



Patient Process Mapping at the Emergency Department in Humber River Hospital: A Case report

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Abstract

Introduction: Benchmarking, a powerful management approach for implementing excellent practices at the best cost and quality, is a recent concept in the healthcare system. The ultimate goal of this research project was to describe and map patient care-flow process at the Emergency Department (ED) in the Humber River Hospital (HRH) as a benchmark and the first full digital hospital in Canada. The motivation of the researcher to select the ED as a research territory was the existence of a massive model and benchmark ED with four zones.

Methods: This study was a cross-sectional, case report study. The population under the study was the staff who worked in the ED and were willing to participate in the research study. Informed written consent was obtained from the participants in the study. Several interviews were done to approve the validity of the questions with care providers that were co-investigators. Then, Staff in the ED were interviewed to get an understanding of the terminology and classifications used in the ED.

Results: The hospital was designed and built on three core principles; Lean, Green and Digital. It uses the best possible technology to support hospital delivery, such as dynamic and smart glass, Ascom phone (connects to Humber Information System and Electronic Medical Record), smart bed technology; robotic technology for certain surgical procedures; automated laboratory processing; automated guided vehicles that deliver medical supplies; and bedside computer screens that allow the patients to control their environments.

Conclusion: It is suggested that the following aspects be applied to design and provide high quality and fast services in the emergency department of hospitals: a) Extensive and separate emergencies for patients based on their type of triage, b) Novel technologies with environmentally friendly orient.

Keywords: Emergency Department, Information Technology, Care flow, Map.

Article History:

Received: 06 October 2020

Accepted: 14 December 2020

Please cite this paper as:

Ajami S. Patient Process Mapping at the Emergency Department in Humber River Hospital: A Case report . J Health Man & Info. 2020; 7(4): 259-265.

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Introduction

Benchmarking, a powerful management approach for implementing excellent practices at the best cost and quality, is a recent concept in the healthcare system (1). In the world of competition, none of organizations has enough time to experience everything using its own test and error methods. Therefore, they should use the best methods to optimize their processes by observing and reviewing the successful practices experienced by others. Benchmarking is one of the most effective ways to continuously improve the processes of the organization.

Benchmarking should not just involve comparing your hospital with national averages; it should involve looking at best in class hospitals and finding out what they make (2).

Schull et al. noted that one policy approach, which

has been undertaken in several countries and several Canadian provinces, is to establish benchmarks for the maximum ED length of stay (LOS), commonly known as ED LOS benchmarks. Recently, the Canadian Association of Emergency Physicians released a position statement recommending national benchmarks for ED performance with respect to ED LOS (3).

Thus, Adler-Milstein et al. aimed to develop benchmark measures of health information and communication technology (ICT) use to facilitate cross-country comparisons and learning. They concluded that many countries are working to implement ICTs to improve healthcare system performance. Although many countries are looking at others as potential models, the lack of consistent terminology and approach has made cross-national comparisons and learning difficult (4).

Hospitals across the nation compete in a number of ways, including the quality of care and pricing, and many use benchmarking to determine the top priorities for improvement. The continuous benchmarking process allows the hospital executives to see how their organizations stack up against regional competitors as well as national leaders.

The ultimate goal of this research project was first to describe the newest technology applied in the Humber River Hospital (HRH) as a benchmark, and second, to map the patient process throughout the ED.

The Research Method

This is a cross-sectional, case report study in which data were collected through a review of documents, observation, and interviews. The HRH is Ontario's first digital hospital, one that is a technological and environmental showcase. The motivation of the researcher to select the ED as a research territory was the existence of a massive, standard, and benchmark ED with four zones. The ED of this hospital was selected for sampling to describe the ED. The researcher obtained permission from the Hospital administrators through Research Ethics Board (REB). Then, HRH "REB application form", "protocol", and "REB consent form" were filled out and sent to the REB office for evaluation. Researchers were invited and interviewed in the REB meeting for extra information. After modification of the application form, the protocol, consent form, and the research project were approved. The population under the study was the staff who worked in the ED and were willing to participate in the research study. Informed written consent was obtained from participants in the study. Several interviews were done to approve the validity of the questions with care providers that were co-investigators. Then, the staff in the ED were interviewed to get an understanding of the terminology and classifications used in the ED.

