PROSTATE CANCER:
WAIT TIMES TO SEE A UROLOGIST

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Prostate Cancer: Wait Times to See a Urologist

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ABSTRACT

Background: Improving wait times has become a national priority and prostate cancer wait times have not been studied in Newfoundland and Labrador (NL).

Methods: Using a retrospective chart review, we measured and compared wait times for prostate cancer care to benchmarks set by local, national, and international experts. Residents who had a prostate biopsy between April 1, 2009 – March 31, 2010 at the Health Science Centre in St. John's, NL were eligible.

Results: The 341 eligible patients experienced the longest median wait of 68 days (0-310) between general practitioner date of referral to first visit with urologist. Few men met the established benchmarks for suspected prostate cancer care. Delays were not uncommon, and most often existed between date of biopsy and notification of results.

Conclusion: Few men met local and national wait time benchmarks for prostate cancer care. Findings can be used to identify strategies to improve the timeliness of specialist care in NL and to enhance the reliability of wait times research.

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LIST OF ABBREVIATIONS

CCS ..... Canadian Cancer Society

CGH ..... Calgary General Hospital

CIHI ..... Canadian Institute for Health Information

CSSO ..... Canadian Society of Surgical Oncology

DRE ..... Digital Rectal Exam

EBR ..... External Beam Radiation

GP ..... General Practitioner

IBR ..... Internal Beam Radiation

MOHLTC ..... Ministry of Health and Long-Term Care of Ontario

NL ..... Newfoundland and Labrador

PIN ..... Prostatic Intraepithelial Neoplasia

PSA ..... Prostate Specific Antigen

RP ..... Radical Prostatectomy

TGH ..... Toronto General Hospital

TNM ..... Tumor Node Metastasis

TRUS ..... Transrectal Ultrasound

UKNHS ..... United Kingdom National Health Service

WCWL ..... Western Canada Wait List Project

WTA ..... Wait Time Alliance

CHAPTER 1

INTRODUCTION

1.1 Background

Prostate cancer has a higher incidence rate in Canadian men than any other cancer (Canadian Cancer Statistics, 2011). In 2011, it was anticipated that 122 per 100 000 Canadian men would be diagnosed with prostate cancer and an estimated 21 per 100 000 men would potentially die from it. Atlantic Canada has been shown to have a higher incidence rate of prostate cancer than the rest of Canada (Canadian Cancer Statistics, 2011).

In 2011, Newfoundland and Labrador (NL) had an expected incidence rate for prostate cancer of 119 per 100 000 men and at least 29 per 100 000 men were expected to die from the disease (Canadian Cancer Statistics, 2011). These are considered to be underestimates due to the variability in the reporting of data from the province.

Although timely access is believed to be one of the keys in reducing morbidity and mortality related to prostate cancer (Saad et al., 2006), appropriate wait times or benchmarks have not been established for prostate cancer. To date, there have been few studies that have examined wait times for prostate cancer care in Canada and none in NL.

1.2 Research Goals and Objectives

This study will describe wait times for prostate cancer care provided by urologists located in St. John's, NL. The specific objectives of the study are:

1. to use chart audit data to measure the wait time intervals for patients with suspected or confirmed prostate cancer in NL. Specific intervals of wait time will be described, including those related to elapsed time between: (a) general

practitioner[1] (GP) referral to first visit with an urologist; (b) decision to biopsy to date of biopsy; (c) date of biopsy to when the pathology report is received by the urologist; (d) date pathology report received to when the patient is informed; and (e) decision to treat to date of first treatment.

2. to examine differences in wait times for men who met and did not meet locally established benchmarks which are related to the following characteristics: community of residence (urban/rural), urgency (non-urgent and urgent symptoms) , and age (young – less than 70 years of age and old – over 70 years of age).

This study will test the following hypotheses:

a. the longest wait interval will occur between the general practitioner referral and first visit with urologist.

b. variations in intervals and total wait times will be related to place of residence, stage of disease, and the age of the patient. Rural, older (≥70 years), and non-urgent patients will wait longer than urban, younger and urgent prostate cancer patients, respectively.

1.3 Rationale

In 1998, Macdonald et al. outlined many problems surrounding the management of wait times and made recommendations for improving the management of health services. They found that "with few exceptions Canada's waiting lists are non-standardized, capriciously organized, poorly monitored, and (according to most informed

[1] The terms family physician, family practitioner, and general practitioner are used interchangeably despite the differences in credentialing.

observers) in grave need of retooling" (Macdonald et al., 1998, pg.*i*). Improving wait times in Canada is an important issue to Canadians and Health Canada has made researching Canada's wait times a national priority (Health Canada, 2004).

In September 2004, Canada's First Ministers created a 10-Year Plan to Strengthen Health Care in which the First Ministers planned to target organization of wait times and reduce waits in five key areas: (a) heart; (b) diagnostics; (c) hip and knee replacement; (d) sight restoration; and (e) cancer. To do this, the plan provided targets for improving waiting times by:

1. establishing comparable wait time data by the end of 2005.
2. providing evidence-based benchmarks by the end of 2005.
3. having each province and territory reporting their wait time data and progress in meeting the wait time targets by the end of 2007 (Health Canada, 2004).

While there have been improvements in reducing wait times for health care services in Canada since the First Ministers met in 2004, the problem is far from being solved. Multiple lists still exist, the reporting of how long people are waiting and for what service is lacking, and efforts to make the data comparable are far from complete (Canadian Institute for Health Information [CIHI], 2006). In order to show the public whether wait times are improving or not, provinces and territories need a baseline measurement. They also need to report data collected from across their jurisdictions consistently to demonstrate their progress, or lack thereof (Health Council of Canada [HCC], 2007).

This study is important because it helps address the national health priorities outlined by Health Canada's 10-year Plan to Strengthen Health Care in Canada. Specifically, this study will:

1. provide reliable and accurate baseline data regarding specific patient wait times for prostate cancer care in NL.

2. aid in identifying the unacceptable or unsatisfactory intervals of wait for prostate cancer patients in NL.

This study will begin to collect data on prostate cancer wait times and describe how long those patients are waiting for each service. Hence, this project will provide baseline data to help access the performance of the prostate cancer care system and identify potential future interventions aimed at reducing waiting times for prostate cancer care. It will also contribute to the body of knowledge around data and methodological challenges associated with wait times research.

The results of this project are relevant to cancer care providers (urologists and oncologists), the Department of Health and Community Services, cancer advocacy groups (prostate cancer support groups), patients and their families, and clinical and health services researchers.

CHAPTER 2

LITERATURE REVIEW

This literature review is organized into two main sections. In the first section, the disease of prostate cancer is introduced and described, and current methods of detection, staging and treatment are outlined. In the second section, the issue of wait times for health care is discussed in terms of definitions and factors impacting wait times, followed by a review of challenges associated with measuring wait times for cancer care generally and prostrate cancer specifically.

2.1 Prostate Cancer:

2.1.1 The Disease

The prostate, as shown in Figure 2.1, is part of the male reproductive system and produces seminal fluid to make semen. The size of the prostate gland is walnut sized and is found underneath the penis next to the urethra (Canadian Cancer Society [CCS], 2010).

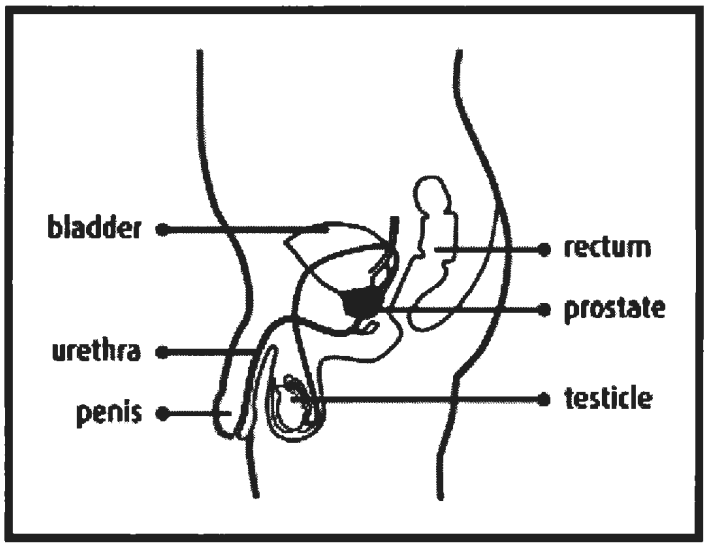

Figure 2.1: The prostate. Borrowed with permission from the Canadian Cancer Society.

