Working Project

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On An Organizational Level: How can the Emergency Department at Rouge Valley Centenary hospital improve their wait times?

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Abstract

"On An Organizational Level: How can the Emergency Department at Rouge Valley Centenary hospital improve wait times?

The prolonged wait times may arguably put into question the Canadian Health Act of 1984. Statistics show throughput wait times are 5.5 hours and output wait times for admitted patients are 32.4 hours. After probing and analyzing best practices through a qualitative/quantitative Value Stream Mapping and a qualitative SWOT Analysis; Team Triage and an Overcapacity Protocol is suggested to improve non-admitted patients wait times by 1.89 hours and admitted patients wait times by 11.5 hours by eliminating wasteful steps in the patient process and upon overcapacity, effectively sharing already stabilized and admitted patients with all wards in the hospital.

Introduction

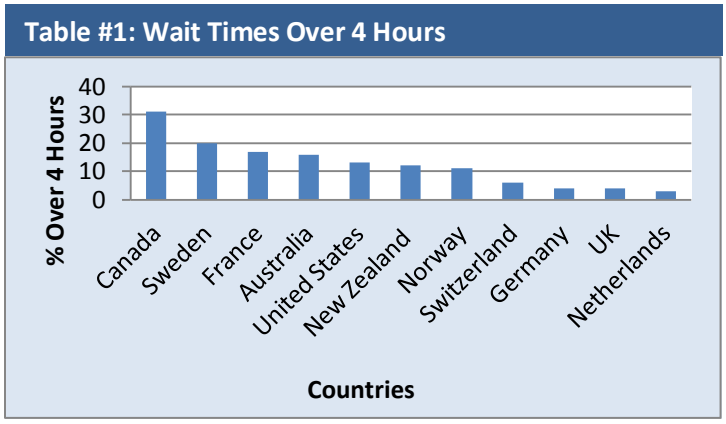
"On an organizational level: How can the Emergency Department at the Rouge Valley Centenary Hospital improve their wait times?"

Rouge Valley Centenary (RVC) hosptial has been providing care since 1967. It is one of four hospitals serving approximately 635 000 people within the district of Scarborough, which is located in eastern Toronto, Canada. RVC is a public organization and by definition, would be considered a 'very high-volume community centre hospital' as it has an inflow of over 50 000 patients per year. Precisely, 62 086 patients flowed through the Emergency Department (ED) from July 2012 to June 2013. As of 2012, the total number of beds/bassinets which were staffed and in operation throughout the hospital was 326. In 1998, the hospital amalgamated with the 'Ajax & Pickering General Hospital', together, creating the Rouge Valley Health System. RVC is dedicated to providing the residence of Toronto with quality health care.

"Health care in Canada has long been a source of national pride. Known as 'medicare', the system is publicly financed but privately run, it provides universal coverage and care is free at the point of use (Irvine et al. 2005)." This went into practice in 1984 when the Canadian Health Act was passed into law and formed the cornerstone of the modern Canadian health care system (Canada Department of Justice. 2012). It states that within this act, publically funded health care must cohere to five key principles; it must be comprehensive, universally available, portable, accessible, and publically administered (Canada Department of Justice. 2012). Unacceptable waits for care, specifically within Emergency Departments

(ED) across Canada, puts a barrier to reasonable access to insured health services and ultimately questions the "accessible" principle of the Act.

The Commonwealth Fund (2010) did an international comparison of eleven developed countries and found that Canadian's have the longest wait times. Of the close to 16 million visits to emergency departments (EDs) each year, of which 1 million result in inpatient hospital admission (Canadian Institute of Health Information. 2012), an astounding 31% of Canadian's wait more than 4 hours in the ED, which is 19 percentage points higher than the average. Whereas, Germany, the United Kingdom, and the Netherlands, less than 5% of patients wait longer than four hours. The complete graph is displayed below:



Unfortunately, at RVC, the statistics are not much better than the Canadian averages; 90% of non-admitted patients wait 5.5 hours before being discharged; likewise, 90% of admitted patients are discharged to another department within 38.2 hours. Below is a chart provided by The Ontario Ministry of Health & Long Term Care on wait times at RVC, patients are divided into one of the five Canadian Triage Assessment Scales (CTAS) based on the severity of their illness; level one being the most severe and level five being the least. Wait times are defined by the time a patient registers to the time the patient is discharged.

TABLE #2: Rouge Valley Centenary Wait Times by CTAS Category

	Admitted Patients (Hours)						Non-admitted Patients (Hours)					
CTAS Level	Target	Cases	Average Wait Time	Median Wait Time	90% completed within	Percent Completed within Target	Target	Cases	Average Wait Time	Median Wait Time	90% completed within	Percent Completed within Target
All Patients	N/A	5595.0	17.1	11.5	38.2	32.8	N/A	56491.0	3.1	2.3	5.5	90.5
CTAS I	8.0	109.0	11.1	5.9	25.7	57.0	8.0	95.0	4.0	3.1	12.7	83.8
CTAS II	8.0	2029.0	16.1	10.3	37.6	47.5	8.0	7279.0	3.3	3.1	7.3	91.8
CTAS III	6.0	3166.0	18.2	12.8	39.5	23.5	6.0	29711.0	3.6	2.6	6.1	90.0
CTAS IV	4.0	291.0	14.2	8.1	33.4	21.5	4.0	17050.0	2.2	1.7	4.0	90.5
CTAS V	4.0	NV	NV	NV	NV	NV	4.0	2356.0	1.9	1.3	3.4	94.0

These unacceptable wait times, puts into question the Canadian Health Act of 1984 as it can be argued that there is a clear 'barrier' to reasonable and accessible access to insured health services at RVC.

The purpose of this paper is to identify the problems at RVC, characterize them, check the literature for alternatives, analyze those alternatives through a SWOT Analysis and a Value Stream Map and conclude with the necessary recommendations needed to alleviate the excessive wait times.

Identification of the Problems

Through the physical observations of the operations at the ED during both high and low periods, through interviews with ED doctors and nurses, as well as through the analysis of wait time statistics, three problems were identified which contribute to the prolonged wait times at RVC. They were acknowledged to be;

1. *Management/ Human Resource Management:*

2. *General Resources*

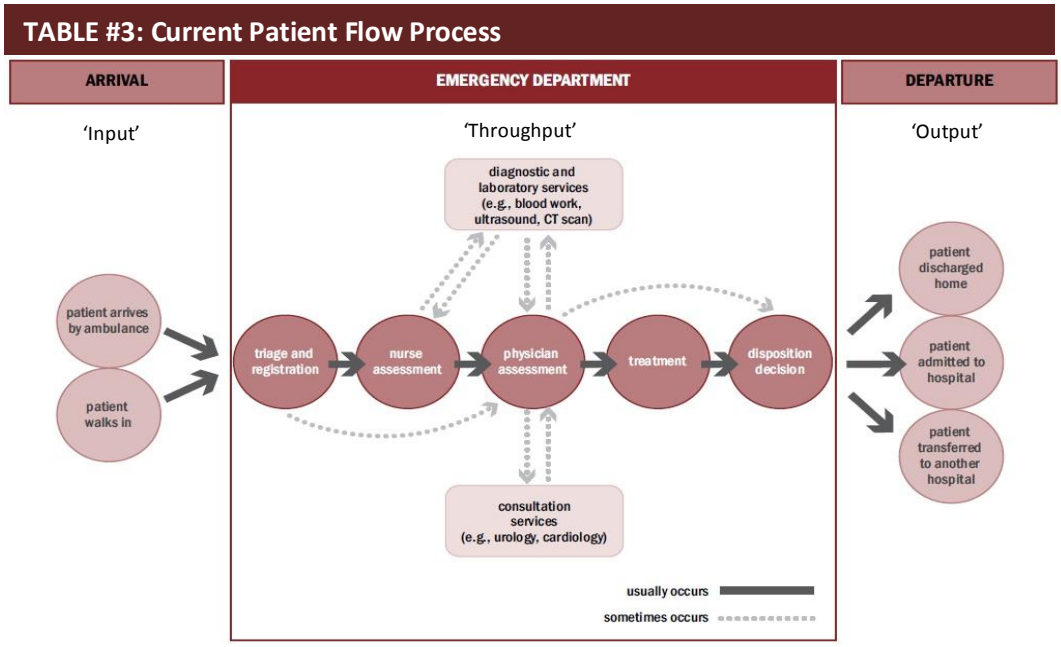
3. *Logistics*

Refer to *Appendix 1-3* for a description of each as well as a section on the interviewees.