The Result

The HRH opened on October 18, 2015. Patient satisfaction is the most important goal for their organization, and measuring how well they do in that effort is the key benchmark for their hospital performance. The hospital currently operates with a total of 656 beds, 14 floors, 9 inpatient units (8 clinics), Medical Laboratory, Medical imaging, Surgical pre-screening, Way finding Kiosk, Integrated Bedside Terminal (IBT), 3,300 staff, approximately 700 physicians, and more than 400 volunteers. 80% of the inpatient rooms are single inpatient room. All care providers are equipped with an Ascom phone (Figure 1)

connected to Meditech (Hospital Information System) and Electronic Medical Record (EMR). Every bed has integrated bedside terminal (IBT) which allows the patient access the TV, Internet, Telephone, EMR, and controls heat and light inside the room. In addition, all window glass is intelligent electro-chromic glass that reduces heat and glare, brings in more natural daylight and opens up the view.

By using smart glass, the Humber River Hospital can help the patients heal more quickly while delivering energy savings to the hospital. It is affiliated with the University of Toronto and Queen's University and is the home of Ontario's first Centre of Excellence for laparoscopic Bariatric surgery, Canada's first home nocturnal dialysis program and a major cancer program. The hospital features everything from automated kiosks, where patients can enter their information, into robotic arms that administer medication. The facility also uses a digital management system that counts, organizes, and checks the expiration dates of all the drugs at the hospital to make sure the patients are not getting the wrong treatment.

The ED is open 24 hours a day, seven days (24/7) a week to provide care to all individuals with illnesses ranging from minor to major. The ED is staffed by physicians, nurses, and other allied team professionals such as social workers, physiotherapists, and pharmacists.

HRH is also a partner in the Code Stroke Care Program. The hospital provides rapid assessment, and transport if needed to Toronto Western Hospital



Figure 1: Ascom phone

Table 1: Distribution of patients into different zones according to their triage levels

Canadian Triage and Acuity Scale (CTAS) in HRH			
Level	Description	Waiting time	Should be visited by providers in zones
1	Resuscitation	0 minutes	Should visit in the Acute-zone
2	Emergency	15 minutes	Should visit in all of zones area, according to severe illness
3	Urgent	30 minutes	Should visit in Sub-acute or Ozone
4	Less Urgent	60 minutes	Should visit in Fast tract zone
5	Non Urgent	120 minutes	Should visit in O-Zone

for specialized treatment. There are 5 levels of triage apply in the ED apply to patients (Table 1).

Each patient undergoes a brief assessment/triaged by a Registered Nurse that determines which patient needs to be seen first. Patients with very serious conditions are seen by the doctor immediately. The sickest patients are treated first. Once triaged, the patient is sent to the appropriate zone within the ED. Humber's Emergency Department (HRD) has four zones; Ozone, Fast Track (FT), Sub Acute (SA), and Acute (Figure 2). After triage, the patient is registered. The patient is asked for his/her health card and to provide/confirm his/her personal information. This information is needed to start their medical record. Registration is done in three places: the main registration desk, in the entrance of EMS corridor, and at the bedside of critical patients by a registration clerk. Fast track-zone (FTZ) registration is done inside the FTZ (Figures 3.1 and 3.2). For Ozone and Sub-acute zone areas, the registration is done at the main registration desk on the north side of the ED. For acute zone area, the registration is done in the registration area that is located at the entrance of the EMS corridor (East site of HRH). If the patient is severely ill or injured (the patients with level 1), the registration clerk comes to the patient bedside and registers him/her in the acute zone. These are dedicated patient care 'zones' with specialized health care teams for critically ill patients, children, cardiac patients, people with mental health issues, and those with non-life threatening illnesses. This helps to speed up the assessment, diagnosis and treatment process for everyone.