Prostate cancer is one of several types of cancers that may develop in the body. Some commonalities exist between the many different cancers. Cancer cells grow without controls and limits; they keep growing and can spread and overwhelm the body. Prostate cancer can be defined by the uncontrolled growth of the glandular cells located within the prostate (Marks, 1999). These cells typically produce fluid that make up part of the semen.

In most situations, prostate cancer is a slow growing cancer, although, there are instances where prostate cancer can grow very rapidly and become deadly. There are groups of males that are more likely to develop prostate cancer than others. If there is a family history of prostate cancer, it is reasonable to assume the risk is higher for developing prostate cancer (Marks, 1999). Prostate cancer is also associated with older age; as the population ages more prostate cancer is usually detected. Even though the risk of prostate cancer diagnoses grows as men age, many can live with undiagnosed prostate cancer only to pass away from another disease (Ilic, O'Connor, Green, & Wilt, 2006).

Prostate cancer symptoms consist of: (a) the need to urinate often; (b) difficulty urinating; (c) semen and blood found in urine; (d) burning sensation during urination; (e) urine flow problems; and (f) painful ejaculation (CCS, 2010). Prostate cancer can remain asymptomatic for many males and may be discovered through screening methods such as the prostate specific antigen (PSA) test or the digital rectal exam (DRE). However, symptoms can begin to appear when a tumor begins to grow and affect the flow of urine. Typically, as men age and grow older, prostate cancer symptoms can begin to become noticeable; however, these symptoms can also be related to a common condition known as

benign prostatic hyperplasia (BPH). Due to the similarities between both prostate cancer and BPH, diagnostic testing is necessary.

2.1.2 Detection Methods

A screening test is a test for a certain disease given to individuals who are asymptomatic. Individuals with a history of prostate cancer in their family are recommended to undergo annual screening tests, such as a DRE and PSA test starting by the age of 40 (Marks, 1999). These screening tests intend to diminish disease-specific morbidity and mortality by detecting prostate cancer earlier and more often (Marks, 1999).

2.1.2.1 The Digital Rectal Exam (DRE)

A DRE is performed to check for problems with the prostate and/or the urology tract. During the examination, a physician uses a gloved finger of one hand to enter the rectum to feel for abnormalities on the prostate gland. A prostate tumor can usually be felt as a hard or boggy lump (Marks, 1999). Most often, the DRE is used together with a PSA test and is not used alone to screen for prostate cancer. Any abnormality in the DRE and PSA can reflect symptoms of other common conditions like BPH. Furthermore, the physician can miss abnormalities in the DRE because the tumor can grow on the opposite side of the prostate that cannot be palpated.

2.1.2.2 The Prostate Specific Antigen Test (PSA)

The PSA test is a blood test that may help detect prostate cancer by measuring prostate specific antigen quantities created by the prostate. While it is typical to find small quantities of PSA in the blood, problems with the prostate can cause increases in blood PSA (CCS, 2010). PSA levels can also change with age, increase gradually and can be

attributed to other known conditions such as BPH, urinary infection, or a recent prostate biopsy (Nam and Klotz, 2009). However, men with prostate cancer can still have normal PSA levels.

While the aim of PSA screening for prostate cancer is to improve the survival rates and increase the quality of life, there is little consensus on the effectiveness of such screening. The Cochrane Review of prostate cancer screening found that the PSA test discovered prostate cancer more often than not, but did not reduce prostate cancer death (Ilic et al., 2006).

In 2009, two landmark studies were published in the New England Journal of Medicine that examined strategies for incorporating the PSA test for screening purposes. The first study was a large randomized control study based in the United States which involved 76 693 men from the Prostate, Lung, Colorectal and Ovarian (PLCO) cancer screening trial. Subjects were randomly assigned to one of two groups: either an annual PSA screening group (in addition to prostate examinations) or a no screening (control) group. The primary outcome in the study was death because of prostate cancer. After completing a 7-year follow-up, the PLCO study found that the incidence of mortality was not significantly different between the screening and control groups (2.0 per 10 000 person-years in the screening group and 1.7 per 10 000 in the control group; rate ratio, 1.13; 95% CI, 0.75 to 1.70 (Andriole et al., 2009).

The European Randomized Study of Screening for Prostate Cancer (ERSPC) included 162 243 men. These men were randomly assigned to a group that was offered PSA screening at an average of once every four years or to a control group that did not

receive such screening. The age group for this study included men between the ages of 55 and 69 years. The primary outcome was the rate of death from prostate cancer. The study found that the ratio of death from prostate cancer in the screening group compared to the control group was 0.80 (95% CI, 0.65 to 0.98; adjusted P = 0.04). Although the PSA test reduced the rate of death from prostate cancer by 20%, it was associated with a high risk of over diagnosis.

Due to the conflicting results from these studies the medical community continues to debate the role of PSA testing (Schroder et al., 2009). Comparing these two studies it is important to point out some potential critiques. First, the PLCO study had 44% of all patients undergoing PSA testing before entering the study, which eliminated patients with aggressive prostate cancer whose death may have been prevented by screening. Furthermore, only 40% of the patients had a prompt biopsy when their PSA went up, and 52% of the controls had PSA testing. These choices may have lead to a lack of evidence supporting a mortality benefit for annual PSA screening.

Currently the U.S. Preventive Services Task Force (USPSTF) recommends against PSA-based screening for prostate cancer given the benefits don't outweigh the harms. This recommendation applies to men in the general U.S. population, regardless of age. This recommendation does not include the use of the PSA test for surveillance after diagnosis or treatment of prostate cancer; the use of the PSA test for this indication is outside the scope of the USPSTF (U.S. Preventive Services Task Force, 2012).

2.1.2.3 The Transrectal Ultrasound (TRUS) Biopsy

If the PSA test and DRE suggest the possibility of prostate cancer, it is necessary to have a biopsy to determine the presence of cancer. Prostate biopsies guided by a transrectal ultrasound (TRUS) are performed to confirm diagnoses. The biopsy consists of a core needle guided by a TRUS penetrating the wall of the rectum into the prostate gland (ACS, 2009). The needle obtains a sample of the prostate, which is then examined for cancerous cells by a pathologist. Typically, eight to 18 core samples are taken; most urologists in NL take 12 samples (Dr. Chris French, personal communication, February, 2009).

2.1.3 Staging

From the biopsy, the grade of the cancer is determined using the Gleason scoring system. According to So & Goldberg, Gleason grading assesses "prostate glandular architecture rather than cytological morphology" (*pg. 24*, 2004). The grade of the cancer indicates the nature of the cancer and its potential behavior by comparing prostate cancer cells to normal cells in the prostate (Marks, 1999). Gleason score is considered to be the best method of grading, because this method examines the heterogeneity of prostate cancer, and has demonstrated the greatest prognostic value (American Joint Committee on Cancer Staging [AJCC], 2012).

The Gleason score or Gleason sum is obtained by adding the primary and secondary grades together. As Gleason scores range from one to five, therefore they can range from 2 to 10. Well-differentiated tumors have a Gleason sum of 2–4, moderately differentiated tumors have a Gleason sum of 5–6, and poorly differentiated tumors have a Gleason sum of 8–10. Gleason score can be classified by: (a) 6 or less as low-risk; (b) 7 as intermediate-

risk; and (c) 8 or above as high-risk. Gleason 7 tumors can be further stratified into either 3+4 or 4+3 positive cores, depending on which grade is most common in the biopsy cores (Epstein, 2011; So & Goldberg, 2004; D'amico et al., 1998). According to Dr. Chris French, this approach to Gleason scoring is used by urologists in St. John's, NL (personal communication, 2012).

Staging describes the progression of an individual's cancer. Knowing the stage of the disease can help patients and urologists plan treatment options and estimate prognoses. A common system for urologists describing the stage of cancer is the Tumor Node Metastasis (TNM) system: T describes tumor size, how much of the prostate it occupies, and its involvement with other tissue, N describes if any lymph node involvement, and M describes metastasis or the movement of cancer from one area of the body to another. Table 2.1 further describes how the staging of prostate cancer takes place (National Cancer Institute, 2010; AJCC, 2012). For example, prostate cancer described as T2c N0 M0 means the tumor is in both lobes but is still inside the prostate gland, with no cancer spreading to the lymph nodes, and no cancer spreading outside areas outside of the pelvis.

