be done that will bring to light the delays and inefficiencies occurring in a particular process at a hospital. In a Canadian hospital when the delay tool was put in operation on general internal medicine and gastrointestinal services for 6 months, it found that "30% of 960 patients experienced delays" each averaging to 2.9 days. The study also showed that most delays occurred in the following frequency [19]:

    (a)   Scheduling of tests (31%).

    (b)   Unavailability of post-discharge facilities (21%).

(c) Physician decision-making (13%).

(d) Discharge planning (12%).

(e) Scheduling of surgery (12%).

A pilot study conducted at Chelsea and Westminster Hospital, London, was used to define the reasons to which delays could be attributed (Table 1). 'Combined social and therapy delay' describes hold-ups affecting 'medically fit' patients who were awaiting review from more than one service—physiotherapy, occupational therapy or social services—for whom it was not possible to determine which of these three services was/were preventing discharge. A delay was recorded for each day during which these patients were not seen or, in the case of social services, during which no progress was made. The number of days delay that prevented timely discharge from hospital ('delay to discharge') was 184 days (20.7%). The mean duration of 'delay to discharge' per patient was 2.2 days[20]

Table 2.1. Causes Of Delays And Associated Resultant Costs.

Service accounting for delay	Delay to discharge (%)	Total delays (%)	Cost per patient (£)	Annual ward cost (£)
Combined social and therapy delay	25.8	28.8	145.9	148,290
Lack of downstream bed (nursing home or rehabilitation centre]	20.4	14.1	115.2	117,861
Social worker	16.8	13.9	95.2	97,432
Occupational therapy	9.0	8.7	50.7	51,859
Physiotherapy	5.2	4.9	29.2	29,858
Patient requesting to remain in hospital	4.6	7.6	26.1	26,715
Medical or surgical review	4.1	4.9	23.0	23,572
Nursing referral	3.5	2.3	20.0	20,429
Radiology/procedure: having test	2.7	8.9	15.4	15,715
Radiology/procedure: reporting test	2.7	0.9	15.4	15,715
Doctor referral	1.1	0.9	6.1	6,286
Patient transport	1.1	1.4	6.1	6,286
Pharmacy	1.1	0.9	6.1	6,286
Doctor delay: other	0.8	0.5	4.6	4,714
Other delay	0.3	0.2	1.5	1,572
Radiology/procedure: requesting test	0.3	0.5	1.5	1,572
Laboratory: reporting sample	0.3	0.5	1.5	1,572
Discharge prescription: incomplete	0.3	0.3	1.5	1,572
Laboratory: lost sample	0.0	0.0	0.0	0.0
Total	100	100	565.3	578,308

However, when defined in terms of delay days, and due to the length of the delays, awaiting post-discharge facilities was found to cause 41% of them, hence being the most important problem [19]. Even though this study proposes an indicative tool that can highlight and quantify delays, it admits that the delay tool's abilities stop there, and further efforts, tools and analyses should be carried out to decide on optimal courses of action. Another attempt to improve the efficiency of

patient flow was conducted in Lucile Packard Children's hospital in California [20]. The hospital faced many problems when it had to delay and turn away patients due to the lack of capacity. The flow was defined from admission through discharge and all the steps were laid down for the purpose of reengineering the process. The objective was to "achieve lasting performance improvement". The effort was directed to measure the effectiveness and improve the following areas:

(a) Reducing patient placement delays.

(b) Decreasing diversion volumes and understanding causes.

(c) Improving accuracy of bed availability and admission predictions.

(d) Reducing the number of medically unnecessary patient days and payment denials.

(e) Decreasing the frequency of discharge delays.

(f) Improving bed turnaround time.

(g) Enhancing the consistency of care performance.

(h) Reducing variances from established standards of care.

To bring about those improvements, distinct measures were set that became standards of performance. Continuously, the goal was to increase care and service coordination, create and sustain cultural change and redefine staff job functions. To be able to trace what has been done throughout each week, reports were created about patient admission, bed assignments, delayed discharge and bed turnaround among others. Meetings specially conducted for evaluation of patient flow performance where carried out, and most of what is discussed there is fed by that week's report. In redefining staffing and job functions, the study

suggested modifying the nursing supervisor position such that they are capable of making appropriate decisions in bed assignment and staffing based on their solid clinical knowledge. They suggest that the nurse supervisor should be able to manage and organize situations such as at peak demand levels, and to encourage case managers to be more involved and active in facilitating the discharge planning process. The results of creating those measures and redefining job responsibilities showed a 40% increase in the ability to anticipate patient discharge. Medical residents collaborated in improving predictability by effectively completing patient rounds and patient discharge orders [20]. This paper brought general promising ideas that might be applicable in many other hospitals, though it did not mention the tools that were used to implement those challenging changes. Instead of redefining roles under the different job descriptions, a new job position altogether was a later modification in efforts to smoothen patient flow. The need to investigate more solutions allowed the emergence of the bed management concept [21]. For that, the Bed Manager title was given to a nurse that practices the identification of empty beds and allocation of waiting patients to them. In many cases, the admission clerk implements that role, though not in a comprehensive manner. Admission clerks are informed about empty beds, and they assign new patients to them, rather than active personnel in identifying those empty beds. The process of bed management is shown in Figure 1 [21]. The research effort did not explicitly imply the effects of having bed managers on board, but rather was more concerned about the training that they should receive in order to be accountable and pro-active bed managers. A fundamental portion of the bed management process is communication. As shown in Figure 1 below, arrows are connecting this duty with all the stages for any patient case. To communicate

information about numbers of admissions and discharges effectively and timely throughout such a large organization (as a hospital) is a challenge. Placement, Stay, Discharge, Emergency Admission, Elective Admission ,Bed availability and management all affect one another differently.
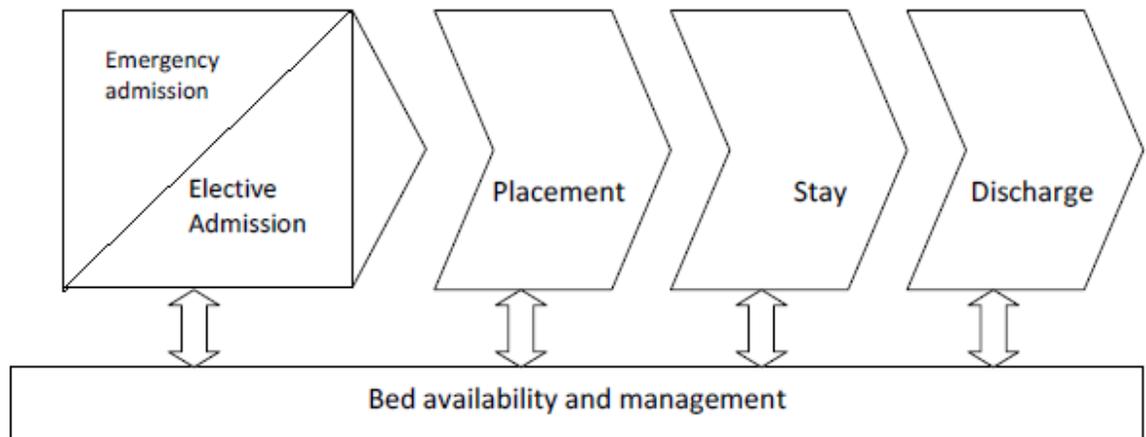
Figure 2.1: Bed Management Process

Accurate data about who is leaving the hospital on a given day is not always available, so admitting departments continuously struggle with this uncertainty, especially during peak demand. Patients are disappointed to have their scheduled operations delayed or cancelled, "Hospital admissions and discharges are not scheduled like a hotel reservation system" [22]. Lack of bed availability sometimes is worsened and made more persistent by late discharges, the author describes it as being "...much like morning rush hour on highways" [22]. The following needs to be done to make sure that the communication of information is done in a way that would allow bed management to be productive:

(a)   Keeping the lines of communication with the inpatient to make sure that any new or upcoming issues are known and addressed right away.

(b)   The night shift supervisor should have a report ready in the morning for the bed manager, the medical directors, and the unit manager to insure continuity of information and reduce double processing. The bed manager here uses this report to discuss patient throughput issues.

(c)   Discharge data should be collected as well as a scheduled admission list.

(d)   Nurses should meet every morning allowing unit charge nurses to be familiar with the potential discharges from other units

(e)   Based on known discharges, possible discharges and staffing, a plan is set by charge nurses and the bed manager for scheduled admissions with keeping a proper margin for emergency admissions.

(f)   Bed managers should do rounds during the day to check on bed status, and keep associated departments such as Post Anaesthetic Care Unit (PACU) informed of the situation. In contrary to most literature that describes the bed manager role or the discharge facilitator role as a solution to patient flow problems, one of the studies reported the resistance of nurses when a bed manager position was newly introduced in their hospital for a 6-months trial period [23]. The unit staff felt that discharge should be their responsibility. This trial was based on the notion of making a pull process out of the patient journey. Instead of pushing from front end, it is better to make sure that the end of the process is clear. Another trial that worked for that particular hospital involved reducing bed numbers in a ward, while keeping a staffing level equal to the one that would be present if there

were a larger number of beds. This was done with an expectation that in an argument that says that patient/nurse contact time would increase, enhancing patient and staff satisfaction [23]. With the current rise in demand for inpatient hospital care, and the scarcity of resources, this scenario would not be a resolution in most cases. Another avenue that was taken in tackling patient flow problems concludes that using latest information technology in providing access to real-time information regarding demand for beds and current hospital capacity can be a key solution [24]. Replacing paper-documented information relating to the arrival, transfer and discharge of patients with an electronic data base, can allow instant analysis and timely updates and processing of patient information. The availability of such around-the-hospital accessible data would let bed mangers communicate with admission clerks as soon as possible. This allows more control over bed capacities, patient flow and the decision making process to be more effective in accordance to real-time information. Efforts were not only directed towards defining the responsibilities of resources and engaging the latest technology that could facilitate the patient flow. Getting to understand the processes that dictate this flow is also paramount. The delay tool mentioned above was designed to unravel delays, and for the same objective, modelling techniques were used to identify bottlenecks that are causing those delays [19]. System dynamics modelling is one technique that "combines both qualitative and quantitative aspects and aims to enhance understanding of complex systems, to gain insights into system behaviour." At a hospital setting, the

outcome of these models can be patient pathways, information flow and resource use - wherever dynamic activities are taking place [25].

2.2 Focusing on Discharge through the Healthcare Perspective

Very often when examining efforts to improve patient flow, rather special attention is given to the discharge piece, in some cases, by clearly mentioning it among other issues when discussing bed management, communication of information or even most importantly, delays. This section summarizes the attempts strictly focused on discharge process related issues. By focusing on lengthy patient episodes it was found that "...four types of system obstacles prevented timely discharge; patient care issues, financial and legal issues, administrative issues and deficiencies in coordination between hospital and community personnel. Such nonmedical reasons for delayed discharges suggest that better planning may be beneficial." [3] Discharge planning is suffering from a lack of information, poor communication and synchronization between acute and long-term care. Consequently, it results in disrupted flow, blocked beds, frustrated patients and distressed unit staff. Even though the process is never the less always completed, it can be described as "unsuccessful" in some literature. Unsuccessful discharges can either be unplanned readmissions within an unexpected short period of time, or delays in length of stay causing it to be greater than what is set by standards for particular patient groups [2]. Solutions to the persistent problems came generally under [26]:

(a) Improving liaison

(b) Planning as far ahead as possible

(c) Improving communication

(d) Creating and maintain clear and concise documentation.

(e) Improving patient assessment.

Research literature is available that expresses and investigates those matters collectively or separately. This section of the chapter will try to cover most of them that fall under efforts conducted by professionals internal to the healthcare discipline. "Planning cannot begin too early; planning can certainly begin too late. Planning that is not flexible or modifiable as new information comes to light is as bad as no planning at all" [18]. In the general concept of planning, this is very convincing, and for discharge planning in particular this is the recommendation as found in many papers [27][28][29]. Evaluating the risk that the patient might need increased planning efforts for discharge is a key element in preparing for what to do. Doing it early is even better. A study that targeted 36 patients split them into an "early intervention group" and another "control" group. The difference between the groups is that the planning process started at day 3 from admission for the early intervention group and after 9 days for the control group. It concluded that early planning reduced readmissions and facilitated discharge [27]. This risk evaluation can be brought about using tools created by healthcare professionals at the hospital, and a scoring scheme can be identified and used as a base for decision making. Also, it can be done by separately involving all necessary allied healthcare professionals such as social workers, physiotherapists and occupational therapist, but again; the earlier the better. Physicians' predictions have been found to be valuable enough by themselves. Some of the factors are

backed up by rigorous studies and some are not. The following factors were considered helpful in deciding whether to involve social workers:

    (a)   Age and gender.