Patient waits depend on the patient's severity of the presenting complaint and the number of other people being treated at the time. In addition, the amount of time spent in the ED depends on:

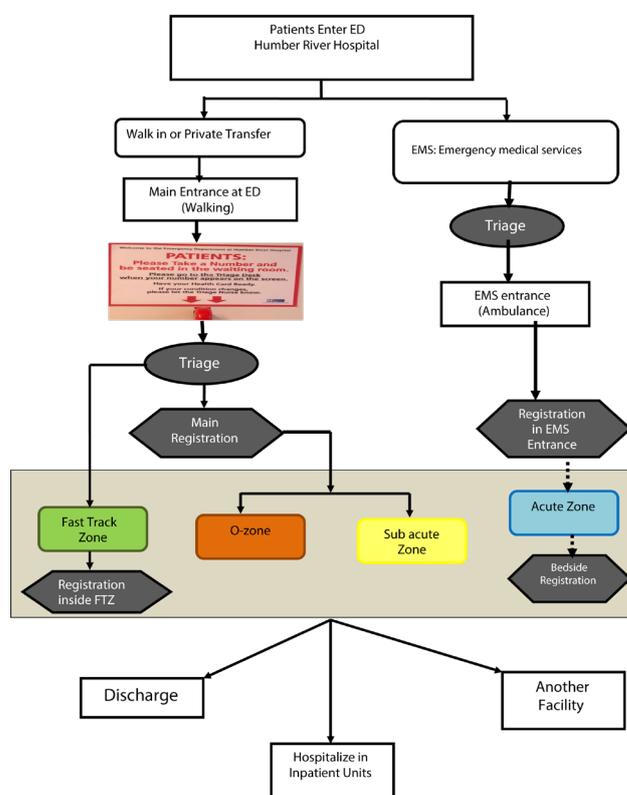
- How many tests are needed (for example, blood work, ECG, urine sample, x-rays or a CT scan,)
- Whether the emergency doctor has requested a consultation with another specialist
- Whether the patient is being admitted to the hospital and needs to wait for an available bed.

If the patient's condition changes at any time after

the triage process, they are asked to call the nurse immediately.

There are different treatment areas to care for different conditions. The patient is sent to an area where a nurse provides specific instructions. A nurse or doctor will advise when the patient can go home. The doctor may refer them to another medical team for further assessment. If the patients are asked to stay, the ED team will care for them in the Emergency Department until an inpatient bed is available. If the patient is discharged, the doctor or nurse will provide instructions on how to care for themselves at home. Written instructions are provided to the patient if needed. The patients are required to arrange their own transportation home.

Each area is equipped based on the types of patients they receive. Each room has been equipped based on the care needs of the patients that come to those zones, for example: blood collection and vein