Table 2.1: TNM Staging System According to the American Joint Committee on Cancer Staging

Staging	Description
T1	The tumor is too small to be seen on scans or felt during examination of the prostate
T2	The tumor is completely inside the prostate gland
T2a	The tumor is in only half of one of the lobes of the prostate gland
T2b	The tumor is in more than half of one of the lobes
T2c	The tumor is in both lobes but is still inside the prostate gland
T3	The tumor has broken through the capsule (covering) of the prostate gland
T4	The tumor has spread into other body organs nearby, such as the rectum (back passage) or bladder
N0	No cancer cells found in any lymph nodes
N1	One positive lymph node smaller than 2cm across
N2	More than one positive lymph node. Or one that is between 2 and 5cm across
N3	Any positive lymph node that is bigger than 5 cm across
M0	No cancer has spread outside the pelvis
M1	Cancer has spread outside the pelvis

Staging of cancer can be separated into two distinct areas: clinical and pathological. Clinical staging identifies how much cancer is present based on physical examination, diagnostics, and biopsies of the prostate. Clinical staging is used by the urologist to triage and treat patients until pathological staging is available. Pathological staging of cancer occurs only for patients who have surgery to take out the affected tissue and explore the extent of the cancer. Pathological staging considers the physical examination, imaging tests, and the surgical results (AJCC, 2010). The clinical stage of cancer will be used in this study as it best reflects current urological practice. The Canadian Surgical Wait Times (SWAT) Initiative (2006) suggests that when treating prostate cancer, it is best practice to triage patients based on risk:

1. a high-risk patient will have a PSA greater than 20 ng/ml, Gleason score greater than 7, and/or T3b.
2. a intermediate risk patient will have a PSA between 10 and 20 ng/ml, a Gleason score of seven, or T2b, T3a.
3. a low-risk patient will have a PSA less than 10 ng/ml, Gleason score less than seven, and a clinical stage of cancer of T1-T2a.

2.1.4 Treatment Options

There are many different treatment options available for treating prostate cancer and the right treatment depends on age, Gleason score, stage, symptoms, and the general health of the patient. Treatment options mainly include: (a) active surveillance (watchful waiting); (b) surgery; (c) radiation therapy; (d) hormone therapy; and (e) chemotherapy. It is possible that prostate cancer may not require treatment as soon as it is diagnosed and

an active surveillance approach may be deemed appropriate. This approach allows patients to avoid potential side effects or other treatments such as erectile dysfunction or bladder control (CCS, 2010). Patients would expect to have regular PSA tests, rectal examinations, and/or a repeat biopsy, which may suggest a change in the growth of the prostate cancer. (Dr. Chris French, personal communication, February, 2010).

2.1.4.1 Surgery

If the cancer is only found within the prostate and has not spread having surgery to remove the prostate can be one of the best options for cure. This treatment option is common for men who are under the age of 70, in good health, and have a stage of T1 or T2, or a small T3 cancer tumor. At the time of surgery, the surgeon may remove some lymph nodes proximal to the prostate to examine if the cancer has spread. The surgery may be performed in a number of different ways including robotic assistance, the use of a scope, or open surgery. Special techniques may be used during surgery to help spare the nerves in maintaining erections. Surgery can produce side effects such as impotence and/or the inability to control urine flow (incontinence). Therefore, different surgical techniques are offered, depending on the progression of the cancer and the potential for side effects such as loss of bladder control, erectile dysfunction, narrowing of the urethra, and bleeding or infection (National Cancer Institute, 2013; CCS, 2010).

2.1.4.2 Radiation

There are two types of radiation techniques used to treat and/or manage prostate cancer: external beam radiation (EBR) and brachytherapy (National Cancer Institute, 2013; Marks, 1999). EBR is high-energy x-ray beams that are directed at mens' prostate tumours to destroy cancer cells. This involves using a three-dimensional conformal

treatment plan with intensity-modulated radiation therapy (IMRT) to maximize the dose to the prostate while minimizing damage to adjacent structures. EBR still remains the standard of care in many settings and may be offered to men for a potential cure, low or medium-grade cancers who would not be considered for surgery due to other health problems, adjuvant therapy, or in advanced cases to control the progression of the cancer or palliative care (National Cancer Institute, 2013; CCS, 2010).

Postoperative EBR has been used to improve local-regional control by eliminating microscopic residual tumor in the area where surgery was performed, surrounding prostatic tissues, and bordering lymph nodes. Many patients may be offered postoperative EBR if they are found to have: (a) cancer found on the margins of the prostate; (b) seminal vesicle involvement; (c) lymph node involvement, (d) extracapsular extension; (e) rising PSA; and (f) recurrence of the cancer found by biopsy. These variables have been associated with biochemical recurrence (National Cancer Institute, 2013).

Brachytherapy involves implanting radioactive, rice-sized seeds in the prostate. The seeds release radiation, killing the cancerous cells. The dose and length of treatment depends on the treating physician and the specific case of cancer. This treatment may be offered to men who have early-stage prostate cancer with small prostates or to men with large prostates after hormone therapy or in conjunction with EBR. One popular advantage with this form of radiation is the ability to deliver a very high dose of radiation to a localized area with a decreased number of treatment visits (National Cancer Institute, 2013; CCS, 2010).

2.1.4.3 Chemotherapy

Chemotherapy uses medication to destroy cancer cells or help prevent them from growing. One problem is that chemotherapy may also damage normal cells. In men with advanced-staged prostate cancer, chemotherapy may help the progression of the cancer, prolong life, and relieve pain that may occur further in the disease course. This treatment is usually not offered to men who have early-stage disease. However, chemotherapy is offered to men whose cancer has returned or has spread to another area of the body and is considered treatment of choice when there is progression of disease despite low levels of testosterone (castration-resistant prostate cancer) (National Cancer Institute, 2013; Maluf, Smaletz, & Herchenhorn, 2012).

2.1.4.4 Hormone Therapy

Endocrine or hormone therapy blocks the body's production of androgens, which are steroid compounds that produce the male characteristics (CCS, 2010). Endocrine therapy is not a cure, but data exists to suggest that it may decrease cancer growth in 70-85% of patients (CCS, 2010). The most common types of endocrine therapies are: (a) luteinizing hormonal therapies (LHRH antagonists/agonists); (b) anti-androgens; and (c) orchiectomy surgery (removal of the testicles). This treatment is most often offered to men whose cancer has spread outside the prostate, who have high-risk of cancer recurrence after radiotherapy or surgery, or for men who are not suitable candidates for surgery or radiation (National Cancer Institute, 2013). Some side effects of this treatment are sweating, loss of sex drive, anergia, osteopenia and possibly anemia (low red blood cell count)(National Cancer Institute, 2013, CCS, 2010).

2.2 Wait Times

2.2.1 Definition of Wait Time

Waiting time refers to the length of time required for a patient to receive a desired service. Wait times can affect a patient's ability to benefit from certain health services by delaying their access to those services (Macdonald et al., 1998).

At this time, there are no nationally standardized definitions for wait times; specifically, when a wait begins and when a wait ends, nor are there are standards for measuring those waits (e.g. mean, median, 90^{th} percentile). For instance, some studies reporting wait times in Canada may investigate the time elapsed from decision to treat to first treatment, diagnosis to first treatment, date of booking hospital appointment to first treatment, or biopsy to first treatment. Moreover, provinces are only reporting on data for a small number of health services. Most importantly, these reports on wait times only reflect a fraction of the total wait time a patient may experience throughout the care pathway (Canadian Partnership Against Cancer, 2012). To this extent, understanding and comparing wait times in the literature, and between provinces remains difficult.

Under the aegis of the Western Canada Waitlist Project (WCWL), Sanmartin (2001) recommends specific definitions for studying and reporting on wait times. First, the wait time to see a family physician should begin with first contact with that provider and ends with the first visit. The wait time to see a specialist begins with date of referral and ends with the first visit. Diagnostic tests can confirm diagnoses and treatment decisions. The waiting time for diagnostic testing is defined as the time between the date of the request for a specific test and the date of examination. Lastly, patients can wait for further treatments or consultations, beginning upon referral to other specialists or

decision to treat. This study employs these definitions for collecting and reporting data about wait times for prostate cancer treatment.

2.2.2 Factors Contributing to Wait Times

2.2.2.1 Health Care Systems Management

A waiting list is a roster of patients waiting for a particular health service (Macdonald et al., 1998). According to the Romanow Report (2002), physicians or hospitals manage wait lists for specific services individually, making it very difficult to track and monitor these lists. There is very little collaboration and coordination that takes place between physicians or hospitals. Each specialist's list may vary in size, which can change how long patients may experience a wait. A patient on one physician's list may wait longer for a service than a patient on another physician's list for the same service (Macdonald et al., 1998). Lack of management can be considered one of the greatest factors impacting wait lists (Romanow, 2002).