    (b)   Decreased mental function.

    (c)   Inability to ambulate.

    (d)   Presence of incontinence.

    (e)   Presence of chronic conditions.

    (f)   Complexity of social situations.

    (g)   Complexity of illness.

By estimating and accounting for the factors above, the need for social work involvement is identified. Getting the requirements fulfilled early enough results in decreased length of stay [29]. Older people come to the hospital with generally more complex health situations that not only require more complex treatment, but certainly bigger discharge planning effort. Many times they stay for lengthy periods beyond acute medical care [29]. One scoring technique that was created for this matter is the Discharge Planning Questionnaire DPQ [30]. The questions can come under the following: activities of daily living (ADL), instrumental activities of daily living (IADL), and social support and environment issues. Scoring for both categories would come out as: 0 = functional independence, 1= assistance needed, 1.1 = do not know, 2 = functional dependence. According to the score, the nurse would communicate with social workers and the physician [31]. Interacting with social services is not an easy task by itself; delays and discrepancies might occur. It is important not only to know what the nurses and the physicians need

from the social workers, but for them to give the social workers what they need so that both sides have things organized in the best interest of the patient. Through another attempt a computer software was developed to manage discharge - and more importantly to ease the sharing of information [32]. It enabled:

(a)   Capturing data relevant for discharge liaison including referral, assessment and discharge details that are in the hospital patient system.

(b)   Nurses to send electronic referrals direct from the ward or from the discharge liaison office to the social services offices at any time of the day or night.

(c)   The extraction of the most recent status for each patient from the hospital patient system to keep social services up to date. Instant access to information such as patients' next of kin, mobility mental state and any changes in discharge date is possible.

(d) Social services to maintain their own memo data in relation to a particular case, e.g. social services registration number, or details of which social worker is dealing with the case. Some of the attempts to address the discharge problem in the United Kingdom were through creating workbooks and setting acts [19]. The Hospital Discharge Planning Workbook [33], published in 1994 was written to highlight the full nature of the process and to ensure that patients are discharged at the right time and with the right arrangements. The National Service Framework (NSF)'s for Older People 2001 [34] and Discharge from Hospital: Pathway, Process and Practice Workbook 2003 [35] were also prepared for the same reason. The Community Care (Delayed Discharges) Act in 2003 [36] stated the

responsibilities for making discharge arrangements so that there would be less disagreement about who is responsible for what. A widely problematic aspect of the patient episode at the hospital is the so-called Alternate Level of Care Status (ALC). This status is given to patients that remain in the hospital after their acute care was completed. The reasons are mainly due to unavailability of appropriate long term care facilities and nursing homes. The congestions there create a reverse domino effect influencing surges in inpatient beds and emergency rooms negatively. Hospitals are trying to meet discharge goals and patients and families do feel this pressure creating anxiety in the decision making process of discharge destinations [37]. Recommendations such as increasing hospital and nursing home capacities have been expressed in literature. Other recommendations suggest to "improve the coordination of services to provide a smooth transition across the continuum of care by clearly defining accountabilities for timely and effective client flow". Projecting demand for alternate level of care facilities is also thought to help plan for how to accommodate for them [37]. They also express the large variation in the ALC length of length of stay as depicted in Figure 2. A patient might wait from 1 day to 120 days. As the data are used and explored, data quality and comparability are likely to improve". A median of 10 ALC days was reported throughout the years 2006-2008. The long-stay patients did not differ from the shorter-stay patients on demographic variables (gender and age) but were more likely to be in the hospital for reasons related to dementia [38]. However, the overall population of ALC patients might not be representative of the differences between the states or cities, and since there is such a wide variation, the

results obtained by accessing all patients together might be misleading. Therefore, the question "What are the main sources of state and facility(hospital) variation in ALC? Is it mainly driven by differences in classifying and recording ALC cases or does it reflect key differences in patient care?" [38]. Although some efforts have been put in place to study the reasons for ALC, and the recommendations that suggest improving the situation, deeper investigations need to be made at state, city and individual hospital levels to help understand the variation and contributors to ALC days. Some work in this area has been initiated in the United States [39].
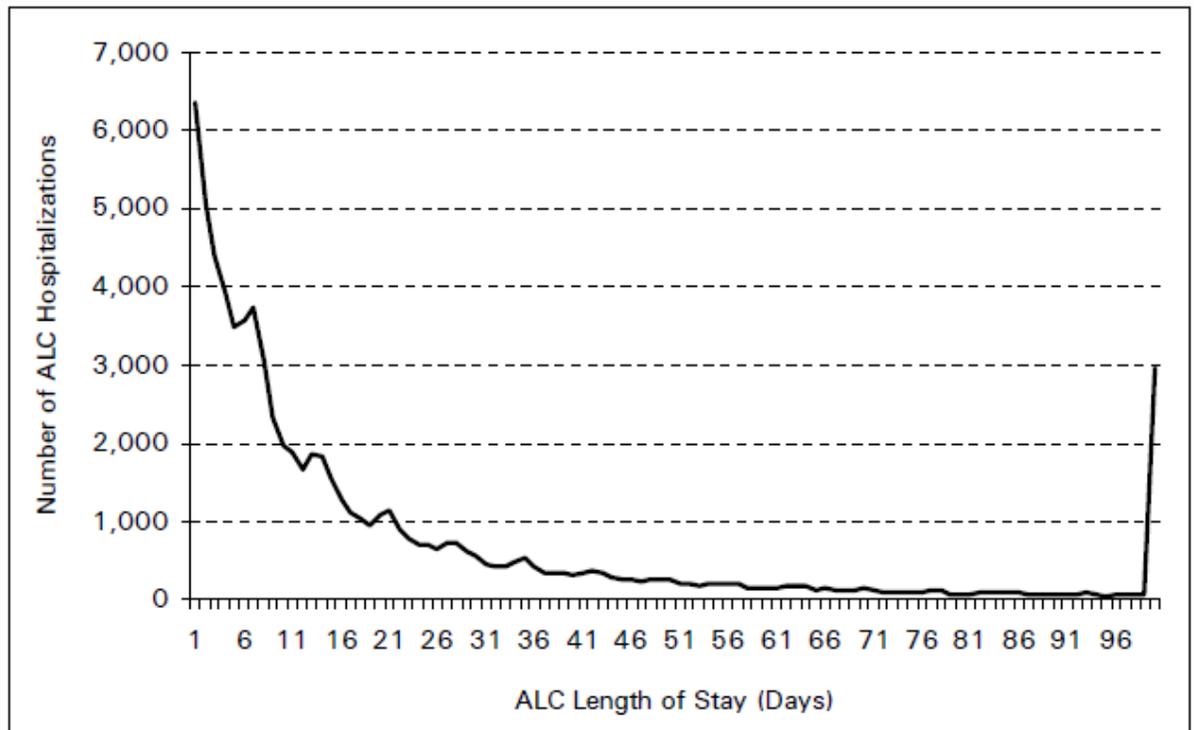
Figure 2: Distribution of ALC Length of Stay in Canada (2008-2008)- (by CIHI 2008)

2.3. Apply Engineering to Healthcare in Analysis of Discharge

"Industrial processes provide a benchmark for the healthcare sector in the improvement of production efficiency, assuming it can be achieved without sacrificing clinical quality [40]". In design and operations management of healthcare systems the patient-oriented approach is widely adopted. This means, that each patient is treated as a project and is managed just like project-oriented companies are managed. Work in Process (WIP) from industry is translated to Patient in Process (PIP) in the healthcare world. The start to finish of a PIP is called a patient episode [40]. When patient episodes vary greatly, effective case management should be combined with process based approaches [41]. Effectiveness was tied to time by the Japanese in the 1980's. And by doing things with less time a competitive advantage is achieved. This gave birth to the principle of Time Based Management (TBM). By applying TBM to patient processes, the patient episode can be divided into a series of time categories [40]:

(a) Diagnostic and care time, including:

➢ Diagnostic time of collecting and analyzing diagnostic information.

➢ Active care time of clinical interventions.

➢ Passive care time when resources are not used actively, but the patient is under observation in inpatient units.

➢ Superfluous time which is defined as medical diagnostic and care that is not based on official care process recommendation.

(b) Administrative time that includes all the non-medical tasks related to a patient episode.

(c) Waiting time including:

➢   Positive waiting time where the patient's condition is likely to improve spontaneously.

➢   Passive waiting time where the patient condition is stable and delay does not influence either the patient's medical condition or the prognosis of the success of medical operation.

➢   Negative waiting time that indicates that the patient's condition is likely to deteriorate and they may require more complex procedures. It could also be that the prognosis of patient's (medical) condition after care episode is less favorable. Another methodology that can be used to deal with the patient processes is called the Soft systems methodology as it is said to be most suited for human activity. Conceptual models are drawn of the current situation and the suggested potentially improved situation. Those models are then compared. The way this methodology works is by following an approach called   Check land's seven stage approach   whose   steps are [17]:

(d)   Steps 1 and 2: involve building the most possible neutral schematic representation of the system and then creating a rich picture of the situation that has all activities connected to each other including all their inputs and outputs.

(e)   Step 3: creating a root definition of the problem using the CATWOE terminology which is broken down to:

➢   C - Customer: beneficiary, e.g., patients

➢   A - Actor: who performs activities, e.g. healthcare professionals

➢   T - Transformation: what input is transformed into what output, e.g. From ineffective to effective continuity of care.

➢   W - Weltanschauung: what view of the world makes the system meaningful, e.g. effective continuity of care will deliver high quality individualized care.

➢   O - Owner: who can abolish the system, e.g. healthcare professionals.

➢   E - Environmental constraints, e.g. socio-cultural.

(f)   Step 4: building a conceptual model, based on the root definition.

(g)   Step 5: comparison of the real world and the systems world in order to propose the agenda for possible change.

(h)   Steps 6 and 7: culturally feasible and systematically desirable changes to structure. From a study that utilized this methodology, discrepancies in the current discharge planning processes where found to be [17]:

(j)   Patient issues: a tendency for them to change their minds regarding needs for discharge at the last minute, and their being unaware of progress with discharge plans, resulting in their unhappiness with what is being proposed.

(k) Communication difficulties: including telecommunication problem, delaying referral to occupational therapists or physiotherapists.

(l) Documentation problem: lack or poor documentation from other healthcare professionals following review of a patient for discharge.

(m) Time pressures: including nurses being too busy in dealing with patients' physical problems which in turn delays timely progressing of the discharge planning process, over loaded nurses forgetting to communicate with community staff and junior doctors having to wait for their seniors to authorise discharge.

(n) Policy issues: uncertainly regarding changes in practice resulting from constantly changing government policies and local authority procedures. Also, nurses at the centre of the discharge process were not aware of social care policies and criteria that affect their clinical area.

(o) Others: policy issues, lack of support from the patient's family, patient needs regarding discharge difficult to determine, and equipment needed in the patient Ideas for improvement included the need for greater cooperation between all that is involved including the patient, and also the adoption of effective communication technologies [17]. The act of communicating with the patient, the family and the long term care facilities does not seem to be sufficient. The quality in communicating with them determines how successful this act would be. Quality Function Deployment is a way to investigate what the systems' requirements are, and translating them to quality characteristics that should be incorporated in the system with varying importance [42]. In communicating with patients and their

families, certain attributes were found to be of significant importance with regards to how the information is passed on, and how thorough, comprehensive and up-to-date is this information, e.g. giving the patients and their families a complete list of long-term care facilities that are available, all the reasons why some are better than others for their particular case and how much they will cost[42]. A model was created by using a so-called "two-part data analysis strategy" with the target of calculating the total number of unproductive days in a patient's episode [43]. This attempt was classified as a "process improvement project" that targeted an inpatient renal unit. The motive of the study was the fact that there exists a positive correlation between the increased length of stay of older patients with the likelihood of death or nursing home placement. This correlation is thought to be caused by exposure to complications related to infections, and reduced mobility or cognitive ability with prolonged stays. A less defined concern was said to be that "length of stay is a quality-of-care issue", especially when related to discharge delays and system inefficiencies. The paper mentioned the adoption of what was called "The Model for Improvement", created by the Institute of Heath Care Improvement [31]. It requires a response to the questions: What are we trying to accomplish? How will we know that a change is an improvement? And what changes can we make that will result in an improvement? The questions should come in conjunction with the Plan-Do-Study-Act [44]. While proposed in the methodology the use of those techniques and tools was not evident. The two-part analysis strategy is translated by a flowchart part and a spread sheet part [43]. The flow chart depicted the stages the patient goes though from admission to Discharge. The chart clearly identified a very important milestone in the process which was called "functionally and medically stable for discharge". Though a very

critical point in the patient episode in general and for discharge planning in particular, this point in time was not commonly documented and written in the patient chart at the moment it was identified. In the flow chart an ideal path was set by the team. It was sketched with sub-paths branching out from it illustrating possible delays. The delays were categorized under:

(a) New or recurrent health issues requiring further assessment or treatment.