Each of these issues are critical in order to improve efficiency, however, due to limitation of this project, this paper will focus on how improving the logistics within the RVC ED can improve patient wait times.

Problem Characterization

Asplin et al. (2003) developed the conceptual model which partitions ED crowding into three interdependent components: input, throughput, and output. This model gives guidance to the characterization of the problem at RVC and will be referred to constantly throughout this paper. Below is the current patient process, including the inter-reliant stages:



(Auditor General of Ontario, 2010)

ED overcrowding has become a national problem and is now a chronic state in many departments (Canadian Triage & Acuity Scale. 2013). Moreover, it poses operational and logistic problems for hospitals (Kelen GD et al. 2007). The American College of

Emergency Physicians (ACEP) defines ED crowding "as a situation in which the identified need for emergency services outstrips available resources in the ED. This situation occurs in hospital EDs when there are more patients than staffed ED treatment beds and wait times exceed a reasonable period. Crowding typically involves patients being monitored in non-treatment areas while awaiting ED treatment beds or inpatient beds. Crowding may also involve an inability to appropriately triage patients, with large numbers of patients in the ED waiting area of any triage assessment category (ACEP Crowding Resources Task Force. 2002)."

Input:

Input is essentially patient demand. One contributing factor to overcrowding in EDs is the use of EDs by non-urgent patients (Derlet R. et al. 2000). For instance, wait time statistics at RVC, shows that 34.35% of the 56 491 patients that are not admitted to the hospital are CTAS4 and CTAS5 (low-acuity) patients. Opening up the Centenary Family Physician Clinic in the hospital, which also operates as a walk-in clinic, is meant to indirectly divert the majority of low acuity cases. However, due to hospital procedures, which are said to be based on the Canadian Health Act, front line professionals can suggest but cannot legally divert patients to non-ED areas based on a patient's health status. Nonetheless, this is a causative issue only when EDs have poor patient flow. With that being said, the two fundamental bottlenecks at RVC are the throughput and the output.

Throughput:

"Throughput highlights the need to look internally at ED care processes and modify them as needed to improve their efficiency and effectiveness, especially those that have the

largest effect on length of stay (LOS) and resource use in the ED. There are two primary throughput phases. The first phase includes triage, room placement, and the initial provider evaluation (Asplin et al. 2003)" and the second phase includes diagnostic testing and ED treatment; including the cohesiveness of patient care teams, physical layout of the ED, nurse and physician staffing ratios, quality of documentation and communications systems, and availability of timely specialty consultation (Asplin et al. 2003). At RVC, the average patient takes 5.4 hours (321 minutes) to flow through both phases. In this particular case, the first phase creates the greatest inefficiency in the throughput process as it sets the stage for the wasteful steps that follow.

The Nurse- Led Canadian Triage system was not designed to reduce wait times (Buchanan et al. 2006). It generates and creates delays, redundancies and duplications in care (Ontario Hospital Association 2011) and presents patients with a series of hurdles. "They wait to see the triage nurse then wait to register. They wait to see the physician then wait to have a radiograph. They wait again for the radiograph to be viewed then again to have their treatment (Redmond, Buxton. 1993)." In the face of ED crowding, this comprehensive triage approach is problematic (Full Capacity. 2006) and the inefficiencies correlate to the development of negative and sometimes devastating consequences and repercussions. CTAS is defined as follows:

TABLE #4: Definition of The Canadian Triage & Acuity Scale (CTAS)
It is a tool that enables Emergency Departments to:
•Prioritize patient care requirements •Examine patient care processes, workload, and resource requirements relative to case mix and community needs
The CTAS allows ED nurses (RN) and physicians to:
•Triage patients according the type and severity of their presenting signs and symptoms •Ensure that the sickest patients are seen first when ED capacity has been exceeded due to visit rates or reduced access to other services •Ensure that a patient's need for care is reassessed while in the ED

(Canadian Triage and Acuity Scale. 2013)

At the RVC, only experienced RN's are in the Triage unit and *no experienced physician is involved.* This creates a bottleneck that can result in the following:

TABLE #5: Negative Symptoms of a Nurse-Led Triage
1. Access time from patient to physician is longer
•The severity of the patients illness may increase or could lead to death •Prolongs rapid assessment and immediate treatment •Decreases patient satisfaction •Increases the stress on frontline workers which can result in inefficiencies and lack of care
2. Higher percentage of misdiagnosing CTAS
•Could increase the likelihood of worsening symptoms or even death
3. Increased probability of ordering uncessessary diagnostic test(s)
•Results in a backlog of services and discharge time
4. Increased probability of not ordering the right tests
•Generates delay in patient flow as the physician would request the needed test
5. Greater possibility to have patients who leave without being seen (LWBS)
•May further complicate patients illness, could result in death or increase the chances of them returning at a later date
6. Lack of legal administrative power for nurses to 'see and treat' minor cases
•Creates patient backlog

(Redmond, Buxton. 1993)

These symptoms of a Nurse-Led Triage and throughput process can have dire, yet unnecessary consequences.

Output:

The inefficient disposition of ED patients contributes to crowding for admitted and discharged patients (Derlet et al. 2001). The most frequently cited reason for ED crowding is the inability to move admitted patients from the ED to an inpatient bed (Derlet et al. 2001; see also Gallagher et al. 1990, Forster et al. 2003). As previously mentioned, at RVC the two greatest factors that create this inability are; the lack of funds to operate the hospital at full capacity and delayed discharges, both a national problem. Despite RVC's proficient bed management, on average admitted patients wait approximately 34.5 hours (1945 minutes) before being moved to the appropriate ward. During periods of high demand, patients have been known to be 'boarded' in the ED for days. The ED should not be utilized as an extension of the intensive care and other inpatient units for admitted patients, because this practice adversely affects patient safety, quality, and access to care (American College of Emergency Physicians, 2011), as well as further consumes nurses and physicians, an already limited resource. When this occurs, it effectively reduces the ED's capacity to care for new patients (Asplin et al. 2003). The Canadian Association of Emergency Physicians (CAEP) states that one patient 'boarded' in the emergency room denies access to four patients per hour to the ED (Overcrowding. 2013). This is a severe problem at RVC.

Based on the identification and the characterization of the problem, which is emphasized by the wait time statistics that are present in Table 2, the major bottleneck in the logistic process is the output. However, the throughput process is not extenuating the prolonged wait times at RVC and there is room for improvement. Therefore, an accumulative

approach to increase the patient throughput and promote patient output would be ideal. Hence, it is necessary to probe national and international best practices to find organizational solutions that would be appropriate for RVC.

Literature Review of Innovative Solutions

Throughput:

It has been argued that processes can be implemented, which will improve patient flow and ultimately mitigate the detrimental effects that ED crowding produces (Full Capacity. 2006). Below are two of the industry's best practices and are backed up by academic studies and research on each method.