2.2.2.2 Aging Populations

Some wait lists, particularly for age sensitive conditions, are increased due to the aging population. Macdonald et al. (1998) believe this is cause for concern because older age populations consume more health care services than other populations, particularly for a variety of medical services such as radiation oncology, which is already under pressure.

2.2.2.3 Patterns of Disease

The waiting times for individuals may also be affected by the increased rates of illness and disease throughout the province. According to the Department of Health and Wellness of Nova Scotia (2009), chronic conditions such as diabetes, heart disease, and

arthritis are costing Nova Scotia taxpayers an estimated $3 billion a year. Increased incidence and prevalence stimulate demand for health services and contribute to wait times in any province. Furthermore, since the development of new detection methods and a push for earlier detection of disease, there has been a substantial increase in new cases of cancer and other diseases, further increasing demand for health services. This has put substantial pressure on disease specific services such as radiation oncology (Macdonald et al., 1998). For example, the PSA test may reduce the rate of death from prostate cancer by 20%, but it may be associated with a high risk of over diagnosis thereby increasing demand for health services (Schroder et al., 2009).

2.2.2.4 New Technology

Physicians today use many types of diagnostic imaging tests to confirm a clinical diagnosis like a magnetic resonance imaging (MRI) or a computer tomography (CT) scan. These tests make up three and 11% of our health care systems imaging technology costs respectively (CIHI, 2006). Due to increased demand for these tests, patients still seem to be reporting difficulties accessing these services. Similarly, patients who require diagnostic imaging for cancer diagnosis may experience the same waits associated with these diagnostic-imaging technologies (CIHI, 2006).

2.2.2.5 Age

A patient's age can influence how he is managed for prostate cancer care. According to Dr. Chris French (personal communication, April, 2010) radical treatment is rarely offered to patients with a life expectancy of less than 10 years. This is because the mortality due to prostate cancer is not necessarily reduced and sometimes the treatment itself can cause harm. Also due to the nature of the triage method Bott, Periera,

Eddy, and Montgomery (2006) suggest that it might be more suitable to manage patients older than 80 years without biopsy. We suspect that older men may wait longer to see a urologist given these local practices in St. John's, NL (Dr. Chris French, urologist, personal communication, May, 2010). A study by Fleshner et al. (2000) illustrated the differences in practices between Canadian and American urologists in this regard. Urologists in Canada were less likely to perform regular biopsies and aggressive treatments for men over the age of 70 years than urologists located in the United States.

2.2.2.6 Community of Residence

According to Campbell, Ritchie, Cassidy, & Little (1999), there are many benefits with the centralization of resources such as cancer care in a health system, but there is also a glaring weakness. Patients from remote areas seeking cancer care treatment or to see a specialist can experience a sizeable difference in accessibility of health services compared to those patients living in urban areas (Campbell et al., 1999).

Cancer patients' treatment time may depend on their area of residence (Launoy, Le Coutour, Gignoux, Pottier, and Dugleux, 1992). Launoy et al. (1992) studied how community of residence impacts the utilization of health care services for colorectal cancer. Specifically, their study compared males and females in rural and urban areas and their clinical symptoms, treatment center (specialized or non-specialized), and survival for colorectal cancer. They found that people living in rural areas were less often treated in specialized centers (41-45% of males and 32-35% of females) than urban patients (50-55% of males and 51-57% of females). Moreover, severe clinical symptoms were significantly associated with rural women ($p < 0.05$) more than urban women, but no difference in survival was illustrated. The authors attributed the severe clinical symptoms

found in women to longer waiting times for health services. However, no analysis of waiting times was presented in the journal article to support those claims.

2.2.2.7 Stage of Cancer

In a study by Mayo et al. (2001), the median waiting times were shorter for patients with more advanced stage of cancer than those with more localized cancer. This can be attributed to providers triaging patients with early stage diagnosis to wait longer than patients with an advanced stage of cancer. A later study by Comber, Cronin, Deady, Lorcain & Riordan (2005) suggests that patients with early stage of cancer are experiencing longer waits than those with late stage diagnoses. It seems that "patients with longer waiting times generally had less advanced disease and better survival, suggesting that typical delays are not of clinical significance, but that patients with advanced disease are probably being "fast-tracked" by GPs and hospitals" (Comber et al., 2005, *pg. 1*).

2.2.3 Benchmarks for Wait Times

The Western Canada Wait List Project (WCWL) was created in 1998 through the funding of Health Canada's Health Transition Fund. The WCWL was created with the objective "to improve the fairness of the system, so that Canadians' access to appropriate and effective medical services is prioritized on the basis of need and potential to benefit." (Western Canada Wait List Project [WCWL], 2005, *pg. 1*). In 2004, Canada's First Ministers created a strategy to improve wait times called *Canada's 10-Year Plan to Strengthen Health Care*. This 10-year plan focused on ensuring that Canadians have access to care they need, when they need it. According to the plan (2004), each province or territory will help in providing benchmarks (a maximum wait time that is

recommended by experts to be medically acceptable) by the end of 2005. To this end, every province will aim to meet the objective of timely care. In addition, the report called upon each province and territory to report their current wait times for the five priority areas of health (cancer, diagnostic imaging, joint replacements, heart, and cataract surgery) to their citizens.

In 2005, Ontario's Ministry of Health and Long-Term Care (MHLTC) issued an announcement on the benchmarks for the five priority areas outlined above[2]. Under these new benchmarks, provinces and territories aimed to provide and report on wait times in reference to those standards. Among others, the cancer benchmark was established as four weeks from when the patient is ready to receive treatment to the actual date of radiotherapy.

The Wait Time Alliance (WTA) was created as a physician's response to Canadians' concerns about health care services. The Canadian Medical Association (CMA) and other specialty associations concerned with wait times represent the WTA. The WTA issued a report in 2005 – *It's About Time* – describing their recommendations for medically acceptable benchmarks. Their recommendations are illustrated along with the federal government's benchmarks in Table 2.2. Although the WTA released their suggestions for benchmarks, each province and territory continue to report on the wait times established by Ontario's Ministry of Health and Long-Term Care (MHLTC).

[2] FPT Announcement, December 12, 2005

Table 2.2: Canadian Established Benchmarks (MHLTC, 2005)

Treatment	**Provincial Benchmarks**	**Wait Times Alliance Benchmark**
Radiotherapy for cancer	Radiation therapy to treat cancer within 4 weeks of patients being ready to treat	A) Consultation within 10 working days B) Treatment within 10 working days of consultation
Hip/knee replacement	Hip and knee replacements within 26 weeks (6 months)	A) Consultation within 3 months B) Treatment within 6 months of consultation
Cardiac	Cardiac bypass surgery	A) Level I patients within 2 weeks; B) Level II patients within 6 weeks; and c) Level III patients within 26 weeks
Cataract surgery	Surgery to remove cataracts within 16 weeks for patients who are at high risk	Within 16 weeks (4 months) of consultation
Diagnostic imaging	None given, although screening guidelines for breast and cervical cancer were proposed	A) Cardiac nuclear imaging within 14 days B) Other imaging within 30 days

2.2.4 Recommended Wait Times For Cancer Treatment

Wait times for cancer treatment in Canada remain a major problem in the delivery of care. Different interest groups and researchers have provided many different recommendations for medically acceptable wait times based on the available evidence and expert opinions. Table 2.3 summarizes these recommendations.