(b) Conflict or resistance to the possibility of discharge from patient or family.

(c) Late identification of discharge issues.

(d) Waiting for placement.

The spread sheet came as a quantitative tool complementing what was demonstrated in the flow chart. It was divided into two parts; data entry and meaningful summary. Certain dates were input in the data entry fields that generally resembled starts and finishes to discharge planning related activities. A list of formulae would deduct the total number of delay days for a particular patient

CHAPTER 3: ANALYSING CURRENT PATIENT DISCHARGE ACTIVITIES

3.1. Introduction. This chapter describes the discharge process from start to end, whether discharge planning was involved or not. Several problems have been discovered while documenting discharge process. In those cases, data has been collected and analysed in order to quantify the problem and identify its nature. The following chapters deal with solving the problems described by this chapter.

3.2. Responsible Resources. It is important to understand who is responsible for what in any work environment to avoid mistakes, double processing, and missing activities. In this case, the job positions that are directly or indirectly connected with the discharge process are: the clinical resource nurse, the nurse practitioner, the registered nurse, the registered practical nurse, the unit clerk, the unit manager, the staff occupational therapist, the staff physiotherapist, the social worker, and finally the physician. The following will is a brief description of what those positions are about and what parts of their responsibilities are related to the discharge process:

> (a) The Clinical Resource Nurse (CRN) is a front line registered nurse who works closely with the unit manager, physicians and other professionals to coordinate care delivery on the unit. He/she full fills this role by:

> ➤ Leading daily multidisciplinary discharge rounds to coordinate delivery of care both internally and externally.

➢ Collaborating with other team members and families/patients to facilitate a smooth transition from the hospital to the discharge destination across the continuum of care.

➢ Identifying barriers to discharge and work with appropriate resources to decrease length of stay and readmission.

➢ Conducting weekly focused case reviews on the unit.

➢ Conducting follow-up calls with patients to assess the effectiveness of discharge instructions and if there were any issues.

➢ Communicating with the unit manager, physicians and other professional staff to problem solve and facilitate optimal patient care.

(b) The Registered Nurse (RN) is accountable for the provision of care in accordance with the 'standards of practice'. The RN provides care to meet the holistic needs of these clients in all cases. The Registered Nurse provides consultation and interventions in situations that are beyond the registered practical nurses' scope of practice. The RNs:

➢ Assess patients through holistic data collection and on-going observation.

➢ Coordinate and participate in the development of the interdisciplinary plan of care in collaboration with the client.

➢ Identify opportunities for quality improvement as well as initiate, participate and evaluate quality improvement initiatives.

➢ Actively participate and contribute to change of shift report, team meetings, and discharge planning.

➢ Take responsibility and accountability for documentation of all care delivered.

➢ Actively contribute to the collaborative effort to improve quality of patient care, decrease patient length of stay and increase appropriate bed utilization.

(c) The Unit Clerk position is a self-directed member of the care team and is responsible to facilitate and ensure the effective coordination of all clerical communications for the unit. The unit clerk:

➢ Maintains an accurate and complete patient record while on the unit.

➢ Ensures patient appointments and arranges transportation.

➢ Notifies the Admitting Department of admissions, discharges, and transfers.

➢ Prepares memos, letters, statistics, and reports for unit specific information as required.

(d) The Unit Manager role is in ensuring that quality is not compromised and that day-to-day operations are efficient. The role promotes an optimal patient experience through timely recruitment and on-going development of the professional and non-professional staff that support the efficient functioning of the patient care unit. The unit manager is also a role model for change and ensures that staff is well prepared and supported in the implementation of change. The unit manager:

➢ Interacts with Patient Care Resource Leader to ensure that discharge planning actively begins at time of admission.

➢ Ensure that optimal resource management is achieved by the unit. This includes effective discharge planning and development of quality assurance programs.

(e)   The Staff Occupational Therapist (SOT) provides patient care services including assessment, treatment and education in order to meet the needs and expectations of the patient on receipt of an authorized referral. The SOT is able to integrate patient information to develop and progress an effective, efficient, goal-oriented treatment plan

(f)   The Staff Physiotherapist (SPT) provides patient care services including assessment, treatment and education in order to meet the needs and expectations of the patient in terms of their physiological well-being. This aspect of the patient condition is vitally related to their dependence/independence after discharge.

(g)   The Social Worker (SW) manages a caseload of those patients requiring discharge planning services. He/she applies appropriate clinical intervention methods to meet both the client's and the organization's interests. The social worker:

➢ Works in collaboration with interdisciplinary team members to identify patients who will require assistance with inpatient, outpatient and/or post hospitalization care needs.

➢ Assesses the patient's functional, mental capacity and limitations/strengths in activities of daily living.

➢ Assists in the formulation of a plan of care that compliments the goals of the patient and family and the healthcare team.

➢ Provides counselling to the patient and/or their family as may be required in the adjustment of the individual's physical, social, emotional, financial and vocational needs, also in making decisions about their plan of care.

➢ Makes arrangements for out of town referrals by coordinating with community resources.

➢ Initiates and organizes meetings with families, community resources and interdisciplinary team members as necessary.

➢ Reassesses the plan of care on an on-going basis.

➢ Provides education and information to interdisciplinary team members about social systems and community resources and their impact on discharge planning.

➢ Interact with community agencies and services to provide on-going care for patients when needed beyond hospitalization.

(h) The physician is the medical doctor that is responsible for accurately diagnosing the patient and deciding on the course of treatments and interventions that are to be implemented. Alongside following up with the patient's medical condition the physician should be able to predict the length of stay. He/she should also issue referrals to other healthcare professionals when necessary, who will also help form the picture of the patient's needs after acute care. The physician is responsible for determining the point where the patient is done receiving acute care and is

medically fit for being discharged. Providing prescriptions for after hospital medications and necessary instructions before discharge are also his/her responsibility. Finally the physician should dictate a discharge summary that will summarize the complete patient episode. That is to be added to the patient's chart after discharge in case it was needed for later reference.

3.3. The Discharge Process

3.3.1. Activity Characteristics as Recognized by the Hospital

Currently, the discharge process at the hospital does not seem to have an identified process structure. It is mainly witnessed as the point where the patient is ready to leave in a day or two, and what needs to be done right before that. However - as it has been explained in previous sections - there is a list of activities that happen well before that point in time. They directly influence how the patients proceed through their stay. Each patient is unique based on the type and severity of illness, age, gender, social standing and multiple other factors. This variety can be misleading, and results in the perception that a generally common process cannot be defined precisely for inpatients. What lacks is an understanding of what most patients go through under the sequence of involvement of those responsible resources.

3.3.2. Identifying the Discharge Process Sequence and Structure. A series of interviews were conducted with hospital staff. The collected information was used to form a picture of the sequence of the discharge process elements. Figure 3 shows a flow chart of the process when the patient undergoes a relatively simple discharge procedure. It includes certain activities common to all patients; however it does not encompass Billing process and related activities. Right after a patient is admitted, an admission record sheet asking for certain information is filled out for the patient that starts. One of the fields is the diagnosis, which should give an indication of the expected length of stay (ELOS) parameter. If the patient diagnosis falls under one of the clinical pathways that are defined by the hospital, then the patient's treatment is set off according to that pathway that has day-by-day instructions. After a few days from admission, a Multidisciplinary History and Physical Assessment are done mainly by the physician. It is a document that has a thorough general patient health analysis. The fields present in this document related to discharge are:

(a)   Location the patient was admitted: home, rest/retirement home, long term care, complex continuing care, and others...

(b)   Information of contact persons: the decision maker, family spokesperson, care partner.

(c)   Living arrangement: who lives with the patient, the type of residence, the mobility status.

(d)   Planned discharge destination.

(e)   Expected date of discharge.
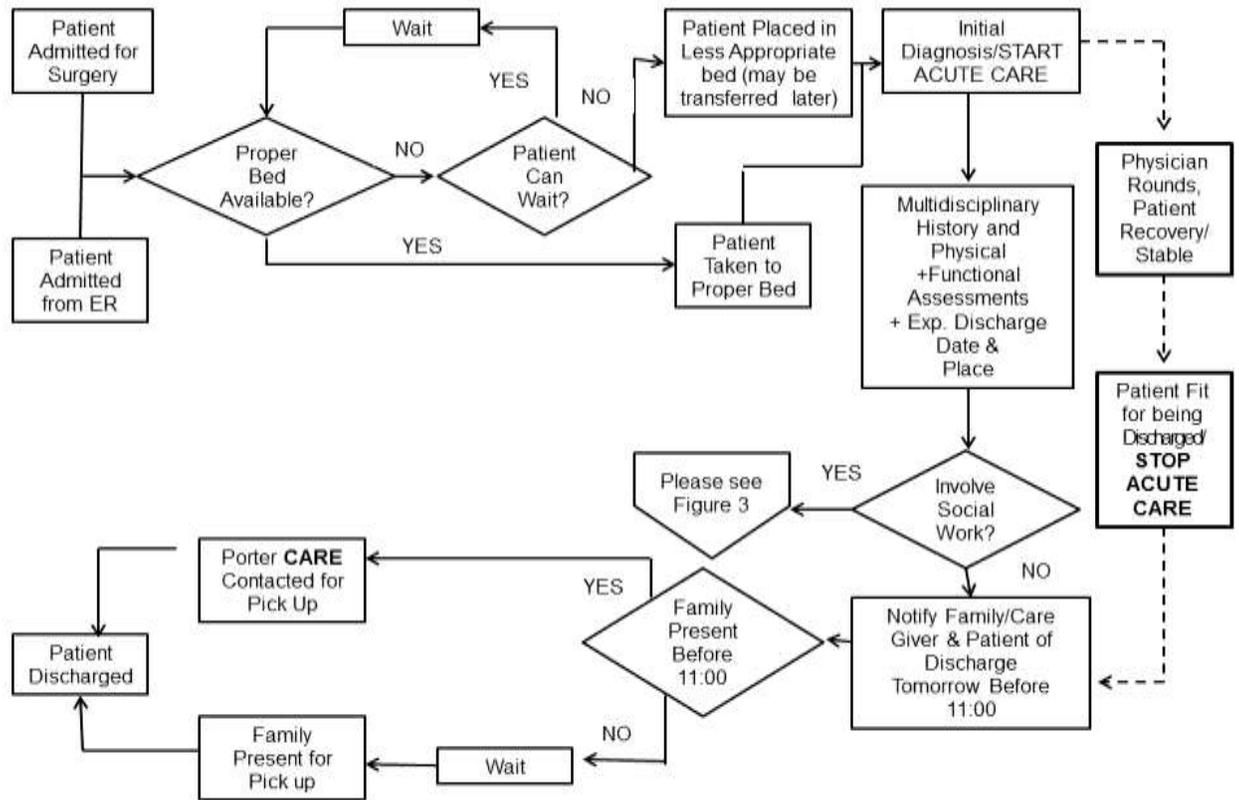
Figure 3.1: Patient Flow Chart with Emphasis on the Discharge Process

At the end of this document there is a section referred to as 'functional assessment' that is done for the purpose of determining if social workers should be involved with this particular case. When the patient has almost completed treatment and recovery, the nurses notify the patient that they will leave soon, and notify the family/ relative that they should pick up the patient on the day of discharge at assigned time. It is believed that discharging patients in the morning time is better for them since that is when they usually feel their best.