Team Triage:

Though the definition of a Team Triage can be used loosely, it usually refers to a triage attended to by a senior physician and a nurse, however, depending on the structure and size of the hospital; they may be accompanied by one extra nurse, a nurse's assistant and in some cases, a registrar. Team Triage is a unique and innovative approach to dealing with capacity constraints and the rationale is to increase accuracy and efficiency in the initial process of the patient evaluation (Oredsson et al. 2011). This will, in turn, promote patient flow throughout the second stage of the throughput process. This is accomplished by the physician developing a patient care plan, as well as initiating early orders for diagnostic and laboratory work, redirecting patients to a consultation by a specialist and as a team, rapidly treating and discharging low acuity patients (Oredsson et al. 2011; see also Travers et al. 2006). A study found that over 30 percent of ED patients never need a room at all. Their injuries are such that they may be rapidly evaluated and treated in triage before they ever

get into a room (Full Capacity. 2006). Similar to a traditional triage unit, patients with severe complications (CTAS 1&2), bypass the triage unit and are attended to within minutes. There have been numerous studies conducted around the world outlining the optimistic outcomes of a Team Triage unit.

A study in the United Kingdom, Subash et al. (2004) studied whether three hours of combined doctor and nurse triage would lead to earlier assessment and treatment and whether the benefit would carry on throughout the day when normal triage resumed. Median times were significantly reduced; all patients were seen within 15 minutes, intervention to triage, down 5 minutes, to see a doctor, down 30 minutes and the percentage of patients discharged within 20 minutes increased from 3% to 19%. In addition, there was no significant effect demonstrated for the remaining 21 hours after the intervention. The main limitation to this study is that it was only an 8 day study, over a four week period which at no point did the department see a high influx of patients.

A number of other studies were conducted that emphasize the benefits of Team Triage. In a study conducted in the United States, Partovi et al. (2001) investigated the effect of a senior emergency physician in the triage team and reported that total LOS decreased by 82 minutes (18%). In addition, it was shown that patients who leave without being seen (LWBS) decreased by 46%. The main limitation that was observed was that the improvements came at an additional cost of $11.98 per patient. In a similar comparison study in the United States, Jones et al. (2008), found a decreased wait to see a doctor, down from a several hours to approximately 10 minutes, decrease in LWBS from 5% to 1%, decrease in LOS of 37 minutes and patient satisfaction rose from 80th percentile to the 97th

percentile on overall quality of care. There was no limitation mentioned. Travers et al. (2006) noted that by placing a senior emergency physician with the triage nurse reduced waiting times for walk-in cases and that by treating and quickly discharging one third of the patients, allowed doctors of high acuity patients to act more efficiently.

Team Triage is a plausible and well documented patient flow process that can increase throughput and mitigate the effects of overcrowding.

Fast Track Area (FTA):

Fast-track Areas (FTA) are created to ‘‘stream’’ patients with non-urgent complaints to treatment in a dedicated area (Taylor et al. 2004) and are designed to improve ED capacity during peak demand from seasonal or diurnal variation in presentations (Purnell. 1991). Staffing of a FTA varies widely. Some suggest that it be staffed by less expensive health care providers such as residents, nurse practitioners, and physician assistants (Yoon, Philip. 2003). Where others believe it should be staffed by senior medical and nursing personnel, underpinned by the notion that senior staff can make timely discharge decisions. (Cooke et al. 2004).

In addition, FTA’s are supported by a “well-known operations research theory, where the average waiting time in a single-server queuing system can be minimized by serving first the client whose expected service time is the shortest. This principle is known as the ‘shortest processing time’ queuing strategy (Yoon, Philip. 2003)” and for many hospitals, the results were stellar. There is great deal of practical research and literature that supports FTA’s.

A study in Australia by Considine et al. (2009) showed that not only did the FTA not compromise waiting times and ED LOS for admitted patients but it significantly reduced wait times for non-admitted patients and fast-track patients; Median ED LOS for non-admitted patients was 132 minutes for controls and 116 minutes for cases. Fast-track patients had a significantly higher incidence of discharge within 2 hours (53% vs 44%) and 4 hours (92% vs 84%). The study was limited due to the fact that it was conducted directly after the implementation of the FTA and there are no claims about the sustainability of the system. Furthermore, there were a number of cases for whom a control could not be matched, resulting in a decreased sample size. Despite the limitations, the study sample was adequate in terms of statistical power.

Several other studies have been conducted that show the benefits of a FTA. Sanchez et al. (2006) compared 71,000 fast track patients with an equally large control group. Despite a 4.4% increase in attendance during the fast track period, when the FTA was implemented, wait times were 50% and LOS was 10% shorter for the total patient population. In this study, physician assistants and nurse practitioners staffed the fast track. Kilic et al. (1998) performed a prospective, double-blind, comparative trial that determined a shorter median LOS for fast-track patients (36 minutes) compared to regular ED patients (63 minutes). Follow-up analysis showed superior patient satisfaction rates for fast-track patients with no significant differences with respect to complications or hospitalizations at other facilities. Cooke et al. (2002) performed a retrospective study that demonstrated that the relative risk of patients waiting more than one hour in the ED decreased by 32% using a fast-track system.

A FTA is a credible and well recognized patient flow process that can increase throughput and lessen the effects of overcrowding

Output:

ED overcrowding is symptomatic of demand exceeding capacity in hospitals and requires system-wide solutions (Position Statement on Overcrowding. 2009). However, the CAEP as well as the ACEP recommend the rapid implementation of overcapacity protocols (OCP) so that all hospitals have an organized approach to deal, in the best manner possible, with situations of demand exceeding capacity (Full Capacity. 2006). Implementing overcapacity protocols effectively shares the responsibility for already stabilized and admitted patients with all wards in the hospital, instead of just 'boarding' them in the ED (Position Statement on Overcrowding. 2009). Depending on the protocol policy, which can differ, there are strict rules and regulations that must be developed on a per hospital bases, for example; the ED capacity that justifies the protocol being put into action, how many patients each ward can cater to, that patients cannot be moved against their will, etc. Depending on the protocol, patients may be placed in existing beds, solariums, lounges, conference rooms, or unit hallways (Elliot, B. Brown, D. 2005). The OCP is slowly gaining popularity in North America as more and more hospitals are adopting the practice.

One of the first hospitals to implement the innovative practice was St. Paul's Hospital in Vancouver, Canada. A comparative study, before and after the implementation of the OCP was conducted by Innes et al. (2005) and the results, to say the least, were astounding. During the post-OCP period, ED volume rose from 30 483 to 30 846 (1.2%), CTAS 1-3 (high acuity) volume rose from 13 078 to 13 828 (5.7%), and daily ambulance arrivals rose

from 46.1 to 46.6 per day (1%). Despite this, the mean ED LOS for all admitted patients fell from 18.9 to 13.9 hours. ED LOS fell greatly for admitted patients; 9.0 hours for medical patients, 1.6 hours surgical patients and 9.2 hours for mental health patients. Similarly, hospital LOS fell by 24 hours for medical patients, 19.2 hours for surgical patients and 19.2 hours mental health patients. After OCP, arriving emergent-urgent patients were rarely left in ED waiting areas. During the post-OCP period, no critical events were reported in ED waiting areas or inpatient wards. This 5 hour mean reduction in ED LOS for 8200 annual admissions provides access to an additional 41 000 hours of ED stretcher and nursing time, more than the access gap estimated prior to OCP implementation. The OCP reduces ED LOS for admitted patients, as well as reduces ED access block and appears to reduce adverse outcomes for ED patients (Innes et al. 2005).

A U.S. based study was conducted by Vicellio et al (2009) to determine the safety of OCP. The four year study concluded that the transfer of ED-boarded admitted patients to an inpatient hallway that occurs during high ED census and wait time for admissions does not appear to result in patient harm. Conversely, the main limitation to this study was that it was limited to only one hospital.

Despite OCP's growing popularity, due to much needed solutions to improve ED output, there is a limited amount of literature supporting this practice. This was confirmed by a systematic review by Villa-Roel C et al. (2012) as they concluded that though OCP may be a promising alternative for overcrowded ED's, the available evidence upon which to support implementation of an OCP is limited. Additional efforts are required to improve the outcome reporting of OCP research using high-quality research methods.

Nonetheless, the approach has been backed as a viable temporary solution by the CAEP and the ACEP and is, logically an intuitive way to curb the output bottleneck.