Table 2.3: Recommended Wait Times for Cancer Treatment From the Literature

Reference	Wait Time Definition	Recommended Maximum Wait Time	Type of Cancer	Type of Treatment
UK National Health Service, 2006	GP referral to specialist assessment	2 weeks	All cancer	All surgeries
UK National Health Service, 2006	Diagnosis to treatment	1 Month	All cancer	All surgeries
UK National Health Service, 2006	Urgent GP referral to treatment	2 Months	All cancer	All surgeries
Canadian Society of Surgical Oncology, 2012	Referral to consultation	2 weeks	All cancer	All surgeries
Canadian Society of Surgical Oncology, 2012	Conclusions of preoperative tests to treatment	2 weeks	All cancer	All surgeries
Ontario's Ministry of Health and Long-Term Care (MHLTC), 2005	Radiation therapy: ready to treat to treatment	4 weeks	All cancer	Radiotherapy
Canadian Surgical Wait Times (SWAT) Initiative, 2006	Decision to operate until day of surgery	1.[a]High Risk ≤28d 2.[b]Medium Risk ≤60d 3.[c]Low Risk - ≤90d	Prostate cancer	Prostate cancer surgery
Moul et al., 2004[d]	From diagnosis to treatment	3 months	Prostate cancer	Radical prostatectomy
Esmail and Walker, 2005	From diagnosis to treatment	4 weeks (range: 3 to 6 weeks)	Prostate cancer	Radical prostatectomy

[a] High risk individuals are categorized with PSA > 20 ng/ml or Gleason score > 7 or ≥ T2
[b] Medium risk individuals are categorized with PSA > 10 - 20 ng/ml
[c] Low risk individuals are categorized with PSA < 10 ng/ml or Gleason score < 7 or ≥T1- T2a
[d] Moul et al. (2004) study only reported in abstract form. Specifics were taken from Saad et al (2006)

The Canadian Society of Surgical Oncology (CSSO) and the United Kingdom National Health Service (UKNHS) made public their position statements on what they believe the maximum wait time for cancer surgeries should be. The CSSO states:

> There is evidence that the number of patients requiring surgery for their diagnosis and/or management of various cancers is increasing. Although there are many factors involved in the timely delivery of excellent health care, the Canadian Society of Surgical Oncology recommends that appropriate numbers of specialists be suitably trained and have available the necessary resources to allow patients to be seen in consultation within two weeks of referral and to allow treatment, including surgery, to be initiated within two weeks of completion of any necessary preoperative tests. (CSSO, 2012)

The United Kingdom National Health Service created a waiting times assignment that began in 1998 under the aegis of the National Cancer Director Michael Richards who said, "A long-term goal set in the NHS Cancer Plan was that no suspected cancer patient should have to wait more than a month from the time of being referred by their GP, until the start of treatment" (Savage, 2007, *pg. 3*). From this, the UKNHS stated that there would be a maximum wait of two weeks from the time of general practitioner's (GP) referral to the time for a specialists' evaluation, a maximum one-month wait between diagnosis and treatment, and a two-month wait between an urgent GP referral and actual treatment (Savage, 2007).

2.2.5 Current Reported Prostate Cancer Wait Times

Fifteen studies reporting wait times for prostate cancer were identified through the literature search. There were many differences among these studies such as: (a) study

designs; (b) analyses; and (c) wait time definitions. Because of the different wait time definitions, the reporting of wait times varied across all intervals. The definitions used by each study typically reflected their study designs and data that were available. These studies are summarized in Table 2.4.

Through retrospective chart auditing, Kavanagh, Lee, and Donnelly (2008) described wait intervals for prostate cancer care patients may experience from the time of general practitioner referral to the date of decision for first treatment. This study also examined wait times for each individual treatment modality. No other study in Canada has been able to describe all of these intervals of wait. Results showed a median wait of seven days from date of referral to first visit, 19 days from decision to biopsy to date of biopsy, 22 days from date of biopsy to date of diagnosis, and 52 days from date of decision for treatment to first treatment date (by treatment type). Overall, patients experienced a median overall wait of 101 days (90^{th} percentile - 187.2 days) from date of referral to first treatment (all treatment types) and an overall median wait of 52 days from diagnosis to first treatment (90^{th} percentile -146.2 days). Additionally, patients who opted for curative radiation experienced a median wait of 145 days (90^{th} percentile - 222.8 days). These results clearly exceed the CSSO's and the OMHLTC's recommendations for acceptable wait times.

A population-based study of the waiting times for prostatectomy in Ontario by Siemens, Schulze, Mackillop, Brundage, and Groome (2005) linked the Ontario Cancer Registry data to hospital discharge data to follow men between 1980 and 2000 who were treated with radical prostatectomy in Ontario. Between 1980 and 2000 there were 9,524 men who were treated with radical prostatectomy. During this period, the percentage of

men who were treated surgically for prostate cancer increased from three to 20%. Most importantly, the overall time from diagnosis to surgery for radical prostatectomy had almost doubled, with an increase in a median waiting time from 55 to 95 days between 1996-2000. Hospitals in Ontario showed an increase in surgical volumes associated with significantly higher waiting times (up to 20 days longer in 1996-2000 ($p < 0.001$). Simunovic et al., (2005) reported a non-significant increase for surgical waiting times for prostate cancer between 1993 and 2000 of 4% (80 days to 83 days). Although the comparison between waiting times was not significant, the reported 75th percentile was 120 days, which still suggests that wait times in Ontario during the study period clearly exceeded the CSSO's and the federal government's benchmark recommendation for acceptable wait times (see Table 2.3).

Research studies completed by Saad et al., (2006) and Kavanagh et al., (2008) have been suggesting that prostate cancer wait times in Canada are increasing. Recently, CIHI (2012) released a report stating that provinces are continuing to struggle to reduce wait times. NL demonstrated a lower than national average for radiation therapy, knee replacement, and cataract surgery.

In contrast, countries like the United States and the United Kingdom have demonstrated prostate cancer wait times that are comparable, but their wait time trends seem to be declining. The United States and Canadian practice experiences and clinical volumes are not significantly different however (Fleshner et al., 2000).

Table 2.4: Wait Times Studies for Prostate Cancer

Reference	Country	Number of Patients (n)	Wait Time Definition	Median (days)
Stevens et al., 2010	Canada	41	Suspicion to Urologist Suspicion to Diagnosis Suspicion to Radical Radiotherapy	40 53 241
Kavanagh et al., 2008	Canada	997	Referral to clinic Referral to biopsy Referral to diagnosis Referral to treatment (all modalities)	7.0 21.0 43.0 101.0
Simunovic et al., 2005	Canada	798	Surgeon consult to hospital admission	80 in 1993 83 in 2000
Simunovic et al., 2001	Canada	58	Referral to surgery	64 in 2001
Siemens et al., 2005	Canada	9524	Diagnosis to hospital admission	55 in 1980-85 95 in 1996-2000
Esmail and Walker, 2005	Canada	Not Available	Diagnosis to prostatectomy	42 (24.5-56)
Cancer Care Ontario, 2004[a]	Canada	51 66	Referral to operation Consult to operation	65 59
Nam et al., 2003	Canada	645	Diagnosis to surgery	68
Moul et al., 2004[b]	USA	3324	Diagnosis to surgery	119 in 1990 63 in 2002
Boorjian et al., 2005	USA	3149	Biopsy to surgery	69
Lee et al., 2006	USA	169	Biopsy to surgery	56 (14 to 378)
Subramonian, Puranik, & Mufti, 2003	United Kingdom	40	1. GP referral to surgery 2. Diagnosis to surgery	1. 244 2. 76
Spurgeon, Barwell, & Kerr, 2000	England	677	1. GP referral to urgent surgery 2. GP referral to non-urgent surgery	1. 53 2. 111
Hurst & Siciliani, 2003[c]	Spain	Not Available	Diagnosis to radical prostatectomy	1992 – 119.43 2000 – 43
Graefen et al., 2005	Germany	795	Diagnosis to surgery	54

[a] Cancer Care Ontario study used a survey approach and this wait times included all urological cancer surgeries
[b] Moul et al. (2004) study was not found in full report, but in abstract form. Details from study were taken from Saad et al. (2006)
[c] This study used a questionnaire approach

2.2.6 Clinical Impact from Prostate Cancer Wait Times

The effectiveness of prostate cancer treatment can be judged in part from survival statistics. Survival itself can be judged in a variety of ways. According to the literature, the best indicators of survival for prostate cancer are survival rates that measure: (a) biochemical recurrence free survival; (b) biochemical relapse free survival; (c) biochemical failure free survival; (d) biochemical-free recurrence; (e) biochemical progression free survival; (f) and biochemical disease-free survival. All of these rates refer to the PSA level in the blood, which upon surgical removal of the prostate should be untraceable. Six studies were found comparing wait times to biological outcomes (Prostate-Cancer, 2011). These studies can be found in Table 2.5.

In an abstract published in 2004 from the American Urological Association annual conference, Moul et al. suggested that high-risk patients who wait greater than 3 months between diagnosis and surgery are 1.19 times more likely to have recurrence of their cancer (1.19, $p=0.044$) than high-risk patients who waited less than three months. Though widely cited, it is imperative to mention that, to our best knowledge, outside of the abstract form this study has not been published and therefore has not been peer-reviewed. Saad et al. (2006) remains the only study (that we know of) that has published the actual research data findings from Moul et al. (2004) by contacting the author personally.