Early discharge allows new patients to be also admitted early enough for tests to be ordered and results received the same day. This ensures that the

proper diagnosis and treatment may start as soon as possible. However, very often this goal of discharge before 1100 AM is not met. Before the patient leaves the hospital he/she should take a copy of another document; the Discharge Information sheet. This sheet has all the information that the patient might need to know upon leaving the hospital, from the procedures that have been performed, prescribed medications and specific physician's instruction. He/she usually needs to present this document at their next follow up visit to the hospital or family doctor. It is worth noting here, that while most of the above is being done, the patient would be undergoing acute care in parallel (this is represented by the path in dashed lines in Figure3.

3.4 The Discharge Planning Process. When the patient's functional assessment yields a result requiring interaction with the social work department, the flow chart in Figure 3 seems to lack a very important path, the discharge planning path. As was the case for the general discharge process, a proper sequence and structure of this path was not identified. However, there were some influential efforts in place that separately defined and facilitated some of the discharge planning activities, in particular the ones related to the decision making process of the most appropriate discharge destination. Discharge Planning is a list of activities that try to ensure the best transition possible for patients that will still require some type of care after they are done receiving acute care at a hospital. It is within the responsibilities of discharge planning to "recognize the danger of shifting patients from one healthcare agency to another" [45]. Discharge planning and continuity of care are not exactly the same, discharge planning is more of:

(a)   Assessing and identifying current and anticipated psychosocial and physiological needs.

(b)   Planning appropriate continuity of care to meet those needs when a change or termination of services by the current heath care provider occurs.

(c)   Preparing and referring the patient for admission to another organized healthcare service.

(d) Preparing the patient for self care. Continuity of care is more of a series of events that occur continuously according to patient needs while they may vary [45]. The activities are mostly ones that do not fall under the acute care category and can be taken care of outside the acute care hospital. The follow up however is accompanied by accurate communication of information about the patient between both healthcare service providers. A discharge planner that was given a case remains responsible for that case until it is closed. They make daily rounds to check patients' health status to discuss and communicate about any changes in their needs. They meet with involved family members every time a decision has to be made, and they fill out applications for patients that will either require placement or continuing care at home. The categories of destinations that should be chosen according to previously made decisions regarding the patient health status and care needs.

3.5. Identifying the Discharge Process Sequence and Structure.   This   is only one step of the process of discharge planning. When a social worker receives a referral request from the nurse in charge, they show up to meet with the patient and their family, and they take action according to the situation. Every time they

meet with the patient or carry out any of their duties they write a note of what has been done on a note pad called 'progress notes', so that when any other healthcare professional arrives to check on the patient, they would be able to know where the patient is at this moment in terms of their discharge planning .If the patient does require placement or continuing care at home, the case manager studies the eligibility of the patient for placement and starts processing the application.

3.6 Bed Meetings and Planning for Patient Flow. Bed meetings are daily gatherings of representative nurses from all around the hospital and are conducted to share information regarding the status of their units. There, the Coordinator of Patient Flow meets with those charge nurses and announces:

(a) Bed occupancy percentage on that day.

(b) Openings for transfer of patients from the hospital to another acute care hospital in the region.

(c) Number of patients in the hospital awaiting transfer that are put on the waiting list of other hospitals in the region. The information that is given to the manager by the nurses includes given in succeeding sub-paras.

(d) Patients that are surely leaving that day at their unit.

(e) Patients that are possibly leaving that day at their unit.

(f) Patient transfers that are to be made that day from unit to unit.

(g) Patients that now require isolation due to infections they have caught (e.g. Vancomycin-Resistant Enterococcus (VRE), Methicillin-resistant Staphylococcus Aureus (MRSA), Clostridium Difficile (C-Diff)).

(h) Patient gender in all the points above

The numbers of predicted discharges that are brought to this meeting are translated into the number of admissions that can happen that day. Decisions are made to appropriately admit patients relative to certain criteria as being for a medical or surgical patient, a female or male, a patient that requires isolation or not, a patient that prefers a ward bed, a semi-private bed or a private bed. Since the hospital is operating at or above 80% capacity most of the time, the predictability of what is going to happen is essential. To add to the criticality of the situation, it is known that the demand for beds is large and rising, and those are the reasons that describe the importance of the status of every bed in the hospital. The Patient Flow Coordinator stated that the information in the bed meeting is used as a base for decisions to allow the operating rooms (OR) to go forward that day or refrain from conducting certain surgeries. If there is a large mismatch in predicted discharges then OR patients would have to stay in the post anaesthetic care unit (PACU) all night; which is not ideal for the patient's health. For medical units, majority of their admissions come from the emergency department (ED). As it is well known, ED patients in India are experiencing largely elevated wait times; which is a topic that appears in many research efforts. The case at this hospital is not different. Therefore, the predictability of discharges and improvements in the discharge process tends to affect inpatient units, and the ED as well; a department which is already struggling .

3.7 Catena of Activities after Discharge is Marked.   The   physician   **/**
consultant responsible for admission and discharge of patient from his opinion of
discharging the patient based upon the medical condition and medical parameters.
This decision is often taken during his morning rounds and at times during evening
rounds as well. The discharge may be pre-planned or impromptu. In most cases it
is pre-planned and through continuous observation of patient by nurses and
physicians. In some cases where wards of patient demand immediate transfer to
other hospital or leave against medical advice an impromptu discharge may be
ordered. BL Kapur being a hospital providing tertiary and high quality of care is
also suitably equipped and manned to provide tertiary care. Transfers to super
specialty facilities are very few but in very many cases patients are shifted to day
care or to facilities/clinic in vicinity of patient residence. A very small number of
patients obtaining treatment may not be able to respond to medical care and may
die. Whatever may be the reason of discharge of a patient; his dues related to
treatment are to be cleared. In case of patient availing insurance/health
schemes/corporate schemes, settlement of bill is continuously taken care as
contractual obligations. In case of patient who are in the category of ' cash paying'
a continuous financial advice is rendered by the department of front office and an
endeavour is made to settle maximum of bills within 24 cycle. A patient is marked
for discharge on hospital HMIS by consultant/physician which initiates chain of
activities as shown in Figure 4   . The ward nurse updates patients' record files
and same are send manually through a General Duty Person (GD) to billing office.
After the file reaches at billing office it is recorded and task distribution is done. In
practice a GD collects the discharge files from 4-5 wards and bring them together .
When a bundle of files reaches Billing Office it creates queuing at desks of Billing

Executives leading to delays. The bills are prepared by transporting information from the file of patient to HMIS, where it has been existing as such. On preparation of bills same are handed over to the relative of patient for clearance and in case of Third Party Agency to their agents (physically/on line). Case bills are settled by payment of liquid cash or electronic transfers and credit bills get settled as per contractual protocols. Very many times, relatives of cash paying patients in India tend to raise objections to bargain a concession on the final bill. This activity is not recorded but definitely contributes to delayed settlements and delayed departure of patients from hospital premises leading to disguised bed occupancy.
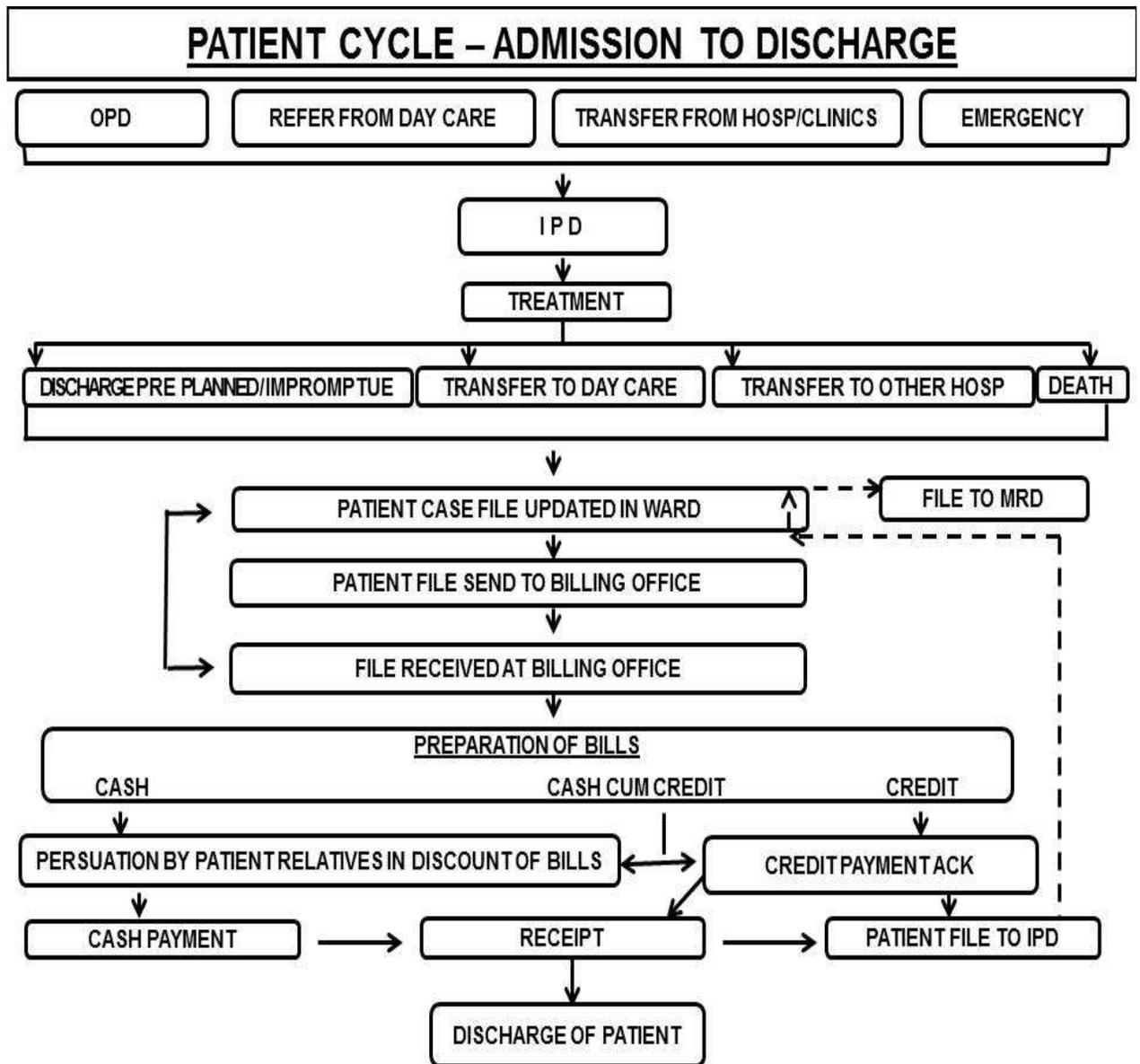
Figure 3.2 - Activities Post "Discharge Decision"

3.7.1. Activity Characteristics as Recognized by the Hospital. Once a patient is declared medically fit for being discharged, he/she will no longer be receiving 'acute care'. If for any reason, the patient does not leave the hospital after that, they will be given the status 'Alternative Level of Care (ALC)'. The number of days a patient stays in the hospital while he/she is not receiving acute care are also

named ALC days. If patient was initially reported as ALC, but left the same day, the patient will not be considered ALC. The length of stay for ALC cases cannot be captured unless it is equal to or greater than 1 day. The reason a patient might be holding the ALC status can be:

(a) Requiring other physical therapy.

(b) Requiring palliative care: meaning convalescence following; surgery, radiotherapy, chemotherapy, psychotherapy, treatment of fracture, combined treatment, other treatment, or unspecified treatment.

(c) Homelessness.

(d) Inadequate housing.

(e) Problems related to living in residential institution.

(f) Other problems related to housing and economic circumstances.

(g) Person living alone.

(h) Need for assistance at home and no other household member able to render care.

(j) Medical services not available in the home.

(k) Person awaiting admission to adequate facility elsewhere.

(l) Other waiting period for investigation and treatment.

(m) Unavailability and inaccessibility of health-care facilities.

(n) Unavailability and inaccessibility of other helping agencies.

(o) Holiday relief care.

(p) Other problems related to medical facilities and other healthcare.

(q) Health supervision and care of other healthy infant and child.

(r) Healthy person accompanying sick person.

(s) Other boarder in health-care facility .Examples of such reasons can be:

(t) No ambulance available to transport the patient back home, patient waits additional days.

(u) Patient waiting for availability in a long-term-care or a rehabilitation facility.

(v) Married couple admitted, one is finished with acute-care, but cannot go back home alone, waits ALC days till partner is also ready to be discharged.