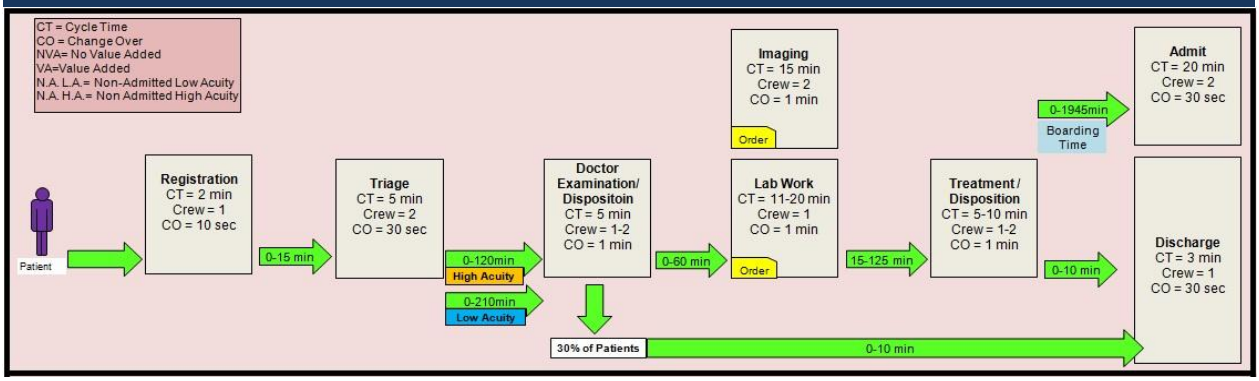
Value Stream Mapping

"Value stream mapping is technique to analyze the flow of materials and information required to bring a product or service to a consumer. In the ED, a value stream map is simply a diagram showing the progression of patients through the system as services are provided (Murrell et al. 2011)." All quantitative data represented in the value stream maps are educated estimates provided by staff at RVC and correlate with information provided in the RVC's Wait Time Statistics (Table #2). Below are three simplistic value stream maps. The first represents the current ED Value Stream (Table #7), the second depicts the implementation of the Team Triage and the OCP (Table #8) and the last shows the FTA as well as the OCP in effect (Table #9). In each map, the 'Cycle Time' (value-added steps), 'Waste' time (non-value added steps) and 'Change Over' time is recorded on each process.

The summation of the 'Cycle Time' and the 'Waste' time equals the total minutes an 'Admitted' patient waits in the ED before being transferred to an inpatient bed. The 'Non-Admitted' patient wait times are divided into two. First, the 'Non-Admitted, Low Acuity Patients' wait times in minutes equal the summation of each service they encounter, multiplied by the percentage of the 'Non-Admitted Low Acuity Patients'. Second, the 'Non-Admitted, High Acuity Patients' wait times in minutes equal the summation of each service they encounter, multiplied by the percentage of the 'Non-Admitted, High Acuity Patients'. By combining them both, you have the total wait time for 'Non-Admitted' patients. Though 34.4% of patients are considered 'Low Acuity', this number was rounded

down to 30%, taking into consideration that some 'Low Acuity' patients have; prolonged treatments, diagnostic testing, or are miscategorized.

TABLE #7: Current Emergency Department Value Stream

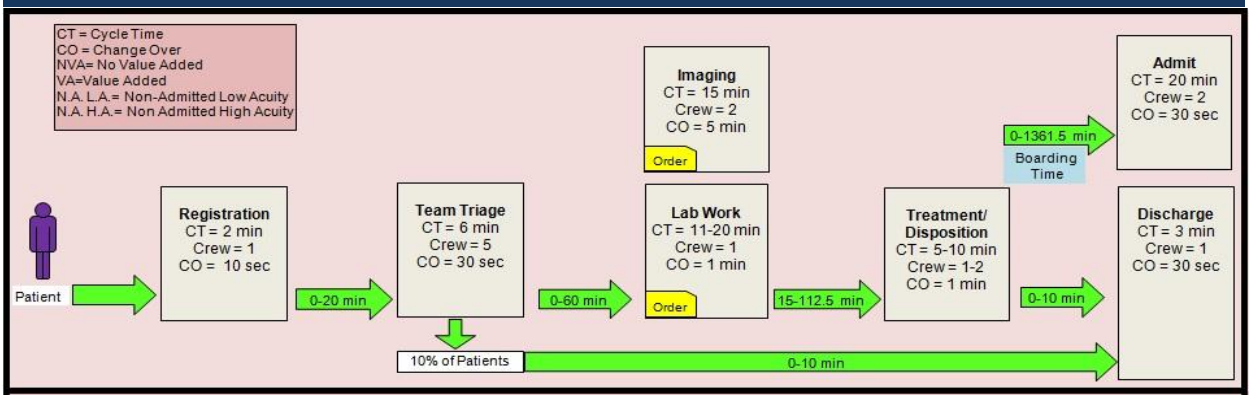


A detailed graph can be found in *Appendix 4*.

Table #7's Accentuated Points:

First and foremost, this value stream accentuates the fact that the 'Boarding Time' is a considerable bottleneck. Consuming on average, 32.4 hours (1945 min) of wait time, adding to the total of 38.6 hours (2320 min) before an 'Admitted Patient' is transferred to an inpatient bed. In addition the flow of 'Non-Admitted' patients through the ED is currently 5.5 hours (334 min).

TABLE #8: Team Triage & Overcapacity Protocol Value Stream



A detailed graph can be found in *Appendix 5*.

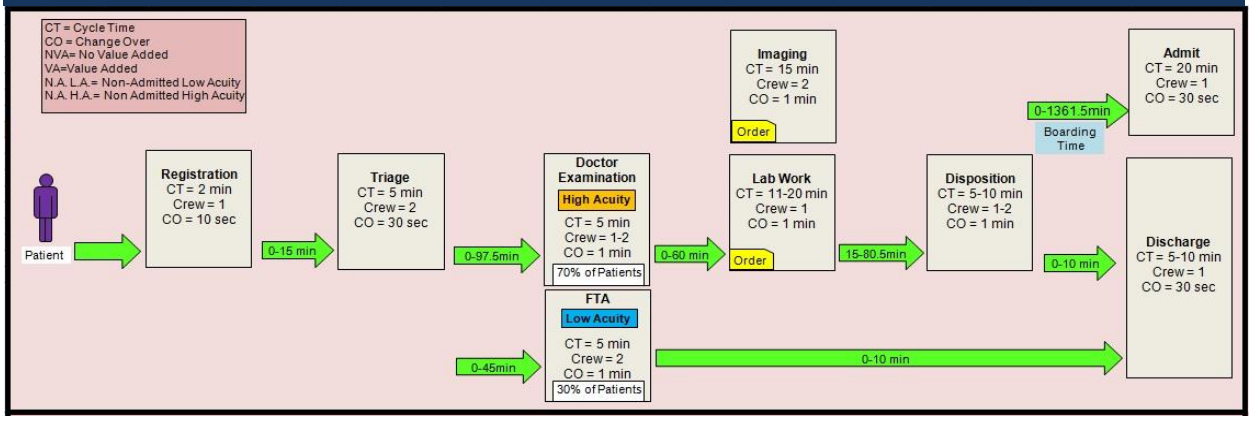
Table #8's Accentuated Points, in comparison to Table #7:

As it is displayed in Table #8, incorporating 'Team Triage' eliminates one step in the process and instantly decreases patient's waits times by 2.08 hours - 3.75 hours (125 min – 225 min). In order to keep the numbers conservative, only 10% of 'Low Acuity' patients were discharged immediately from 'Team Triage', which effectively decreased the wait time from the 'Imaging/ Lab Work' to 'Treatment' by 10% to 112.5 minutes.

Furthermore, based on the literature and on opinions of front line professionals at RVC, implementing an OCP would decrease 'Boarding Time' by 30% to 22.61 hours (1361.5 minutes).