A study by Nam et al. (2003) casts doubt on the safety of delay beyond three months in achieving long-term cancer control. In a population-based retrospective chart review, these researchers observed 645 men who had radical prostatectomy surgery between 1987 and 1997. They showed that men who had surgery within 90 days of

diagnosis experienced a statistically significantly higher 10-year biochemical recurrence free survival than those who had surgery 90 days or longer after diagnosis (74.6% vs. 61.3%, $p = 0.05$).

In contrast, a study by Khan et al. (2004) found that wait times of up to five months do not negatively impact PSA recurrence free survival at 10 years follow-up (p-value >0.05). In fact, patients who had surgery longer than 150 days from diagnosis had superior long-term cancer control rates. Furthermore, this study analyzed men considered high-risk and found no adverse outcome. This analysis only included 55 patients, so no data were shown in the article for lack of statistical power. There are two possible confounders that may explain why these results may have occurred between the Nam et al. (2003) and Khan et al. (2004) studies:

1. The Nam et al. (2003) study had considerably more men in the delayed group with a PSA greater than 10 ng/mL than Khan et al. (2004), which may have added to the likelihood of biochemical failure.
2. The Khan et al. (2004) study had a possible selection bias as men with lower Gleason and PSA score along with normal DRE findings experienced the greater delays.

Considering these studies, the consensus on whether or not men with longer wait times will face significantly worse survival rates is still unknown (Khan et al., 2004; Graefen et al., 2005; Boorjian, Bianco, Scardino, and Eastham, 2005; Lee, Allareddy, O'donnell, Williams, and Konety, (2006).

Table 2.5: Wait Time and Risk of Cancer Recurrence

Author	No. of Patients	Years	Key Groups	Key Outcome: PSA recurrence	
Nam et al., 2003	645	1987-97	Wait ≥3 versus <3 months	Adjusted HR = 1.46; P=0.05	
Moul et al., 2004[a]	3324	1988-2002	Wait ≥3 versus <3 months	Adjusted HR = 1.19; P = 0.044	
Khan et al., 2004	926	1989-1994	Wait Groups	P-value at 5 year survival	P-value at 10 year survival
			≤60d	>0.05	>0.05
			61d to 90d	>0.05	>0.05
			91d to 120d	>0.05	>0.05
			121d to 150d	>0.05	>0.05
			>150d	>0.05	>0.05
Graefen et al., 2005	795	1992-2000	Time to treatment as continuous variable	Adjusted HR = 1.0; P = 0.84	
Boorjian et al., 2005	3149	1987-2002	Wait ≥3 versus <3 months	Adjusted HR = 1.01; P = 0.939	
Lee et al., 2006	169	2001-2004	Time to treatment as continuous variable	Adjusted HR = 0.994; P = 0.62	

PSA = prostate specific antigen, HR = hazard ratio
[a]Moul et al. (2004) study only reported in abstract form.
Details of study were taken from Saad et al study in 2006.
All studies used retrospective cohort design

2.2.7 The Wait Time Model for Men Seeking Prostate Cancer Care in NL

Men journey through the prostate cancer care pathway through several steps, each of which involves a certain amount of waiting time. Figure 2.2 illustrates steps most commonly experienced by men seeking prostate cancer care in NL.

The first step begins with the patient's GP making a referral to the urologist and extends until the patient has the first visit with the urologist. Next, the patient and the urologist decide on the date of biopsy and time elapses until the biopsy is performed. After the biopsy, there is a waiting period until the urologist receives the biopsy report and then informs the patient of the results of the biopsy. Lastly, those men who have been diagnosed with cancer decide on a treatment and wait until their treatment is arranged and commences. Additional waiting time intervals were measured: (1) total waiting time from the GP referral to when the urologist informed the patient of their results; and (2) waiting time from GP referral to the urologist until date of first treatment.

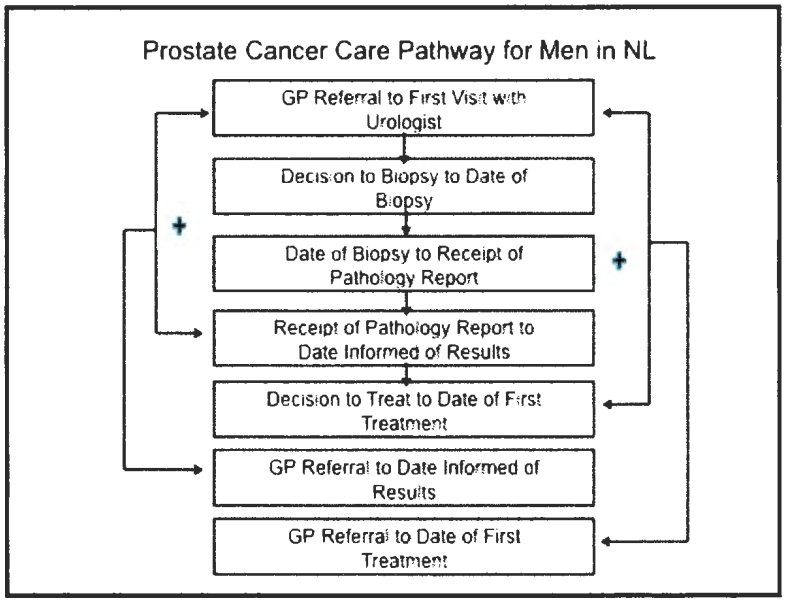

Figure 2.2: The Prostate Cancer Care Pathway

To our knowledge, there are only three Canadian studies that examined the entire urological cancer care pathway (Kavanagh et al., 2008; Cole, Hopman, & Kawakami, 2011) and only two for prostate cancer (Stevens et al., 2010; Kavanagh et al., 2008). This study will examine all of the intervals that men experience while seeking urological care for suspected or confirmed prostate cancer.

2.2.8 Methodological Approaches to the Study of Waiting Time

Wait times in Canada have been primarily examined through retrospective chart audit reviews and reviews of hospitalization data by various studies throughout Canada. (Cole, Hopman, & Kawakami, 2011; Kavanagh et al., 2008; Simunovic et al., 2005; Nam RK et al., 2003; Simunovic et al., 2001). These designs have limitations: retrospective chart reviews and hospitalization data may rely on accuracy of the clinical records, and important data may not be available because it may not have been inputted into the system to begin with. However, a retrospective chart review study design is very feasible, accessible, and allows for a study to be completed in a practical amount of time.

To date, there have been few studies that have examined wait times for prostate cancer care in Canada and in NL. The purpose of this study is to measure all the wait times for prostate cancer patients between when a patient is referred by their family physician until they receive their first treatment. This study implemented a retrospective chart review similar to other Canadian studies. A retrospective chart review was used as the study design because of the wide availability of patients' charts and electronic medical records, feasibility and the ability to capture the desired wait intervals.

2.3 Summary

The literature review suggests that prostate cancer care wait times in Canada are increasing. Provincial benchmarks provided by Ontario's Ministry of Health and Long-Term Care in 2005 provided provinces with a platform to begin reporting the wait time data to the public. However, these provincial benchmarks lacked specific criteria for prostate cancer. This study will use a local urologist practicing in St. John's, NL to provide benchmarks on prostate cancer care. There is little consensus in the literature on benchmarks for prostate cancer care. Moreover, limited research exists documenting how long patients are waiting for prostate cancer care in Newfoundland and Labrador.

Using a retrospective chart audit review, this study will focus on the wait times of men who are referred to one of the practicing urologists in St. John's, NL at the Health Science Centre. We will be able to review the charts of urology patients who have received a prostate biopsy and/or TRUS at the Health Science Centre between April 1, 2009 and March 31, 2010. In each chart we will be able to identify important patient demographic characteristics and key dates such as: (a) the date of referral to a urologist, (b) the date first seen by the urologist, the date of the biopsy, (c) date the physician receives the biopsy results, (d) the date the patient is informed of the biopsy results, (e) the date the patient and provider decides on a treatment date, and (f) the date of the first treatment.

CHAPTER 3

METHODS

3.1 Study Design

This study used a retrospective chart review of prostate cancer patients in St. John's, NL over a period of 12 months between April 1, 2009 and March 31, 2010. All of the urologists (6) in St. John's, NL at the Health Science Centre agreed to participate in the study.