CHAPTER- 4 COLLECTION OF DATA – METHODOLOGY, TOOLS

4.1 Data Collection.   In order to reach at the root of cause of queuing problem at billing office and to understand delays in billing process there was requirement of obtaining adequate data. There was observable and conspicuous increase in activity around 1200 hours and the intensity continued till almost 1700 hours . To confirm and to support this observation there was need for collecting unbiased authentic data free from individual biases. Since data was required to analyse the process, therefore it was most appropriate to obtain data that got generated in the process itself. Though entire data was available at billing office as part of HMIS however it was not generated at billing office . The generation of the data in the process required involvement of functionaries at respective wards (nurses and physicians), clerks and cashier at billing office and support of HMIS to record events on occurrence and register them at their designated destination. Initially the data was obtained only for month of Jan 2015 and on basis of preliminary analysis data for quarter ending Mar 2015 was obtained. The data has been collected from billing office, which is part of front office in   BL Kapur hospital Delhi. This data pertains to discharges that have taken place in quarter ending 31 Mar 2015. It depicts a current trend as available in the hospital is very relevant for   interventions in internal processes and protocols. The analysis of data, related inferences and recommendations may find their applicability in other corporate hospitals. The recommendations that may sprung from analysis of data of BL Kapur Hospital may not be sacrosanct yet possibility of their advantageous advantages gained cannot be wished away.   Entire   data   obtained   is   a

secondary data available on records and is related to factual events which are totally devoid of any biases of subjects, data collector or analyser.

The data collected has been generated in BL Kapur Hospital on occurrence of related events in chain of hospital discharge process starting at the time decision of discharging a patient has been taken and recorded against his name and identification and finally culminating at clearance of bill and disposal of patient as per discharge remarks. The original data contained u/m fields against each patient record:-

(a)   Registration No.

(b)   Encounter No.

(c)   Patient Name.

(d)   Sponsor Name.

(e)   Payment Type.

(f)   Marked For Discharge By(Consultant Dr).

(g)   Mark For Discharge Date.

(h)   Mark For Discharge Time.

(i)   Mark For Discharge Remarks.

 (j)   Send For Billing By(Ward Nurse).

(k)   Send For Billing Date.

(l)   Send For Billing Time.

(m)   Send For Billing Remark(Discharge/ Day care / death).

(n)   File Received By (In Billing Office).

(o)   File Received Date (at Billing Office) .

(p)   File Received Time.

(q)   Bill Ready By (Name of Person).

(r)   Bill Ready Date.

(s)   Bill Ready Time.

(t)   Send For TPA By(Name of Person).

(u)   Send For TPA date.

(v)   Send For TPA time.

(w)   Invoice Created By(Name of Person)..

(x)   Invoice Date.

(y)   Invoice Time.

4.2   Data Refining and Problem Identification

4.2.1 Data Refining.   The first and fore most step taken towards refining the data was removal of names of patients from the list to maintain confidentiality. This removal has affected over analysis in no way what so ever; in fact it has contributed to impartiality to some extent, however small it may be. The additional fields generated to calculation time differentials   The data was objectively corrected and refined. A very simple and rudimentary approach was adopted towards data refinement and correction. It was done in steps in tune with patient turn over cycle (Refer Figure 3.1) .The shape of consolidated data after removal of undesired fields   and used for analysis in SPSS Ver 16.0 is as under mentioned:-

(a)   Registration No.

(b)   Payment Type.

(c)   Mark For Discharge Date.

(d)   Mark For Discharge Time.

(e)   Mark For Discharge Remarks.

(f)   Send For Billing Date.

(g)   Send For Billing Time.

(h)   Send For Billing Remark(Discharge/ Day care / deadth).

(i)   File Received Date (at Billing Office) .

(j)   File Received Time.

(k)   Bill Ready Date.

(l)   Bill Ready Time.

(m)   Invoice Date.

(n)   Invoice Time.

(o)   Time Taken for Bill Preparation Cash.

(p)   Time Taken for Bill Preparation Credit.

(q)   Gap Between Bill Clearance and File Received.

(r)   Gap Between Bill Clearance and Mark for Discharge.

(s)   Gap between file marked for discharge and received at Billing Office.

4.2.2 Data Improvement .   As part of summer Training cum dissertation visits were made to different departments. During these visits it was observed in billing office that there were queues and commotion of activities ranging from relative of patient haggling over discounts to tracing a patient file not getting recovered readily. That was the starting point of observation and analysis that passed away for further probe and enquiry. The data of Jan 2015 was analysed using SPSS Version 16.0. On subjecting this data to compare means of paired

samples results as given in Table 3 were indicative of strong correlation and significance. The mean time when file of patient marked from discharge is 12.55 hours with stand and deviation of approximately 3 hrs. The mean time of patient file send for billing is 13.26 hours with standard deviation of approximately 3 hours (2hrs 55 min)

Table 4.1: Means of Timings of Discharge Decision and Receipt of file in Billing office (Jan 2015)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Dis_tm_mark	12:40:00.368	1305	02:44:46.203	00:04:33.668
	file_rcd_tm	13:35:36.874	1305	02:36:21.735	00:04:19.704

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Dis_tm_mark & file_rcd_tm	1305	.907	.000

4.2.3. Paired Sample Statistics.

Table 4.2: Means of Timings (Data of Jan – Feb 2015)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Mark for discharge time	12:55:09	2766	03:01:50.130	00:03:27.445
	Send For Billing Time	13:26:23	2766	02:55:25.200	00:03:20.126
Pair 2	Send For Billing Time	13:19:24	2548	02:52:52.520	00:03:25.487
	File Received Time	13:40:31	2548	02:49:26.883	00:03:21.413
Pair 3	File Received Time	13:40:31	2548	02:49:26.883	00:03:21.413
	Gap Between Bill Clearance and File Received	00:00:11	2548	00:01:21.798	00:00:01.620

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Mark for discharge time & Send For Billing Time	2766	.954	.000
Pair 2	Send For Billing Time & File Received Time	2548	.989	.000

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Mark for discharge time	12:55:09	2766	03:01:50.130	00:03:27.445
	Send For Billing Time	13:26:23	2766	02:55:25.200	00:03:20.126
Pair 2	Send For Billing Time	13:19:24	2548	02:52:52.520	00:03:25.487
	File Received Time	13:40:31	2548	02:49:26.883	00:03:21.413
Pair 3	File Received Time	13:40:31	2548	02:49:26.883	00:03:21.413
Pair 3	File Received Time & Gap Between Bill Clearance and File Received		2548	.000	.997

Table No 4.2   is indicative of strong correlation (correlation of 0.954 between the time file is marked for discharge and the time it is send for discharge. The evidence of delayed decision in discharging the patient is cogent and strong and so is the delay in transit of files from wards to Billing Office. Mean delay calculation from aforesaid means is approximately half an hour (13.26 – 12.55). On comparison of results against Pair 2 , on an average 20 minutes are spent in file movement from ward to billing office.   The billing cycle in hospital is starting and ending at 1200hrs during noon has its implications on availability of beds and patients turn over. Various studies have shown that ideally discharge decisions must get finalised by 1100 AM and billing/clearance should be completed within 30 min; so that patient gets out of ward by 1130 AM thereby

allowing hospital staff to prepare the bed to receive a new patient. However in India average time taken between the decision to discharge the patient and his bill clearance taken approximately two and half hours.[48]. After this problem has been identified, deeper analysis was conducted to see whether there was a difference in the level of accuracy of information coming from month to month accordingly data for entire quarter was obtained and analysed.

4.2.4 Software for analysis.   SPSS Ver 16.0 and MS Excel (2007) have been used for analysis.

4.3   Analysis Of Data

4.3.1 Marking Patient For Discharge.   In the discharge process the first and fore most event that kick starts other subsequent activities is marking the decision of discharging the patient in HMIS of the hospital. There was no requirement of collection or refinement of this data and it was analyzed with SPSS Ver 16.0.The histogram generated depicts No of Cases (frequencies) on y – axis and timings of day (on 24 hourly cycle) on X-axis.
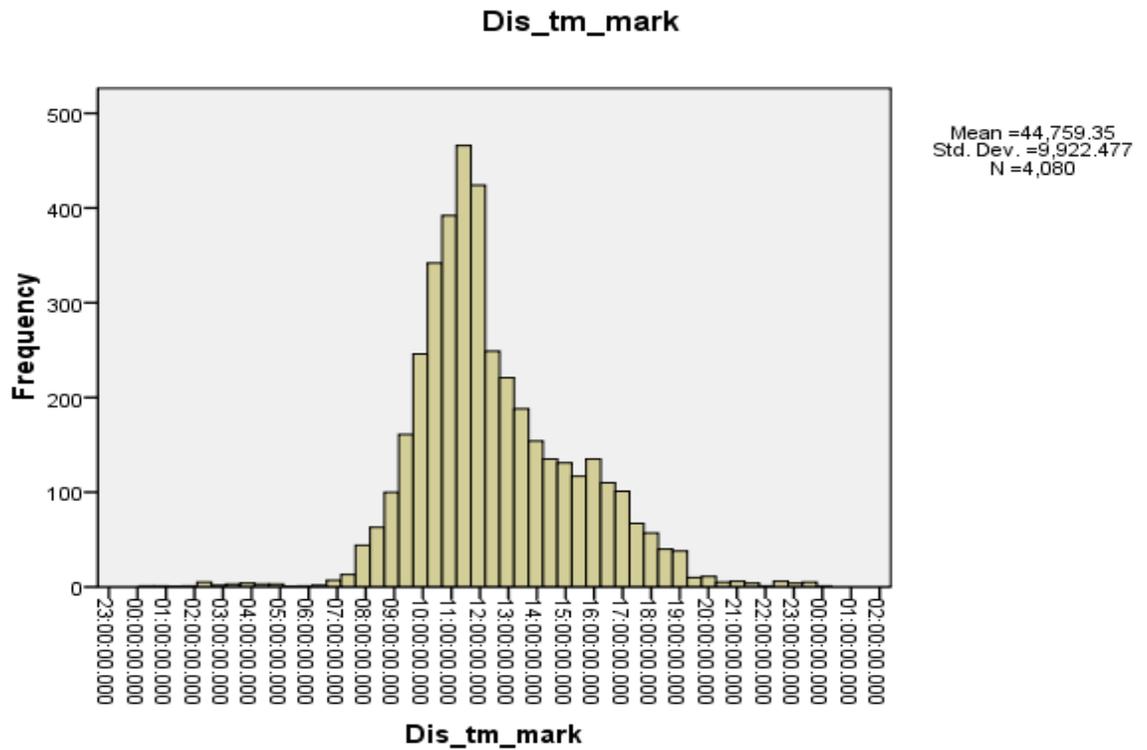
Figure 4.1 : Timings of Patient Marked For Discharge in Ward

The above histogram depicts frequency of discharges marketed in patient file as per timings of the day. As can be seen that negligible discharge decisions on taken between 1930h to 0730h. Majority of discharge decision are taken from 0900h to 1700h (over 100) and peak time for this decision window is from 1000h to 1200h. Mean time of decision recorded / marked for discharge in HMIS is 1255h

Inference   The window of discharge decision lends itself to patients remaining in occupation of beds beyond 1200hrs of the day. This results in avoidable bed occupancy and commitment of hospital resources which are much to the disliking of patient relatives as well as to hospital management, alike.