The 'Team Triage & OCP Value Stream' illustrates that an 'Admitted' patient would wait on average 26.75 hours (1605 minutes) before being transferred to an inpatient bed, a difference of 11.5 hours. In contrast, a 'Non-Admitted' patient would wait 3.61 hours (216.5 minutes) before being discharged from the hospital, a difference of 1.89 hours (117.5 minutes).

TABLE #9: Fast Track Area & Overcapacity Protocol Value Stream



A detailed graph can be found in *Appendix 6.*

Table #9's Accentuated Points, in comparison to Table #7:

As it is displayed in Table #9, integrating a 'Fast Track Area' places 'High Acuity' and 'Low Acuity' patients in separate streams after the 'Triage' process, which decreases wait times before being initially evaluated by a physician by 27.5 minutes – 80 minutes and decreases wait times even further after 'Imaging/ Lab Work' by 30% to 80.5 minutes.

Similar to 'Team Triage', by introducing the OCP, 'Boarding Times' were decreased by 30% to 22.61 hours (1361.5 minutes).

The 'Fast Track Area & OCP Value Stream' demonstrates that an 'Admitted' patient would wait on average 27.65 hours (1659 minutes) before being transferred to an inpatient bed, a difference of 10.55 hours. As 'Non-Admitted' patient would wait 4.04 hours (242.9 minutes) before being discharged from the hospital, a difference of 1.42 hours (91.1 minutes).

The Comparison of Table #8 and Table #9:

Though both models, especially with the integration of an OCP, are far more superior in contrast with the current process at RVC, however, 'Team Triage' is more efficient. With a 'FTA', on average, 'Admitted' patients would wait 64 minutes longer to be discharged and 'Non-Admitted' patients would wait 26.4 minutes longer before being discharged from the hospital.

It is stated that the advantage and efficiency of Team Triage may be most significant in complex situations, whereas noncomplex patients are better handled by fast track (Oredsson

et al. 2011). This is exemplified within these models. It may be that RVC does not have enough low acuity patients for a specified FTA to be beneficial.

SWOT Analysis

A SWOT Analysis will give qualitative scrutiny of each of the proposed models and help determine not only which is the most favorable for RVC but understand how to overcome the weaknesses of the chosen models in the recommendation section.

Throughput:

TABLE #10: Team Triage SWOT Analysis

Strengths	Weaknesses
• Decreased access time to physician • Decrease LOS • Early administered treatment • 'See and Treat' minor cases • 'Top Down' Approach→ Patient care plan • Decrease patients who LWBS • Increase patient satisfaction • Higher probability of ordering accurate and necessary tests • Eliminated steps in patient flow process • Minimize the influx of patients due to the aging demographics threat • Mitigate overcrowding issues	• May see an increase in low acuity patients • Increased costs (if additional physician is hired) • Change management may be difficult • Mentally and physically demanding on senior physician • Difficulty scheduling senior physicians
Opportunities	**Threats**
• Become a benchmark hospital in Canada, as an estimated 99% of hospital have Nurse Led Triage • Positive publicity • Pay per patient incentives, leading to increased budget	• Aging demographics • Increasing population • Stress on the public system could lead to decreased budges

TABLE #11: Fast Track Area SWOT Analysis

Strengths	Weaknesses
• Decreased access time to physician • Decrease LOS • Decrease patients who LWBS • Increase patient satisfaction • Handle ageing demographics • Mitigate overcrowding issues • Creates a parallel patient flow process	• May see an increase in low acuity patients • Still have limitations presented by a Nurse-Led Triage (see Table x) • Restructuring would be needed • Restructuring costs • Lack of space • Change management may be difficult
Opportunities	**Threats**
• Become a benchmark hospital in Canada, as an estimated 99% of hospital have Nurse Led Triage • Positive publicity • Pay per patient incentives, leading to increased budget	• Aging demographics • Increasing population • Stress on the public system could lead to decreased budges

The Comparison of the Two Throughput Methods:

The opportunities and threats of the two models are identical. Nevertheless, when observing the strengths and weaknesses in a qualitative perspective, the Team Triage is perceived to outperform the FTA. The majority of the Team Triage benefits arise due to the elimination of a time consuming step in the current patient flow process. Furthermore, by having a physician assisting in the triaging of patients, allows for more accuracy and efficiency in the second phase of the throughput process based on the patient care plan that is initially developed.

The greatest upside to the FTA is the creation of a parallel patient flow process, which would decongest the ED. Yet at RVC, this benefit becomes a great weakness. This is caused by two critical setbacks; the hospital lacks the necessary room to develop a parallel FTA, in addition, it also lacks the financial capabilities for the necessary restructuring costs. These two setbacks question the feasibility of the FTA option.

Consequently, based on the SWOT Analysis alone, it seems that the Team Triage could be the optimal fit for the RVC.

Output:

TABLE #12: Overcapacity Protocol SWOT Analysis

Strengths	Weaknesses
• Decrease LOS • Improve patient flow; throughput and output • Increase patient satisfaction • Shared excess workload→Promotes teamwork • Lessen pressure on Emergency Department • Obtain provincial targets • Improves nurse/patient ratio • Increases safety • Insignificant cost • Patients receive expert care by people best suited to provide that care	• Limited academic research on OCP • Short term fix • Increased workload on professionals in other wards • May be operating in OCP multiple times a week
Opportunities	**Threats**
• Become a benchmark hospital • Conduct research on OCP as literature for the health care community to consult to • Positive publicity	• Ageing demographics • Increasing population • Smaller future budgets • Decreases incentives for government bodies to take long term action against overcrowding

Recommendations

On an organization level, in order to decrease wait times and restore reasonable access to publically insured patients at RVC, the following is recommended:

Throughput:

Based on the characterization of the throughput problem, the literature review, and the analysis of each, it is suggested that the implementation of a Team Triage would serve as a great benefit to RVC.

As there are limited resources dedicated to physician hours in the ED, Team Triage should be strategically scheduled 8 hours a day, seven days a week, during hours of peak demand. Outside of those hours, reverting back to the traditional triage ought to suffice. Due to the volume of patients, it is recommended that Team Triage consists of a senior physician, two registered nurses and a registrar. Having a senior physician in the triage will essentially 'flip the current paradigm' and create a 'top down' process that will bring added value not only to the patients but to the ED in general.

It is recommended to increase the 32 hours of scheduled physician time per day to 40 hours which will cover the senior physician in Team Triage. Though this is suggested, all analysis that has been completed has been done with the current resource structure. Increasing the scheduled physician time to 40 hours would result in even further benefits.

As identified in the Team Triage SWOT Analysis, there are weaknesses that must be addressed and measures that must be taken to minimize them. Those solutions can be found in *Appendix 7*.

Output:

The most strenuous bottleneck on the current process is the inability to stream patients out

of the ED and into the necessary ward. Due to the lack of alternative measures that currently exist on an organizational level; it is advised to create and implement an OCP and put it to use when needed.

However, there is a great amount of detail that must be thoroughly discussed, debated and ultimately decided on so that an effective protocol is in place. Some things that must be considered are; what capacity does the ED need to reach before the protocol takes effect, which admitted patients will be transferred to inpatient units, what can be utilized as an overcapacity care space, how to measure and evaluate the practice, etc. An example of a detailed OCP is available in *Appendix 12-15*.

As previous identified in the OCP SWOT Analysis, there are weaknesses which must be addressed to mitigate their effect. Those solutions can be found in *Appendix 8*.

Furthermore, the critical success factors can be found in *Appendix 9-11*, which also covers change management.

CONCLUSION

Upon conclusion, it is recommended based on research and analysis, that RVC test and implement a Team Triage and an OCP to improve both the throughput and output components of the ED process. By doing so, wait times can be decreased by an estimated 1.89 hours and 11.5 hours for non-admitted patients and admitted patients, respectively. This will result in positive implications for RVC, the front line professionals, and most importantly the patients. In sometime, RVC may lead the way as a benchmark hospital not only in Canada but around the world.