3.2 Sample

Electronic and paper charts of patients who had been referred to one of the six urologists in St. John's, NL at the Health Science Centre and received a biopsy and/or TRUS between April 1, 2009 and March 31, 2010 for suspected malignancy were audited for this study. Sample size and power analysis can be found in Chapter 4 section 4.1.

3.2.1 Eligibility

To be eligible for the chart review, patients must have resided in NL and had their first biopsy/TRUS from one of the urologists participating in the study between April 1, 2009 and March 31, 2010. Patients whose charts were not available, who were younger than 19 years of age, or had been previously diagnosed with any other type of cancer were excluded. Furthermore, patients were also excluded if their eligibility criteria could not be determined.

3.3 Data Collection

Charts of prostate cancer patients seeing any of the six urologists in St. John's were reviewed to gather data on patient wait times. The data collection took place in the Health Science Centre in St. John's, NL. Each chart was reviewed using the chart audit

tool presented in Appendix A. First, all electronic charts were audited using a computer located in the department of Community Health and Humanities in the Health Science Centre, St. John's, NL that had the Meditech system installed. Meditech is an online patient care system that health care providers use to manage their patients' care. Medical records personnel were asked to identify all patients who had a prostate biopsy/TRUS between April 1, 2009 and March 31, 2010. MCP numbers were recorded once Medical Records identified all patients who had a biopsy/TRUS. Using these MCP numbers, medical records pulled the paper charts on all eligible patients for the study. The paper charts were used to fill in any missing data not found in the Meditech system (e.g. GP letter of referral). No identifiable patient information was entered during the data entering process, and all MCP numbers were recorded on the chart audit forms. Auditing of the paper charts took place in a private area located in a private research office in the medical records department.

Data were collected on patient characteristics (age and community of residence), clinical characteristics (PSA score upon referral, Gleason score, prostate volume and clinical stage of cancer) and key dates (general practitioner referral to first visit with urologist, biopsy, pathology report, when patient was informed of results, and first treatment). Data were also collected on whether there were any delays in patient care and the reason for that delay. Although each patient was given a study identification number, MCP numbers were only recorded on the chart audit form. MCP numbers were used only to identify charts (in case they were not immediately available for review) or to re-call a chart in case of an error in data entry.

3.4 Analysis

A database was created using SPSS data entry software. To clean the data, frequencies on all variables were run to identify incorrect, implausible, or missing data.

3.4.1 Variables

The main outcome (dependent) variables were seven wait intervals: (a) general practitioner referral to first visit with the urologist; (b) the decision to biopsy to biopsy date; (c) the biopsy date to the date the pathology report was received; (d) date pathology report received to the date of notification of the patient; (e) decision to treat to first treatment (if cancer); (f) GP referral to notification of results; and (g) GP referral to first treatment (cancer patients only). Each dependant variable was coded as either meeting the benchmark (0) or not meeting the benchmark (1). Appendix B shows each of the dependent variables, and how they were coded.

There were no established Canadian benchmarks for these intervals; so a local urologist was asked to identify acceptable wait times for each interval. Specifically, he was asked "if your father was seeking care for prostate cancer-like symptoms, how long would you want him to wait from the time he was referred to a urologist to seeing the urologist, from the decision to biopsy to biopsy date, from the biopsy date to the date the pathology report received, from pathology report received to the notification of the patient, from decision to treat to first treatment? The two dependant variables, from referral to notification and referral to treatment were determined by adding each of the benchmarks together. These benchmarks can be found in Table 3.1.

Table 3.1: Local Benchmarks Established by Local Expert Opinion

Interval	Benchmark
[a]GP referral to first visit with the specialist	≤60 days
Decision to biopsy to date of biopsy	≤14 days
Biopsy to receipt of the pathology report	≤21 days
Receipt of the pathology report to patient informed of their results	≤7 days
Decides to treat to first treatment *	≤4 days
[a]GP referral until notification of results	≤102 days
[a]GP referral until first treatment*	≤16 days
[a]GP – General Practitioner *Includes individuals with prostate cancer only	

In the analyses, we were particularly interested in differences in wait times related to: (a) age; (b) community of residence; and (c) urgency. According to local expert opinion, patients can be managed differently according to their age (personal communication, Dr. Chris French, May 25, 2009). Patients who were less than 70 years old on date of first visit with the urologist were coded as young (0) and patients with age older or equal to 70 were coded as old (1). Community of residence was coded as urban (≥10 000) (0) and rural (<10 000) (1). This definition has been used in other NL studies (Mathews & Edwards, 2004; Mathews, Rourke, and Park, 2008).

We were also interested in describing men who would be considered urgent and non-urgent, based on patients' clinical characteristics from as early on in the care-seeking process as possible. There was no single urgency variable available that would capture urgency and include all men throughout all of the wait intervals. Therefore, nine variables were considered to capture urgency: (a) age; (b) referral reason; (c) PSA on referral; (d) DRE; (e) prostate volume; (f) having cancer; (g) Gleason; (h) clinical risk; (i) and stage of cancer. Table 3.2 presents each variable that could be used in each interval. Two of the variables, prostate volume and referral reason, were of limited use in the analyses because of a large amount of missing data and minimal variation, respectively.

Following the SWAT's guidelines (2006), patients who had a PSA less than 10 ng/mL, Gleason scores less than seven, and a clinical stage of cancer of T1-T2a were coded as early-stage (0). Patients who had a PSA greater than 10 ng/mL, Gleason scores greater than seven, and a clinical stage of cancer greater than or equal to T2 were coded as late-stage (1). When PSA differed from clinical stage, Gleason score was used to determine the category of the patient.

Other variables that were considered in the analysis were having prostate cancer (have cancer or no cancer), delay during any of the wait intervals, and comorbidities: (a) diabetes; (b) cardiovascular disease; (c) musculoskeletal disease; (d) neurological disease; (e) gastrointestinal/herniation; (g) hypertension; and (h) other (cataracts and chronic obstructive pulmonary disease [COPD]). Patients with comorbidities were coded as having comorbidities (1) or not having any comorbidities (0). Men with prostate cancer were coded as having cancer (1) or not having prostate cancer (0).

Three types of delays were captured: (a) patient (0), defined as a delay related to men not seeking medical attention in the presence of their prostate cancer symptoms (e.g. canceling an appointment, vacationing, sick, seeking second opinion, etc.); (b) physician (1), defined as a delay related to the urologist affecting the attainment of a consultation, biopsy, or surgery (vacation or sick); and (c) system (2), defined as a delay related to health care system delivery issues such as a delay in appropriate diagnostic assessment initiated by a physician or referral in the presence of prostate cancer symptoms. For example, if there were a loss of referral letters, biopsy reports not available, or lost appointment at any stage in the patient care pathway indicating in the patients' charts. Men not experiencing a delay were coded as no delay (3). The season when patients

were first referred to the urologists was also collected. Appendix C describes how the covariate and independent variables were coded for the statistical analysis.

Table 3.2: Variables Used to Determine the Urgency of Men at Each of the Wait Intervals

Variable	Referral to first visit with urologist	Decision to biopsy to date of biopsy	Biopsy to date pathology report received	Date pathology report received to notification of results	Decision to treat to first treatment^	Referral to notification of results	Referral to first treatment^
Age	x	x	x	x	x	x	x
Referral Reason*	x	x	x	x	x	x	x
Has Prostate Cancer^				x	x	x	x
Prostate Volume**			x	x	x	x	x
DRE		x	x	x	x	x	x
PSA	x	x	x	x	x	x	x
Gleason^					x		x
Clinical Risk^					x		x
Stage^					x		x

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
* Not considered because little variation exists between referral reasons (PSA/DRE/Family History and Urinary problems)
** Not considered because there is a large amount of missing data.
^ Only includes men with prostate cancer

3.4.2 Statistical Analyses

Statistical analysis was performed using SPSS 18.0 to address each study objective, as described below:

Objective #1: to use chart audit data to measure the wait time intervals for patients with suspected or confirmed prostate cancer in NL. Specific intervals of wait time will be described, including those related to elapsed between: (a) general practitioner (GP) referral to first visit with an urologist; (b) decision to biopsy to date of biopsy; (c) date of biopsy to when the pathology report is received by the urologist; (d) date pathology report received to when the patient is informed; and (e) decision to treat to date of first treatment.

This study used frequencies to describe the characteristics of the sample. In addition to providing the frequency and proportion of patients who met and did not meet the benchmarks for each interval, medians, means, ranges, and standard deviations for each wait period were reported to highlight the distribution for each interval. The 90^{th} percentile of each wait interval was also reported. The 90^{th} percentile corresponds to the statistic that is reported by the province and allows the comparison of data collected in this study to the data collected by the province.