4.3.2 Receipts Of File At Billing Office.   The time as recorded against each patient was taken and it was made to undergo two processes of analysis. One to generate a pattern of receipts of patient files marked for discharge in relation to the timings of the day. The second was to observe time differential or time lag between the time a patient was marked for discharge and his file was received in the billing office. SPSS 16.0 and   M S excel software has been used to generate histograms, calculate time differentials in aforesaid events and to draw out average lag time between decision taken to discharge and initiation of discharge process   after   receipt   of   file   at   billing   office.
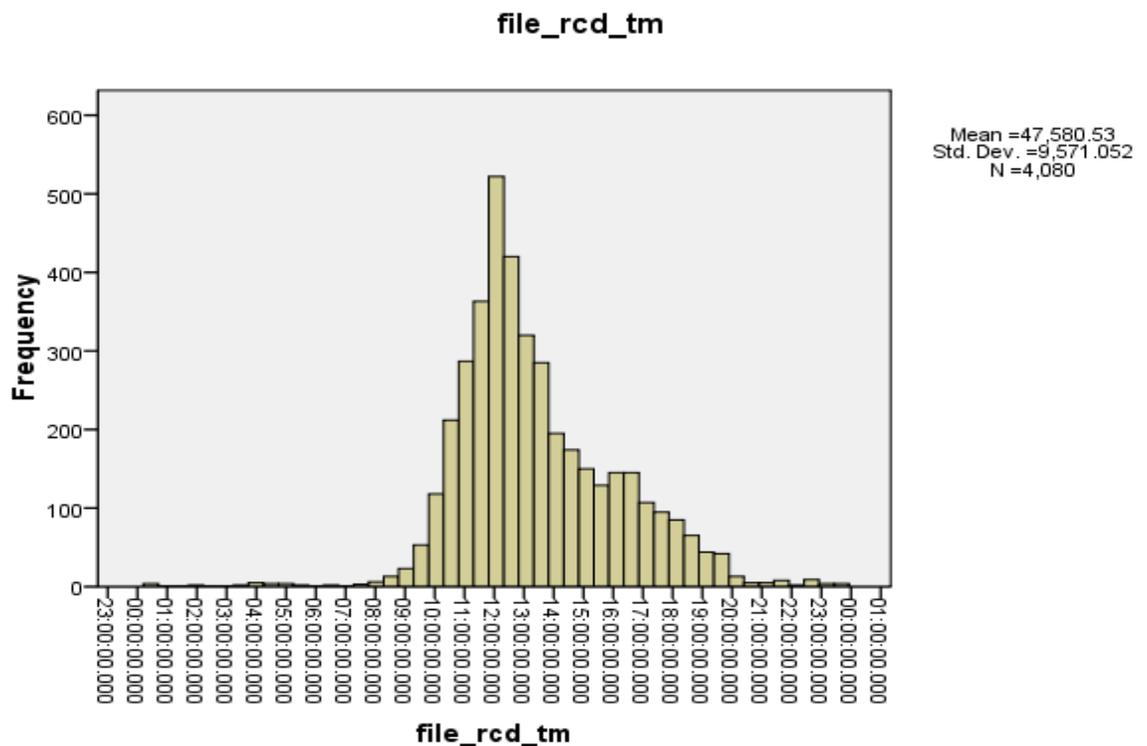

Figure 4.2 :Timings of receipt of Patient Files in Billing Office

The above histogram bars depict frequency of files received in Billing office during different ours of the day . These files are received after their dispatch from different IPD wards subsequent to patients marked for discharge. The receipts are negligible from 2000h to 0800h and there are significant No of files (>100 received from 1000h to 1730h). The peak times in which over 300 files are received is from 1130h to 1330h. The mean time of receipt of files at Billing Office is 1340h.

Inference   In reference to fig 2.1 there is an apparent time lag of 45 minutes between decision taken to discharge a patient and receipt of file in billing office. This delay can be well managed and reduced to nil by correct application of Hospital Management Information System (HMIS).

4.3.3 Time Taken For Preparation Of Bills The data as it was recorded with hospital was taken ipso facto and no alternation was made. It was analyzed to observe the work load on Billing office as per timings of day and the frequency of bills generated in hourly slots. Use of SPSS 16.0 and MS Excel was made to generate histograms and bar charts. While analyzing this data need was felt to segregate cash paying and credit paying patients. Accordingly filtering was resorted to refine this data by way of sorting it using filter in MS Excel. There were cases that were marked both for cash and credit in accordance with their respective health insurance policies and same were counted towards both i.e. cash as well as credit. There was no feasibility of separating them by creating fiction. The data as applicable to recorded facts was taken and sorted for intended analysis.
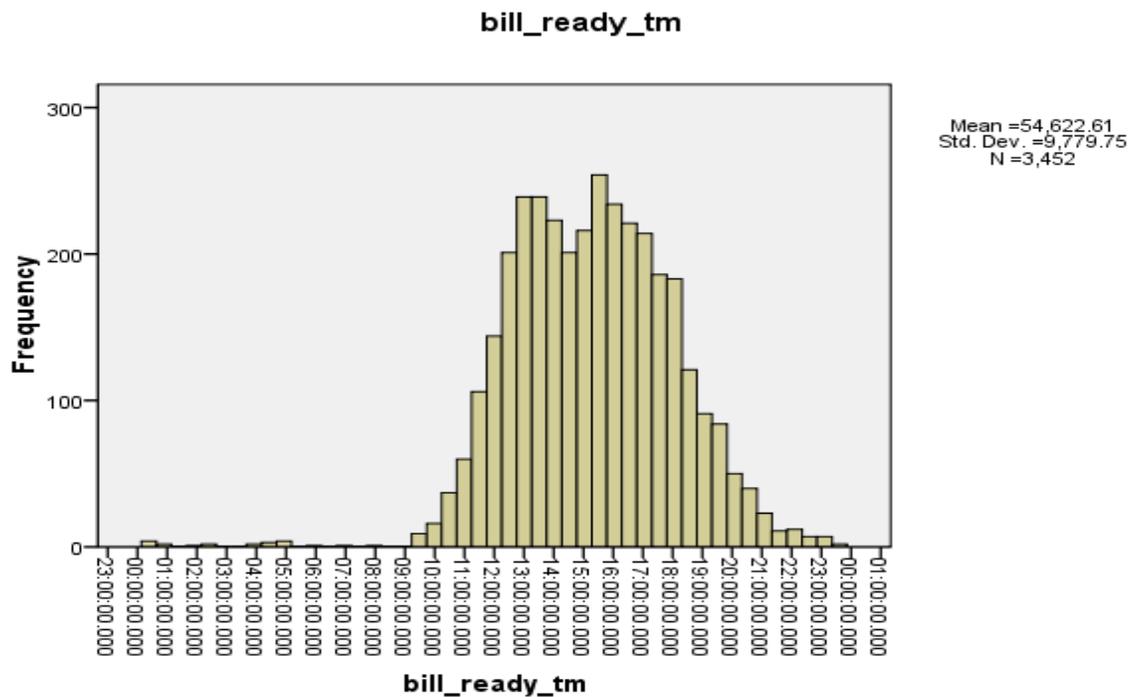
Figure 4.3 : Timings of Making Bills Ready for Delivery at Billing Office

In this figure frequency of preparation of bills in billing office is negligible between 0900 hours to 2330 hours However there is significant increase (>100) between 1100 hours to 1930 hours. Peak activity (>200) in bill preparation is from 1200h to 1730 hours. Mean time by which bills are ready at Billing Office is 1534h.

Inference. The timings of significant activity in billing office are from 1100 hours to 1930 hours and the peak activity timings are from 1200 hours to 1730 hours . This has implications related to commitment of resources of manpower and automation. Max No of bills get prepared after 1200 hours and the process is contributing to delayed discharges, requiring urgent intervention to save precious hospital resources translating in costs incurred by patient and the hospital.

gap_bill_mark

Mean =98,497.44
Std. Dev. =12,663.429
N =4,080
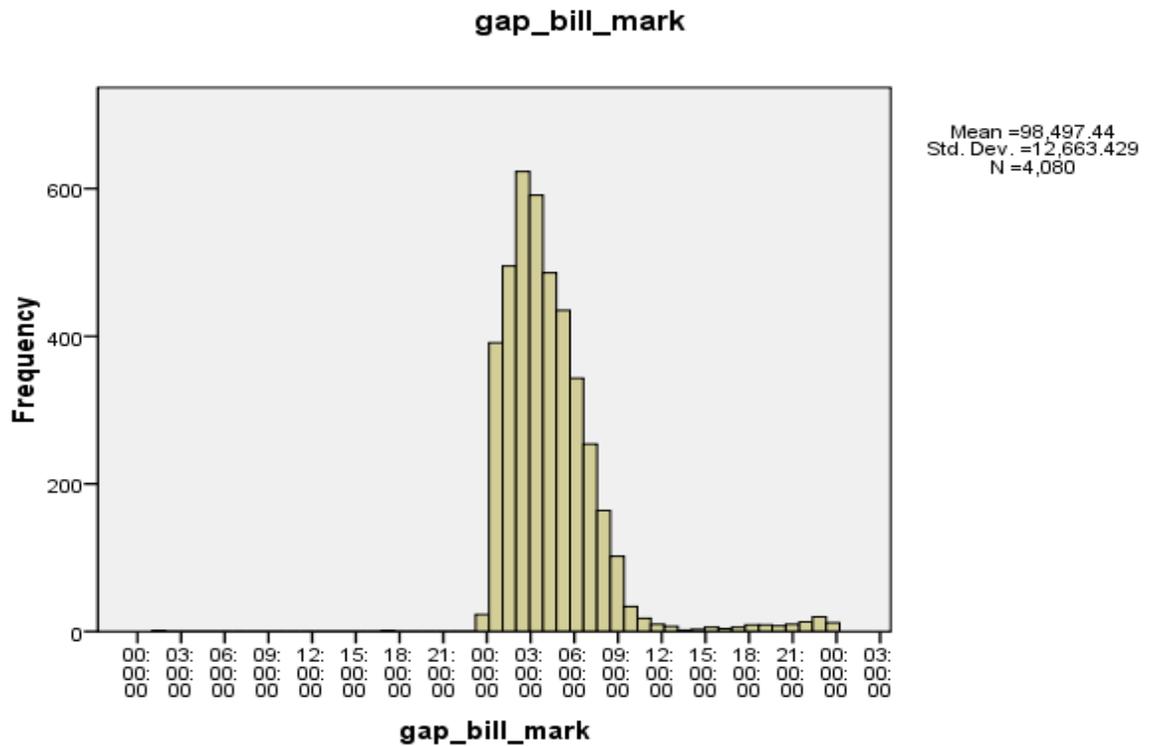
Figure 4.4   Time difference between Patient marked for Discharge and

Preparation of Bill

Total mean time taken for preparation of bills after discharge is marked is almost 3 hours (1240h to 1534h).

Inference   The acceptable delay in discharge being 03hrs much acceded by the time bills are prepaid for patients marked for discharge. To discharge patients by 1200 hrs there is a need to review entire discharge process holistically.

4.3.4   Time Taken to Prepare Bills for Cash and for Credit   There   were patients that were marked for cash or credit or both under their billing remarks. For eg a patient marked for cash only had a blank space under credit column. This

required filtering and using MS Excel cases of cash bills and cash/credit bills were filtered to obtain un ambiguous number so that correct averages are obtained. Similarly credit and credit cum cash cleaning cases were sorted out separately. This helped in analyzing average time taken in preparation of cash bills and credit bills.

4.3.5 Time Taken for Preparation of Cash Bill

The data analysis shows that more than 1/3 of total cash bills are prepaid within 45 minutes of receipt of file. Over 100 cases get cleared within 05 hours. There are less than 50 cases which get prepared in almost 09hrs.
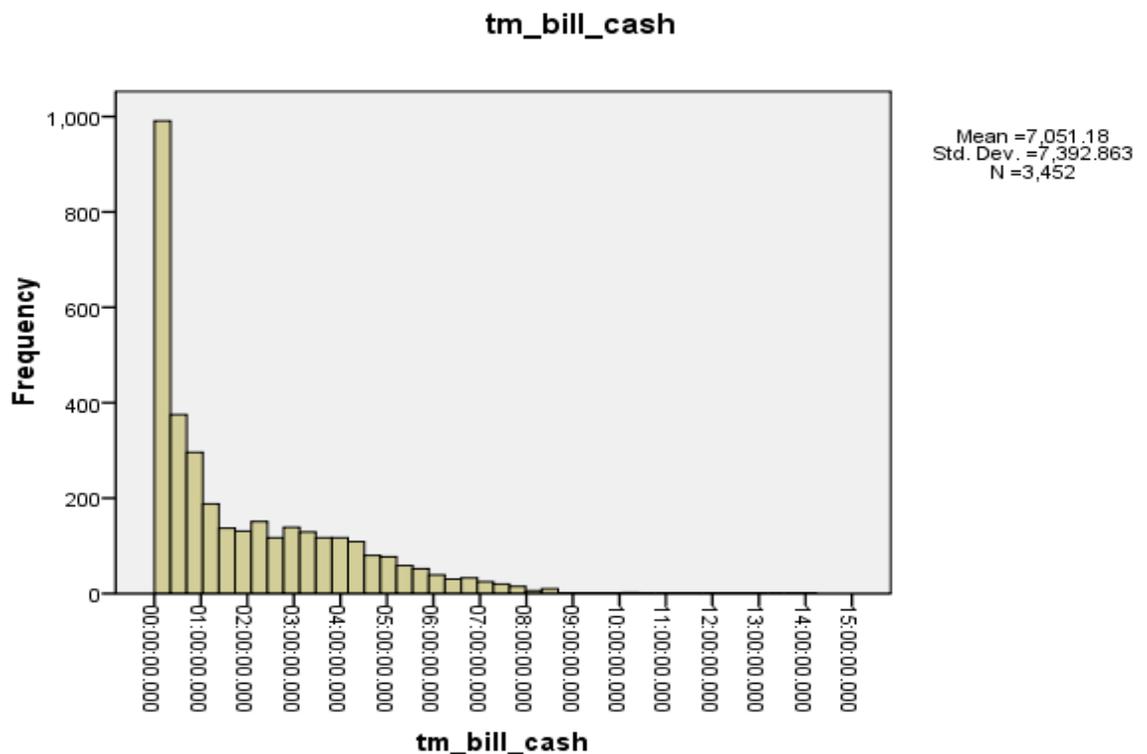

Figure 4.5 : Time Taken for Preparation of Cash Bill

Inference   It is a case for introspection for such a agmficant time being devoted to preparation/finalization of case bills. These are cases where bill are overlapping cash and credit clearance.