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APPENDIX 1: Detailed Problem Descriptions

1. Management/ Human Resource Management

The nursing staff at RVC is de-motivated. Firstly, the Nurse Manager is not at the hospital full time and is currently moving back and forth between two hospitals. This is causing traditional management duties to fall upon the unit coordinator or the charge nurse; this increases their 'job description' and actually goes against the union's rules and regulations. Additionally, the lack of management is felt as there is no employee recognition program, no staff meetings, no exit interviews for retirees, and no yearly employee appraisals (which they are suppose to have) and there have not been one in over eight years.

Furthermore, the overwhelming amount of patients puts additional stress and frustration on the nursing staff. The problem is intensified when there is a lack of resources to handle a high influx of patients. This stress and frustration translates into the nursing staff viewing their duties less as a passion and more as a job, providing less emotional care and support to their patients.

2. General Resources

This is more of a provincial and national problem which ultimately affects RVC. The hospital lacks the financial resources and is not properly equipped to handle a high influx of patients. This is seen as the hospital does not currently operate at full capacity. Even worse, the ED does not have bed capacity to house 'boarded' patients and there is an insufficient amount of space in the department to put more beds. Currently in the ED there are 23 beds; 5 in the Acute Care Room, 11 in the Observation Room and 7 in the Main Room. The

APPENDIX 2: Detailed Problem Descriptions Continued.

remainder of patients; wait on chairs, stretchers, stand up, sit down on the floors, etc. During peak demand, 2 doctors (Physician hours: 5 shifts a day, total of 32 hours) and 13 nurses tend to these patients.

3. Logistics:

There is difficulty transferring admitted patients to an inpatient bed. This puts a great deal of strain on essential resources. Moreover, the patient flow process throughout the ED is redundant and inefficient, duplicating unnecessary steps. These inefficiencies increase wait times for patients as well as increase work on front line professionals.

Interviewees

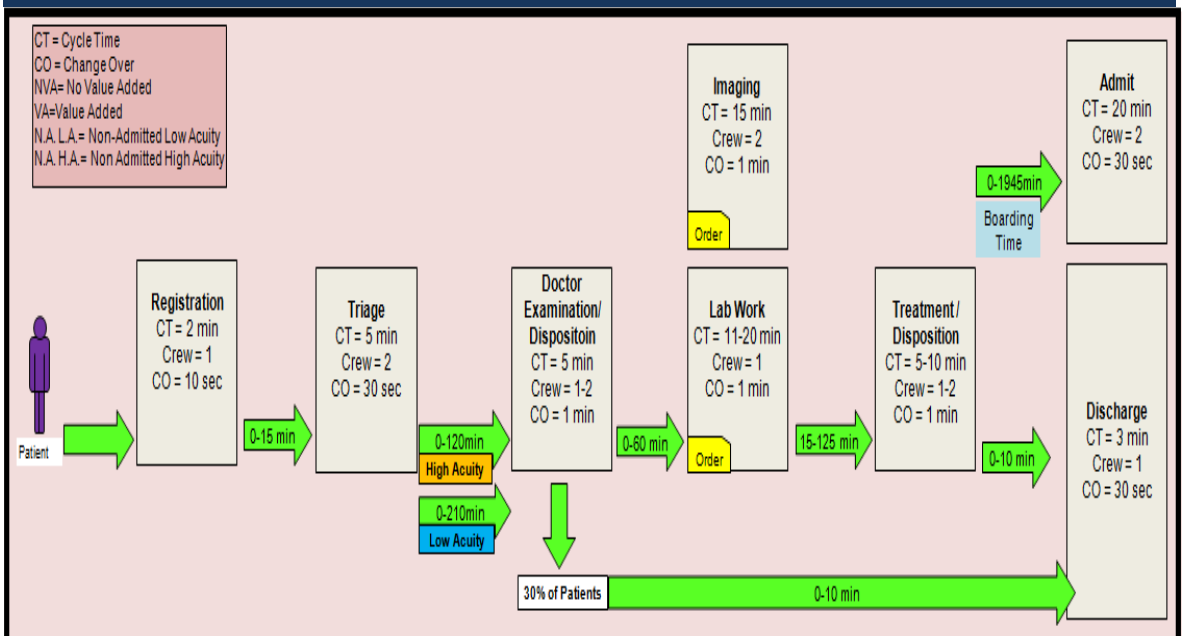
Having conducted four interviews, two with doctors and two with nurses, gave me a well rounded view about the underlying issues in the ED that affect wait times. An interesting finding which presented itself upon completion of the interviews was that each interviewee touched upon (some a little more in depth than others), the same three 'underlying' issues. All of which were confirmed to some degree, through the physical observations and the analysis of wait times. Therefore there was a clear agreement on what needs to be changed but I concluded that for the sake of this project, that both 'Management/ Human Resource Management' and 'General Resources' were not as crucial as the 'logistics' problem. As the logistics problem is obviously an organizational problem that can directly and indirectly improve the management issue and to some extent help maximize the currently resources by rearranging them and using the effectively.

APPENDIX 3: Detailed Problem Descriptions Continued.

Therefore, this paper will focus on how improving the logistics at RVC's ED can improve patient wait times while taking into consideration the limited resources that exist.

APPENDIX 4: Current Emergency Department Value Stream Graph (Detailed)

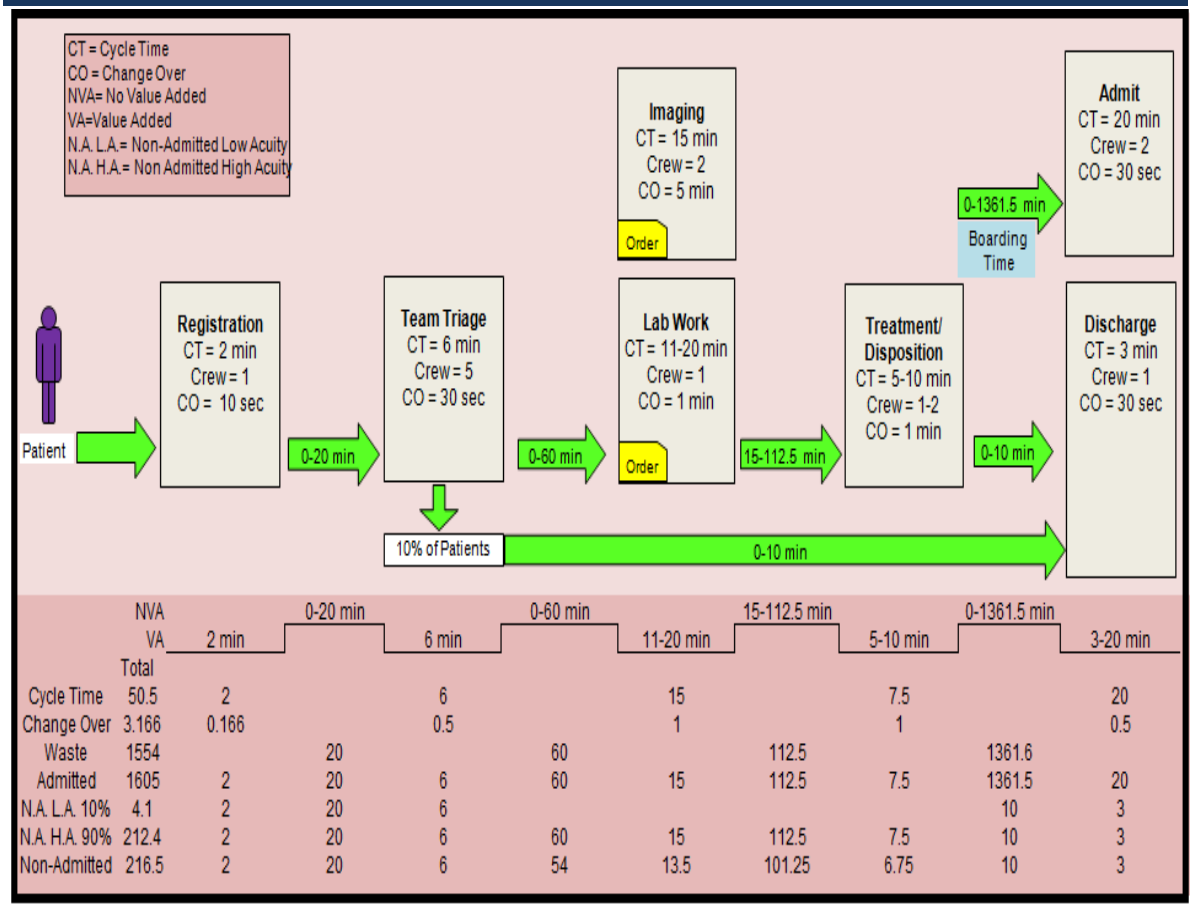
TABLE #13: Current Emergency Department Value Stream (Detailed)