**Figure 2:** Patient Flow Map in the Emergency Department in the Humber River Hospital

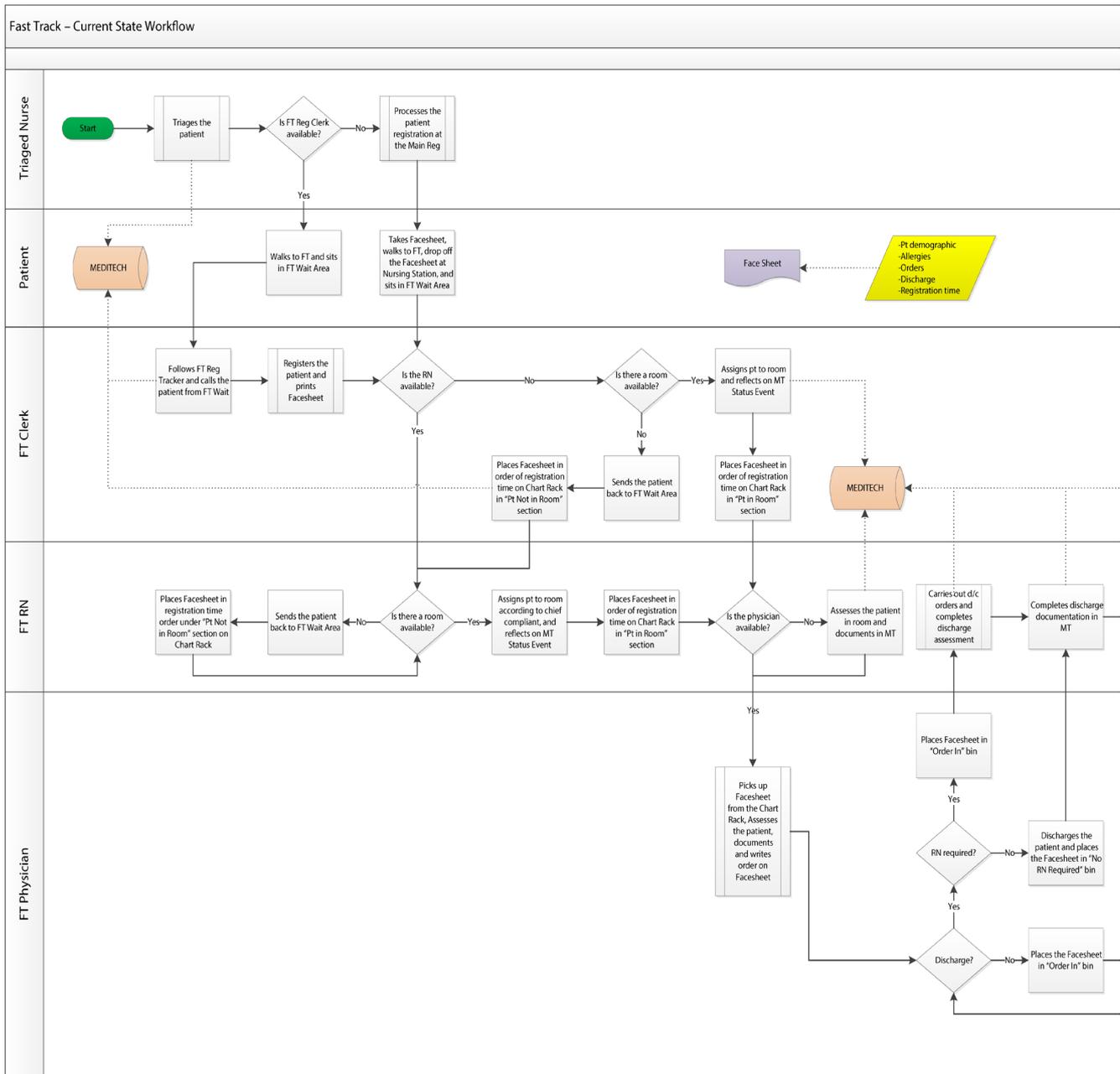


Figure 3.1: The care-flow of the patients at FT

puncture equipment, IV tubing, urine collection, oxygen tubing, and personal hygiene supplies.

For elderly patients, a transportation service can be called. An ambulance service is also available for a fee. Patients may be asked to complete a short, confidential survey about their experience in the Emergency Department. Ozone and FT also have an automated vital signs machine in each room while acute and sub-acute cases have the bedside cardiac monitoring equipment and ceiling lifts [A ceiling lift is a motorized device that lifts and transfers a person from point to point along an overhead track. The track can be ceiling mounted, or may be portable].

Some zones have specialty rooms within the zone,

such as Reverse Isolation, Trauma, Gynecology, Pediatrics, Dialysis, Mental Health, Bariatric, Casting, Procedure, ENT, and Eye Rooms. The Medical Imaging department is within the Emergency Department that includes CT scanner, Ultrasound and X-ray. All rooms are equipped with sink, curtain, bedside monitoring (telemetry), bedside computer, stretcher, IV pumps, oxygen tubing, blood tubing, vital monitoring, and urine sample container equipment. The majority of patients, about 60%, are registered in Ozone area. The ED is also equipped with the following facilities for special patients:

- Acute room (resuscitation room),
- Trauma room,

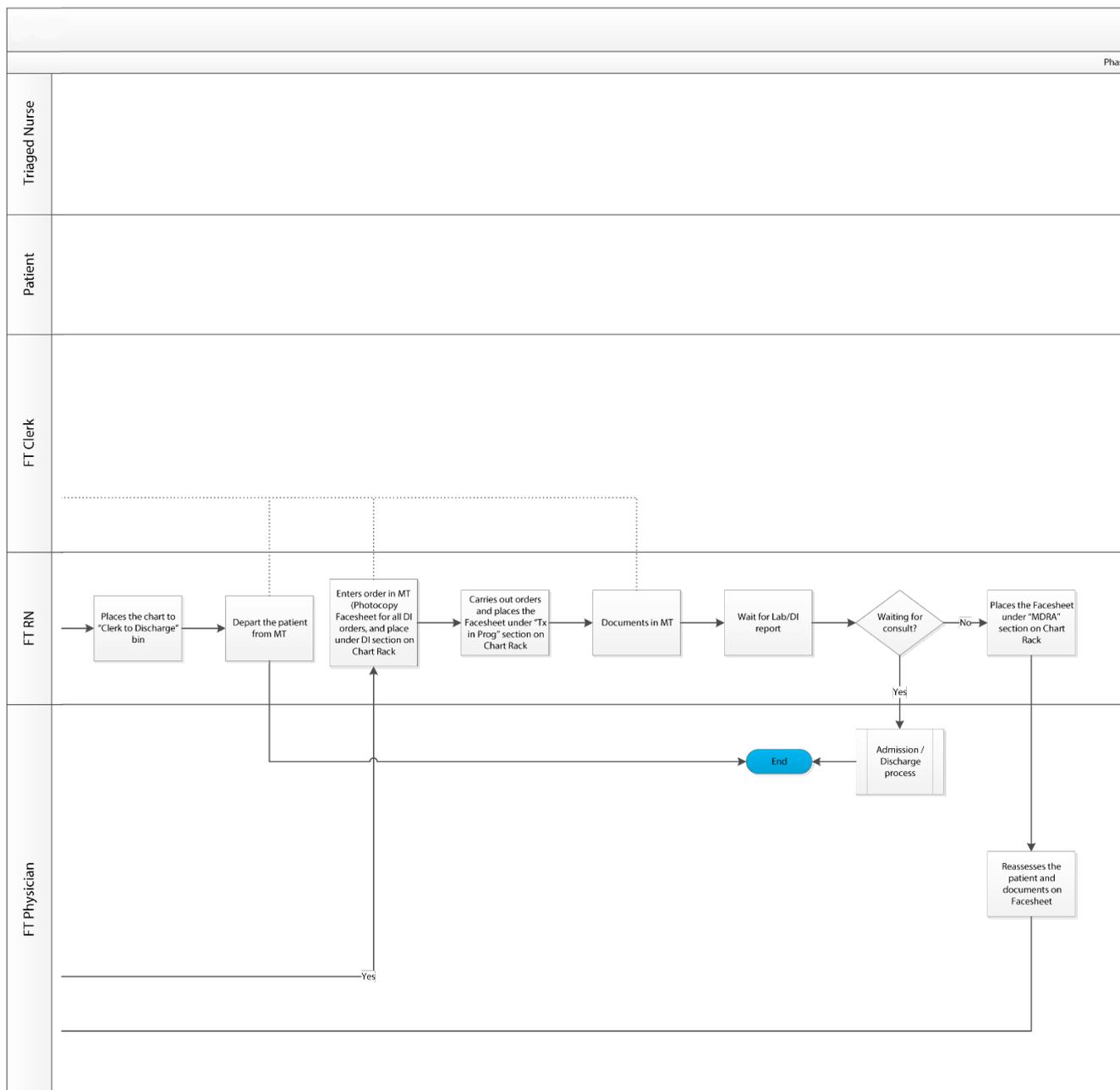


Figure 3.2: The care-flow of patient at FT(continue)

- Gynecology room that is equipped with bath and shower,
- Isolation room,
- Pediatrics room,
- Bariatric room that is a especial room for extremely obese people that are more than 400 pounds (Bariatric is the science of providing health care for those who have extreme obesity),
- Mental health room (that equipped with safe)
- Full casting room,
- Procedure room (chest tube, abscess, dislocated, etc.),
- Diagnostic medical imaging,
- CT, Ultrasound, X-ray facilities inside of the ED,

- Wash room,
- Tim Horton,
- Quiet room,
- tools for patient safety),
- EMS Room for interviewing and exchanging information with police.

The ED is equipped with diagnostic medical imaging (CT, Ultrasound, X-ray) facilities (24/7), automatic tube system and shooting sample (blood test), Endoscopy (on call can come down), and Colonoscopy (on call can come down) (Table 2).