4.3.6 Time Taken for Preparation of Credit Bill

 More than half of bills get prepared within 30 minutes of receipt of files marked for discharge. In over 100 cases files get cleared with final bills in 2 hours 30 minutes

tm_bill_credit
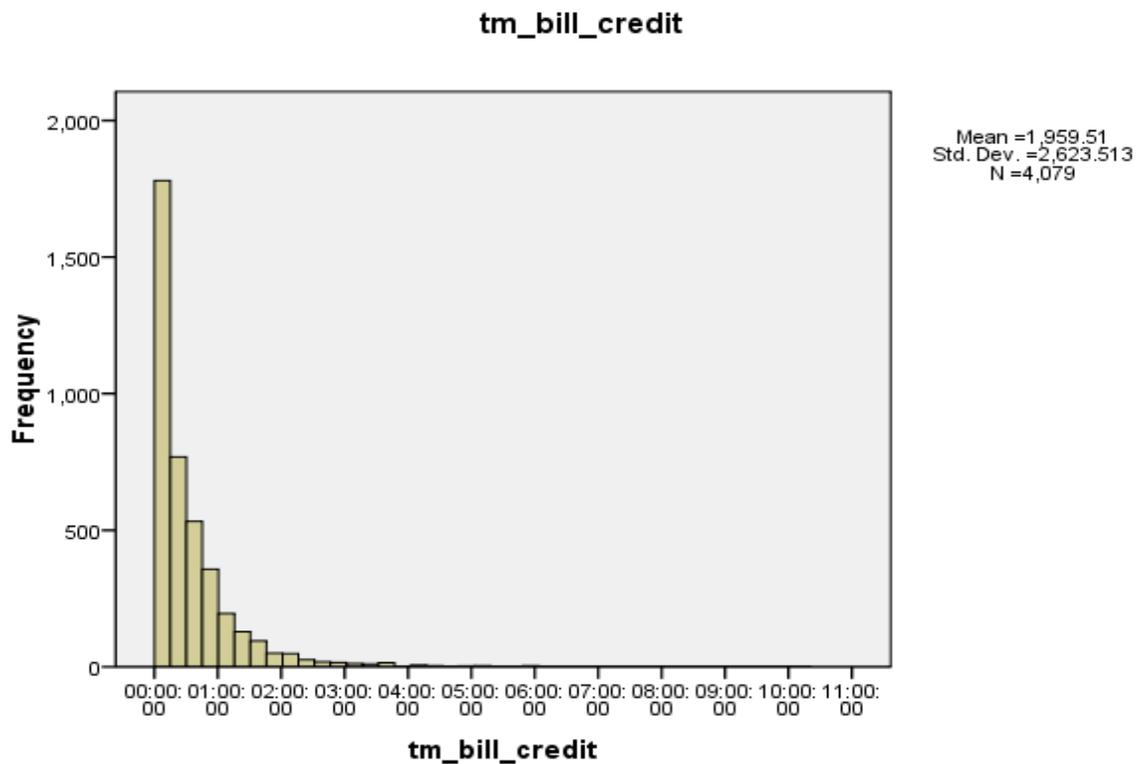
Figure 4.6 : Time Taken for Preparation of Credit Bill

Inference. There is scope for reducing this time in preparation of bills. However in comparison to Figure 9 billing in credit is surprisingly faster than cash bills.

4.3.7 Time Taken for Move of File and Preparation of Cash / Credit Bill

(a) Receipt of file. There is average delay of over 45 minutes receipt of file in billing office after decision of discharge has been taken by consultant.

(b) Cash bills. The average time taken at billing office in preparation of cash paying bills is almost 2 hours (1:55) . This is in addition to time spent in receipt of file stated afore.

(c) Credit Bills. Average time taken in preparation of Credit Bills is more than an hour (1:15).

Inference. In an automated environment bars of histogram in figures 4.5 &4.6 can be made to vanish or reduced significantly to less than15 minutes

4.3.8 Timings for Clearance Of Bills This data was obtained as was recorded. It was recorded in real time of 24 hourly cycle. This data was analyzed without any refining process on SPSS and during the analysis need was felt to draw out time taken for entire discharge process i.e. time when case marked for discharge and time when bill is cleared. This differential of time generated another field which helped in analyzing average time taken in clearance of cash and credit bills. Tools used for analysis are SPSS 16.0 and MS Excel.
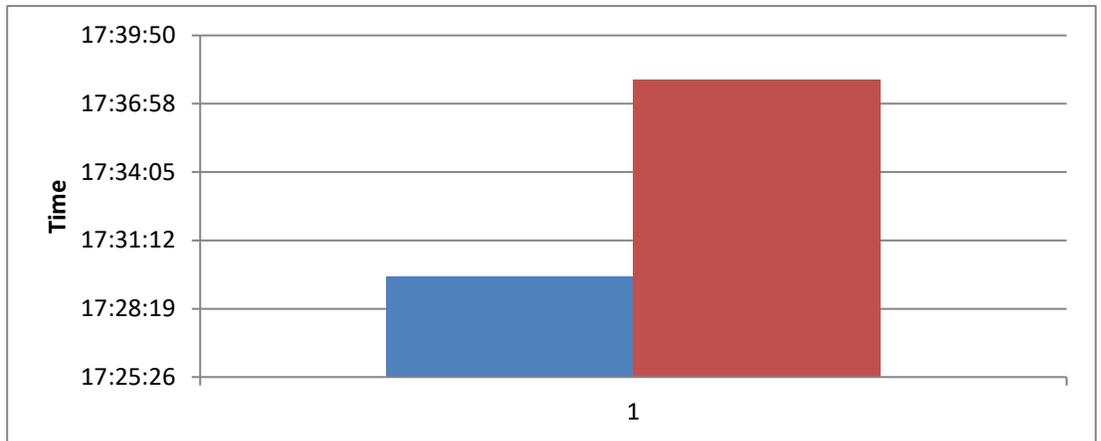
Figure 4.7 : Average Timings of Bill Clearances and Entire Discharge

Process (Credit / Cash)

This fig depicts average times taken for entire discharge process up to settlement of bills . By mean time of 17 : 30 (refer bar on left) all dues related to a patient are cleared where payment are made by credit and for cash payments this time is even greater by almost 10 minutes (right bar).

CHAPTER 5 : CONCLUSION AND RECOMMENDATIONS

5.1   Interpretation and Recommendations.   The results obtained

through analysis of data have been simple to understand and clear enough to

draw out relevant inferences. In consideration of the limited duration of summer

training and scope of dissertation no complex/advance analysis have been made

which otherwise would have been possible.   The possibility of synthesis of data

to draw out more and varied inferences is not ruled out. What has been attempted

to answer through this analysis is nothing more and nothing less than finding

scope for improvement in discharge process which may result is better efficiency

of hospital.

**5.2.1. Discharge Decision.**
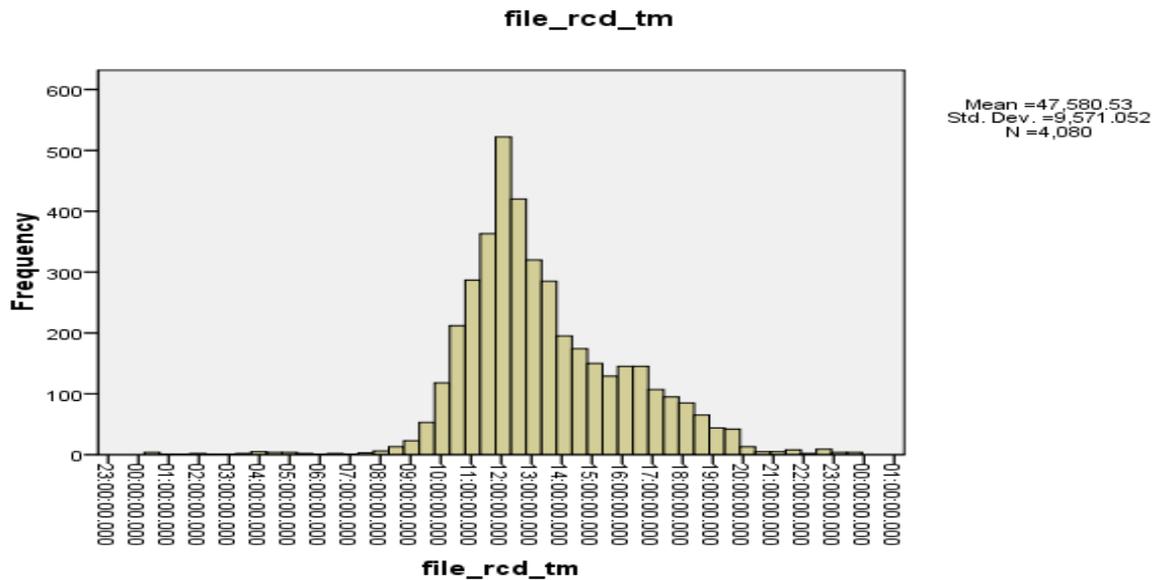
Figure 5.1 : Timings of Patient Marked For Discharge in Ward

A very small No of discharge decisions are taken in non-working hours of the day. There are very few decisions taken to discharge patients in window of 1930 hours to 0730 hours. Because maximum decisions of discharge are taken in period of 1000hrs to 1200 hours   the discharge process inevitably spreads to billing cycle of next day. This leads us to draw two inference for hospital one is to preponing decision making of discharging a patient and other is to postpone timings of billing cycle from already existing time of 1200 hours to altered time of 1500 hours . This change of time will have its impact on other functions of the hospital therefore a balanced decision need to be arrived at with diligence and deliberation.

5.2.2 Propone   Decision Making. This can be achieved through selective delegation   of decision making authority by involvement of subordinate doctors and nursing staff. It is suggested that prelim recommendations on discharge of a patient can be made by nursing staff attending the patient and same may be concurred / averred by resident doctors. The consultant/physician treating the patient may be posted of such recommendations that may help him in early decision making even w/o seeing the patient. The discharge process can be halted if consultant opines further stay. Ideally discharge decisions must be finalized prior to 1100AM for all patients requiring discharge on that given date. Another metric that can be used by the hospital in order to predict discharges and plan for admissions is called the Expected Length of Stay (ELOS).(This metric corresponds to the number of days the patient is expected to stay at the hospital. Such a metric has been developed by the Canadian Institute of Health Information

(CIHI) where the number is generated by comparing patient characteristics with a database prepared. All hospitals in Canada send data to CIHI who later classify patients based on diagnosis, co-morbid conditions, interventions and age groups. According to this information CIHI provides hospitals with Case Mix Groups (CMGs) and expected lengths of stay. Based on a coding process of patient characteristics and their corresponding CMG, the ELOS is derived). If the hospital has determined ELOS for each patient, they would be able to predict when this patient is supposed to leave; hence, when another patient can be admitted in their place.