	NVA / VA		0-15 min		0-120 min		0-60 min		15-125 min		0-1945 min	
	Total	2 min		5 min		5 min		11-20 min		5-10 min		3-20 min
Cycle Time	54.5	2		5		5		15		7.5		20
Change Over	4.17	0.166		0.5		1		1		1		0.5
Waste	2265		15		120		60		125		1945	
Admitted	2320	2	15	5	120	5	60	15	125	7.5	1945	20
N.A. L.A. 30%	75	2	15	5	210	5					10	3
N.A. H.A. 70%	259	2	15	5	120	5	60	15	125	10	10	3
Non Admitted	334	2	15	5	147	5	42	10.5	87.5	7	10	3

APPENDIX 5: Team Triage & OCP Value Stream Graph (Detailed)

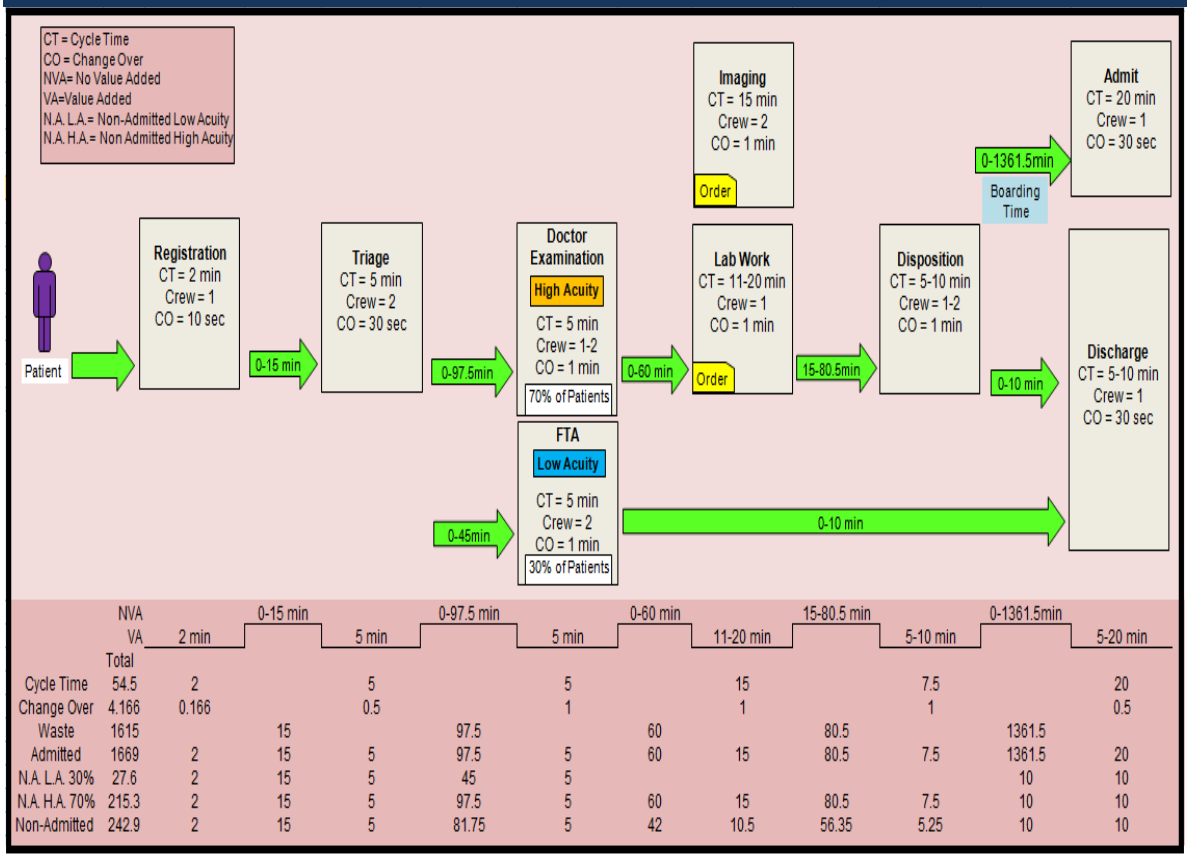
TABLE #14: Team Triage & Overcapacity Protocol Value Stream (Detailed)



		NVA	0-20 min		0-60 min		15-112.5 min		0-1361.5 min	
		VA	2 min	6 min		11-20 min		5-10 min		3-20 min
	Total									
Cycle Time	50.5	2		6		15		7.5		20
Change Over	3.166	0.166		0.5		1		1		0.5
Waste	1554		20		60		112.5		1361.6	
Admitted	1605	2	20	6	60	15	112.5	7.5	1361.5	20
N.A. L.A. 10%	4.1	2	20	6					10	3
N.A. H.A. 90%	212.4	2	20	6	60	15	112.5	7.5	10	3
Non-Admitted	216.5	2	20	6	54	13.5	101.25	6.75	10	3

APPENDIX 6: FTA & OCP Value Stream Graph (Detailed)

TABLE #15: Fast Track Area & Overcapacity Protocol Value Stream (Detailed)



	NVA / VA	2 min	0-15 min	5 min	0-97.5 min	5 min	0-60 min	11-20 min	15-80.5 min	5-10 min	0-1361.5min	5-20 min
	Total											
Cycle Time	54.5	2		5		5		15		7.5		20
Change Over	4.166	0.166		0.5		1		1		1		0.5
Waste	1615		15		97.5		60		80.5		1361.5	
Admitted	1669	2	15	5	97.5	5	60	15	80.5	7.5	1361.5	20
N.A. L.A. 30%	27.6	2	15	5	45	5					10	10
N.A. H.A. 70%	215.3	2	15	5	97.5	5	60	15	80.5	7.5	10	10
Non-Admitted	242.9	2	15	5	81.75	5	42	10.5	56.35	5.25	10	10

APPENDIX 7: Throughput Solutions to SWOT Analysis

Possible increase in low acuity patients:

- Upon discharge, discharge nurse should brief low acuity patients on alternatives to using the ED when presented with a non-urgent medical issue
- Each patient should be given a list of walk-in doctors within the local vicinity
- Patients who do not have a family physician should receive a 'Health Care Connect' pamphlet, a government program that will assist citizens in finding a family physician

Increased Costs:

- There would only be increased costs if an additional doctor is hired for 8 hours per day
- This could be done by finding savings in the $330 million (approximate) a year budget

Mentally and physically demanding on senior physicians:

- Physician should willingly accept the position and they should not be forced to work in Triage
- Could swop in senior physicians from the 'Ajax & Pickering General Hospital' who would be willing to work the position
- Have a creative scheduling system; e.g., three days on, three days off or four hour shifts, etc.