Discussion

Vermeulen et al. in their article mentioned that the pay-

Table 2: The number of care providers who work in different places in the ED 24/7 in HRH

Expe- ri- tise	Emer- gency Physi- cian	Patient Flow Man- ager	Opera- tional Man- ager	Clinical Prac- tice Leader	Nurse	Social Work- er	Geriatric Nurse Manger	Physio- thera- pist	Clerk (Regis- ter)	Reg- ular Clerk	Por- ter	House- keeper	Secu- rity	Medical imaging special- ist
Total #	16	1	1	2	53	2	1	6	6	2	6	6	3	20

for-performance program was the first performance-based funding strategy directed at EDs in Ontario. Hospitals were rewarded for improvements in achieving specific benchmarks for ED length of stay, as specified by the Ministry: A maximum of 8 hours for patients admitted to the hospital or triaged as high acuity (defined as Canadian Triage and Acuity Scale level I [resuscitation], II [emergent], or III [urgent]) and 4 hours for non-admitted low-acuity patients (Canadian Triage and Acuity Scale level VI [less urgent] or V [non-urgent]). The Ministry sets targets for compliance with benchmarks of 90% or greater (5).

Besides, registration can help streamline throughput for almost all ED patients. Rather than going through the long process of triage and registration prior to placement into a bed, bedside registration dramatically cuts time from arrival to bed placement (6).

HRH is divided ED into four zones and patients with level 1 register in a bed or bedside in the acute zone. This process will speed up healthcare delivery for critically ill patients.

Conclusion

Patient Workflow Management automates the registration and check-in process in healthcare facilities to improve the flow of patients and patient information. Overall, the maximum average stay time of the patients to get healthcare services from triage to leaving the hospital was 5.58 in Sub-acute zone in the ED from April to May 2017. From the total of 23,642 patients who visited the ED, 9.3% (2,206) were admitted in inpatient wards in this period. To submit Emergency services, they allocate 5 zones for different levels of patients that on one hand could increase the quality and productivity of care and, on the other hand, distribute the load of registration through different zones. According to the interview, the majority of patients, about 60%, are registered in Ozone area. The majority of complaints are about; Lack of communication, "Nobody tells me what will happen or what I should do next?, When I'm going to go home? , and Lack of information about what the processes in every spot in the ED Services. This long waiting causes the patient to be unhappy and hopeless; hence their level of satisfaction becomes

nil. The problems for the ED service staff included: High workload, High time load (12 hours), and Lack of communication. Unfortunately, the time of the beginning and end of all services provided in the ED was not documented. In this case, the researcher could not draw a model. It is suggested that these times are documented for further assessment to improve the current situation.

Acknowledgement

My special thanks to; Michael W. Carter, Professor in the Department of Mechanical and Industrial Engineering at the University of Toronto, affiliate of the Centre for Healthcare Engineering, Canada., Jane Casey, Program Director of Emergency Services & Command Centre, Humber River Hospital, for all of her valuable support before, during, and after doing my research project., Rosa Spataro-Sherman, Clinical Practice Leader, Emergency Services, Humber River Hospital, for all helps to complete our process mapping., Kate Wilson, Director of Strategy and Culture Humber River Hospital, for creating a great hope and referring me to the right people to implement my research project., Mayda Timberlake, Clinical Manager at Emergency Services for all helps to complete our process mapping., Louisa Ceci, Manager of Hospital Volunteers, for conducting me to the right place and the right people., Lionora (Ellie) Lombardo, Program Assistant, Professional Practice for all her organizing to meet the right people, Anna Maria Pistilli, for all her organizing to meet the right people., Shawn Thaddeus, Business support specialist, to provide correct and necessary data., Irene Melissa, for all her helpful cooperation to conduct me in research paths., Professor Patricia M. Baranek, PhD, my mentor for all helps to her persuasion and comments to edit my proposal and report., Amy Giansante, Manager of Patient Flow; Emergency Services at Humber, to guide me to know and understand patient care-flow in the ED.

Ethical approval: Approved by Research ethics board at Humber River Hospital in Toronto, Canada

Funding: This research is part of my sabbatical study at the University of Toronto in Canada.

Conflict of Interest: None declared.

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