5.2.3 Reduce Delay In Communication. During the round of consultant in ward decision to discharge a patient are made by assessing physiological condition but same not recorded/communicated on HMIS to others in real or near real time. This avoidable delay can be reduced by making use of Wi-Fi devices

**5.2.4. Delays in physical Movements of Patient File**
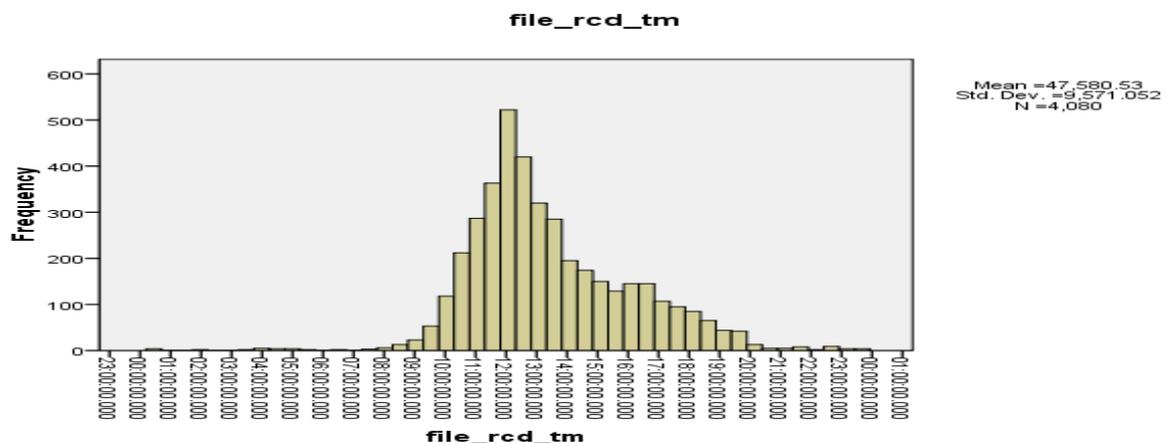
Figure 5.2 :Timings of receipt of Patient Files in   Billing Office.

There is considerable time lag of 45 minutes between decision taken to discharge a patient and receipt of his case file at billing office. Once decision has been marked on system (HMIS) the requirement of sending file to billing office is purely a wasteful activity which not only consumes precious time but also fritters away valuable resources of hospital. On an average there is a delay of more than 45 minutes in initiation of billing process after discharge decision is marked / recorded. To reduce this time relevant information be shared with billing office on HMIS. Physical movement of file is fraught with risks of its misplacement and it falling into hands of unauthorized person. (in Some cases , the patient file had over writings related to treatment administered to patients. Such files were within easy accessibility of relatives of patient approaching to avail concession of . Photographs taken of such over writings have great potential of causing insurmountable embarrassment to hospital by inviting legal suits of negligence against the hospital or its employees). Such unauthorized access to patients record can not only erode the well established brand image but also create wasteful activity for the hospital. There is one more issue that need consideration by management of hospital and that is review of staffing pattern in shifts in accordance to work load(as per timings of day and receipt of files/decision to discharge document).

5.2.5. Delays in processing of Bills
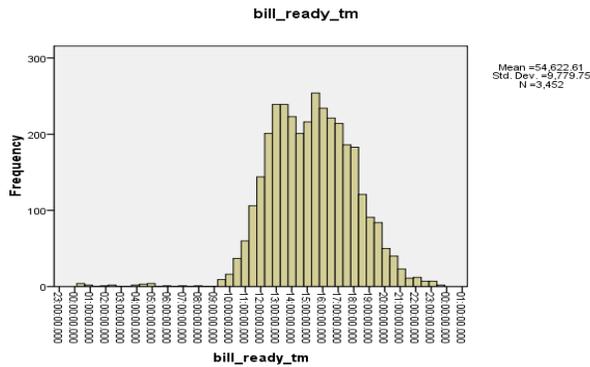
Figure 5.3 : Timings of Making Bills Ready for Delivery at Billing office
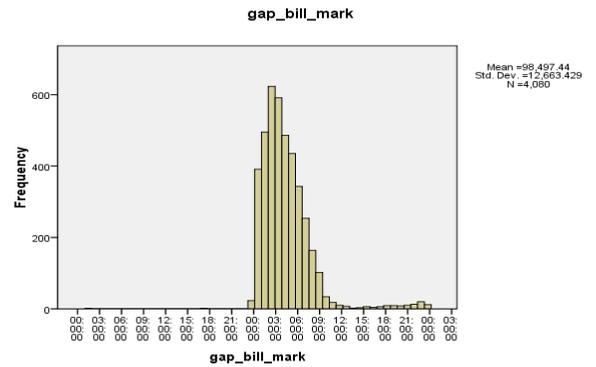

Figure 5.4 : Time difference between Patient marked for Discharge and Preparation of Bill.

There are avoidable delays in processing and preparation of cash as well as credit bills. Considering average delay in receipt of files at billing office to be 45 minutes it takes more than an hour for a credits bill to be prepaid. In case of cash bills it takes even more up to (average) 1 hours 55 minutes. Ideally these timings can be reduced to 15 to 30 minutes by correct application of software and refining of discharge process and protocols.

5.2.6 Clientele   Categorization
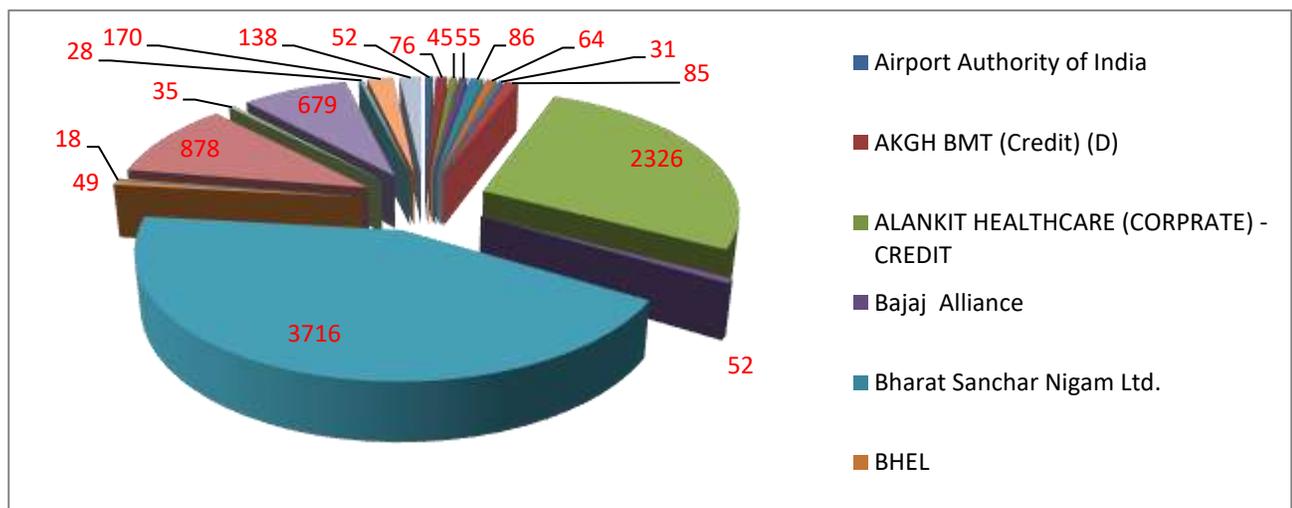
Figure 5.5 : Categories of Patients Admitted

It depicts share of clientele proportion getting admitted/discharged from the hospital. Major proportion is taken by departments/organization of government (incl CGHS) followed by cash patients. The data can be sorted and filtered as per requirements and can help draw marketing strategy or correction validation of same.

5.4.   Death Rate

PATIENT DISPOSAL IN %

- SYMBOLS
- DEATH
- DISCHARGE,BILL
- DAY CARE

6.30
2.03
10.46
81.21
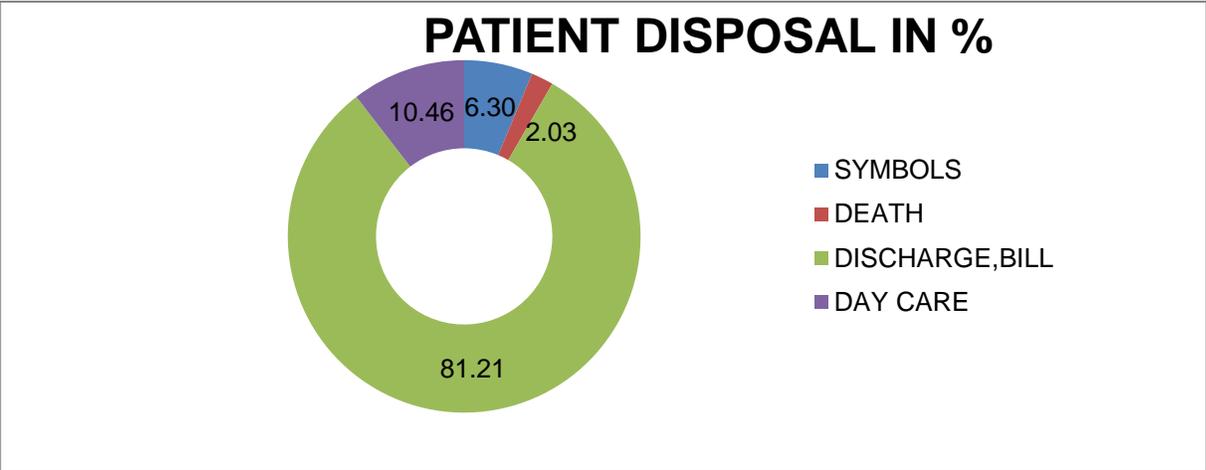
Figure 5.9 : Disposal Of Patients as per Billing Remarks

It shows discharge remarks against patients. There is 2% death rate in hospital providing tertiary care and same is in consonance with statistics in developed countries as well.

5.3   Summary of Recommendations.   The recommendations are based purely on analysis of data and supplemented with personal observation. These are

intended to bring greater efficiency in management functions and likely to translate in to better consumer satisfaction.

5.3.1 Prepone Discharge Decision. A preliminary discharge decision by doctors subordinate to treating physician may be taken to initiate billing process. Involvement of nurses will help in better decision process.

5.3.2 Physical Movement of Patient Records. These be replaced by sharing information on HMIS which will be near real time and translate into net saving of 40 minutes as also in elimination of duplicate of work and resources committed in physical handling of patient files.

5.3.3 Improvement In Communication Of Discharge Decision. This can be made near real time by imaginative use of technology available in the hospital. Wi-Fi enabled data devices may be used to record and communicate discharge decision as it is made.

5.3.4 Review Staffing Pattern In Billing Office. This can be made commensurate to work load and will be more productive.

5.3.5 Bill Preparation. The preparation time can be reduced to below 15 minutes by exploiting software of HMIS.

5.3.6 Marketing Strategy. By analysis of quarterly data of Government / corporate/TPA patients, marketing strategy can be reviewed or validated.

5.4   Conclusion

In the present competitive world, quality of health care is playing an important role in the modern society. Among various factors affecting the health care system, discharge process is one of the important factors related to patient satisfaction. It is the process that occurs when the patient leaves the facility. It implies that the patient has previously been admitted to the facility. As the final step in the hospital experience, the discharge process is likely to be well remembered by the patient. Even if everything else went satisfactorily, a slow, frustrating discharge process can result in low patient satisfaction. It is an important area which touches the patients' emotion; influence the image of the hospital and patient satisfaction. Therefore, the demand for effective health services is ever increasing. Soon after completion of treatment, the patient as well as his or her escorts expects to be relieved off immediately. The delay in discharge process leads to dissatisfaction and affects the image of the hospital. Discharge planning is essential to the concurrent patient care review system conducted as part of the hospital's utilization

management effort. If discharge planning is delayed, patient's stay can be unnecessarily extended. Discharge planning is centralized, coordinated effort, to ensure that each patient has a planned program for needed continuing care and follow ups. When it comes to the discharge subject, it's the moment where the patient pays for the services enjoyed in the hospital and the management receives for the same. Billing, plays a vital role in the discharge process, which involves much of clerical work to be done in the billing office and demands time. But for the satisfaction of the patient, minimizing the time consumption in billing is again an

important factor. Billing and discharge process documents are vital for any hospital. Its importance encompasses the Clinical aspect, Financial aspect, Scientific database for research purpose, Administration both retrospective and prospective, help to improve the functioning of the hospital as well as to make many administrative decisions and these documents are also legally important. Therefore this time management study on discharge and billing process is undertaken with the aim of giving better services for the patient satisfaction within the minimum time. This can be done only with the help of thorough study of time taken for the whole discharge process beginning from Discharge decision time till the patient leaves the Hospital. May all the patients leave the hospitals with gratitude not to only the physicians and nurses treating them but also to all the employees that helped in replacing the venom of pain and suffering with which they got admitted by the elixir of vigour and enthusiasm.

"Sarve bhavantu sukhineh;

sarve santu niramaya.

Sarve bhadrani pashyantu;

ma kashchid dukh bhag bhavet."

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