Change management may be difficult: Refer to *Appendix 9-11 'Critical Success Factors'*

APPENDIX 8: Output Solutions to SWOT Analysis

Short term fix, may be operating on an OCP multiple times a week:

- Forming a lobbyist group with hospitals across the nation in order to put pressure on the provincial and federal government to commit to permanent solutions to the overcrowding problem which will indirectly, improve the output
    - Financial incentives for ED to lower wait times, increase hours of operation for family doctors, same day appointments for family doctors, as well as the amplified ability for family doctors to treat patients (E.g. care for patients with: tonsillectomy, abscess removals, stitches, broken bones, etc.), more long term care facilities, etc.

Limited academic research on OCP:

- Sets the stage for RVC to invite researchers to conduct studies on the positive and negative effects of the OCP, by doing so, it would be added value to the hospital as well as the health care community

Increased workload on professionals in other wards

- Strong managerial communication is essential so professionals in other wards understand the burden of having an increased workload
    - Stress the importance of teamwork
    - Explain that overcrowding is a hospital issue and not only an ED problem
    - Convey all the positive results to all employees

Change management may be difficult: Refer to *Appendix 9-11 'Critical Success Factors'*

APPENDIX 9: Critical Success Factors

1. Each implication should adhere to a test phase period of at least six months before full scale implementation. Doing so, will validate all perceived benefits, test design specifications and work out all systematic errors. This will lead to a model that embodies user confidence, allowing for a smooth execution.

2. Creating and implementing an OCP involves leadership and cohesiveness from the top-down and throughout the entire hospital. The use the well renowned, Kotter's 'Eight Steps to Transforming Your Organization', will help in the execution of a successful Team Triage and OCP.

TABLE #16: Eight Steps to Transforming Your Organization

(Kotter. 2007)

APPENDIX 10: Critical Success Factors Continued

Implementing both recommendations simultaneously may be problematic as both employees and organizations tend to be resistant to change and some may feel that it is overwhelming. For those reasons, introducing them in a two phase process, first the OCP followed up by the Team Triage, will allow for a smoother transition.

Each step needed to complete the transformation is essential. The obvious urgency that exists at RVC is the major health risks of their patients due to prolonged wait times that put into question the Canadian Health Act of 1984. Moreover, understanding that there will be greater demand in the future due to the aging demographics and the increasing population, brings even more importance to the issue at hand.

Forming a powerful guiding coalition should involve leaders from different positions and areas of expertise. For example; A representative from the Board of Directors, ED physician(s), ED nurse, a health care consultant, professionals who have implemented similar changes, etc. Creating and building a strong cohesive team is the backbone to its success.

Upon creating a vision around the innovation needed to provide patients with quality care in a timely fashion, should be communicated through; the organizations website, staff meetings, the management team, training seminars, workshops, etc. After which, allow others to act on the vision; let them express their views, give suggestions and be a part of the movement.

APPENDIX 11: Critical Success Factors Continued

Then by planning for and creating short term wins, it will essentially reinforce employees and the leadership team alike that the implementations are credible and are creating positive change within the organization. These short term wins must be visible and unambiguous; for example, communicating the improved wait time statistics.

Upon consolidating the change, RVC should constantly look for further innovative approaches to improve current structures, processes, and the organizational culture that will ultimately reinforce the vision. This constant evolution will guarantee never ending success. Finally by institutionalizing the change, the old ways will be gone and the void will be filled by new and improved norms. The improvements will be in place and the success and new culture will be visible and well communicated to new and current employees, creating everlasting success.

APPENDIX 12: Overcapacity Protocol Sample

OVER CAPACITY PROTOCOL - ACUTE

1.0 PROTOCOL

When demands for urgent and emergent care continue to mount and no Emergency Department (ED) care spaces are available for these emergent and urgent patients and all usual actions for rapid admissions to inpatient beds have been maximized, the Over Capacity Protocol should be initiated. This protocol is intended to ensure systematic actions are undertaken to ensure admitted patients being cared for in the ED will be appropriately admitted to an inpatient unit. The protocol may be extended to other areas of the hospital, for example critical care, as required.

Persons presenting to the Emergency Department who are in need of an inpatient admission shall be admitted under an accepting Most Responsible Physician (MRP) to the appropriate clinical service. The MRP shall determine the need for admission including the degree of urgency. The MRP shall assume responsibility for the overall care of the patient regardless of the location of the patient in accordance with the Fraser Health's Most Responsible Physician policy and other standard operating policies of Fraser Health.

Patients in the Emergency Department who are in need of inpatient admission shall be subject to the current admitting processes. Discussions between nurses from the ED and receiving units will occur to ensure that clinical patient care needs are met.

APPENDIX 13: Overcapacity Protocol Sample Continued

Inpatients who have been admitted to an over-capacity inpatient bed shall be considered for the next available standard inpatient bed located on an appropriate unit. Treatment and care of all patients will continue on admission to an inpatient unit regardless of location.

2.0 PURPOSE

To minimize the risk to patients waiting for admission and treatment in Emergency Departments.

Prolonged stays in the Emergency Department directly impacts the Emergency Department's ability to assess and treat other patients in a timely and appropriate manner. The risk to patient safety and patient outcome is greater in those patients waiting with undetermined diagnoses in the waiting room than to those patients who may be moved to an over capacity bed in the facility.

3.0 DEFINITION

Over capacity involves placing patients to areas outside of the Emergency Department that are above the existing bed census for the site.

4.0 GUIDING PRINCIPLES

- Fraser Health is committed to ensuring the timely admission of all patients.
- Fraser Health will endeavour to ensure that admitted patients in Emergency who require inpatient care are admitted to an inpatient unit where the clinical knowledge and skills are appropriate for the patient's care requirements

APPENDIX 14: Overcapacity Protocol Sample Continued

- Fraser Health recognizes its Emergency Department resources are intended to provide a response to persons with urgent or emergent clinical needs. Emergency Department resources are not intended to be used for ongoing inpatient care.
- Patient safety and appropriateness of care are paramount considerations in determining the unit to which an emergency inpatient should be admitted.
- The risk to patient safety and patient outcome is greater in those patients waiting with an undetermined diagnosis than to those patients who have been examined, investigated, diagnosed and are awaiting admission to hospital.
- Hospital overcrowding needs to be addressed with the support of the entire health care system.
- Steps will always be taken to maximize patient flow and resource allocation prior to implementing the Over Capacity Protocol.
- Fraser Health acknowledges that the use of an Over Capacity Protocol is a serious and significant action and must be monitored for its potential to cause negative patient outcomes.

5.0 CRITERIA FOR IMPLEMENTATION

- All steps in the site for decongesting the Emergency Department have been enacted without measurable relief.
- The Emergency Department is no longer able to safely continue to receive incoming patients.

APPENDIX 15: Overcapacity Protocol Sample Continued

6.0 PRINCIPLES TO GUIDE PATIENT SELECTION FOR OVER CAPACITY BED

- All patients must have admitting orders and an MRP.
- Each unit will determine patient selection and location for over capacity in consultation with Site Leaders/Access.
- In the absence of an appropriate patient to transfer from the Emergency Department, patient care units will review the existing inpatient population for a suitable patient to place in the Over Capacity Protocol bed so that the emergency patient can be transferred immediately.

7.0 REPORTING

Each site will include the number of patients transferred to inpatient units under the Over Capacity Protocol on the Access daily bed status reports.

8.0 PROCEDURES

See the pertinent Hospital's Decongestion Plan for details about the location of patients, patient care needs and staffing models.

9.0 EVALUATION

- Ongoing patient care quality review process at each hospital
- Fraser Health's Emergency Status Access Report

10.0 REFERENCES

- www.calgaryhealthregion.ca/policydb/ - "Admission of Patients to Over-Capacity Inpatient Beds" - Policy # 1451
- Vancouver Coastal Health Authority – "Over Capacity Protocol"
- Canadian Association of Emergency Physicians, (2004). Revisions to the Canadian Emergency Department and Triage Acuity Scale Implementation Guidelines, Canadian Journal of Emergency Medicine, (6)