Objective #2: to examine differences in wait times related to community of residence, urgency, and age, including differences in wait times for men who: (a) met and did not meet locally established benchmarks, (b) men from urban and rural communities, (c) men with non-urgent and urgent symptoms; and (d) young (less than 70 years) and old (70 years and older) men.

Chi-square tests were used to examine the relationships between all seven wait time benchmarks and the three key areas of interest: (a) community of residence, (b) urgency, and (c) age of men with suspected of confirmed prostate cancer. Specifically, tests were conducted to determine if there were significant differences between men who did or did not meet the benchmark with respect to the following characteristics: community of residence (urban versus rural); urgency (urgent and non-urgent); and age (young and old).

To adjust for potential confounders, multiple logistic regression was used to identify any significant ($p < 0.05$) predictors (independent and control) in whether or not men met or did not meet each individual benchmark. Potential predictors for each regressional model were selected based on significant chi-square analyses. Any variables that were built on one another only had one variable entered into the model (e.g. Gleason, clinical risk, and stage of cancer). If a significant Chi-square result was found, Gleason score was used in lieu of clinical risk or stage of cancer as most urologists consider the Gleason grade as the most powerful preoperative prognostic value (So & Goldenberg, 2004). There were no large standard error values (indicating multicollinearity), found during the multiple logistic regression analyses. Supplementary analyses were conducted to test the main effects for interactions to include in the regression model (Appendix D & E).

3.5 Chart Audit Ethical Considerations

Memorial University's Human Investigation's Committee (HIC) approved this study (Appendix F). Approval from Eastern Health's Research Protocol Approval Committee (RPAC) was also obtained (Appendix G).

MCP numbers were kept on the chart audit form and not entered during the data entering process. Numbers were only used to re-retrieve any charts in case of missing data or data entering error. Names or other personal identifiers were not recorded or used in this study.

All data were stored in locked filing cabinets and on password protected computers in the Division of Community Health and Humanities, Memorial University of Newfoundland. The thesis supervisor and the researcher had access to the filing cabinet or the password-protected computer.

3.6 Limitations

Chart auditing in this study attempts to determine all intervals of wait a patient may experience while seeking health services for prostate cancer. However, audits of urology charts do not provide data on patient waits between first contact with the general practitioner for an appointment and first visit with the general practitioner. In addition, the auditing of urologists' charts will not capture wait times that a patient may experience while seeing an oncologist, nor will it capture the interval between requesting a GP appointment to first appointment with the GP. This study will only capture the waits for visits and treatments provided or coordinated by a urologist.

3.7 Knowledge Transfer

This study was developed in collaboration with the researcher's supervisory committee, urologists, and prostate cancer support groups. The results of this project are relevant to cancer providers (urologists), the Departments of Health and Community Services of Newfoundland and Labrador, and cancer advocacy groups (prostate cancer support groups), and the Canadian Cancer Society. Research findings will be presented

at Urology Rounds at the Health Science Centre in St. John's, NL. Summary reports will be provided to non-clinician stakeholders. Articles for peer-reviewed publication will be prepared and presentations made at seminars and national conferences. Meetings with key stakeholders will be held upon request.

CHAPTER 4

ANALYSIS

4.1 Sample

Between April 1, 2009 and March 31, 2010, 629 men who had been referred to a urologist practicing in St. John's, NL had a biopsy/TRUS for suspected or confirmed prostate cancer at the Health Science Centre in St. John's, NL. Among these, 29 (4.6%) individuals had more than one biopsy, leaving a total of 605 unique individuals. From this potential sample, 264 (43.6%) individuals were excluded from the study, leaving a final sample of 341 (56.4%) eligible men. Figure 4.1 outlines the number of men excluded from the study and the reason they were excluded.

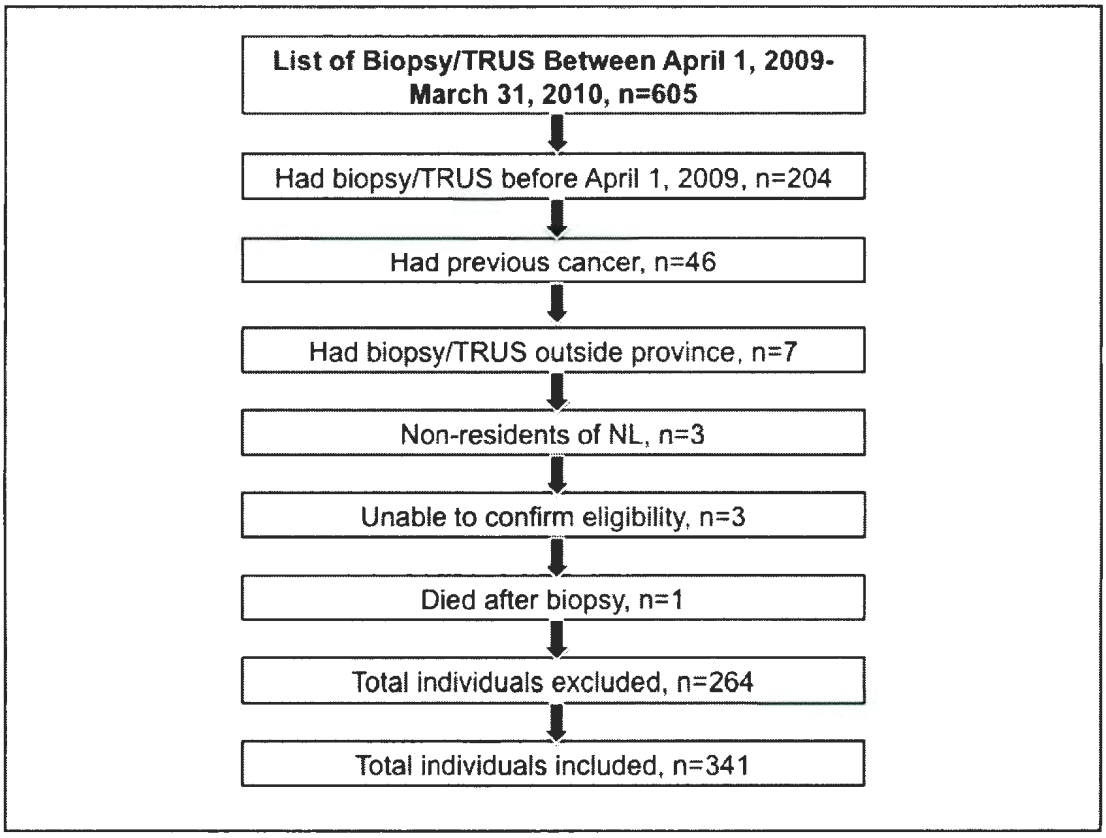

Figure 4.1: Explanation For the Sample Size and Reasons for Excluded Individuals.

Given a sample size of 341, we were able to detect a 15% difference between urban (49%) and rural patients (51%), and an 18% difference between old (18.5%) and young patients (81.5%) with an alpha of 0.05 and a power of 80%. We were also able to detect a minimum of 15.5% and a maximum 19.8% difference with an alpha of 0.05 and a power of 80% between the variables "has prostate cancer" and "age" respectively. These calculations are based on the proportions found in Table 4.1 below.

4.2 Characteristics of Sample

4.2.1 Demographic and Clinical Characteristics

Table 4.1 lists the patient demographic and clinical characteristics of the men who had a biopsy/TRUS between April 1, 2009 and March 31, 2010 at the Health Science Centre in St. John's, NL. Just over half of the men were from a rural area (51%) and most men were young (81.5%). Of the 341 men in the study, 157 (46%) men had prostate cancer, and of those, over half (56%) were considered to be late-stage based on the stage variable. An abnormal DRE, elevated PSA, and/or a family history of cancer were the most common reasons for referring men to a urologist (98%). Over half (58%) of men referred for a biopsy/TRUS had cardiovascular disease.

Three types of delays were captured: (a) patient, defined as a delay related to men not seeking medical attention in the presence of their prostate cancer symptoms (e.g. canceling an appointment, vacationing, sick, seeking second opinion, etc.); (b) physician, defined as a delay related to the urologist affecting the attainment of a consultation, biopsy, or surgery (vacation or sick); and (c) system, defined as a delay related to health care system delivery issues such as a delay in appropriate diagnostic assessment initiated by a physician or referral in the presence of prostate cancer symptoms. Delays of any

kind were generally rare in all but two intervals. System delays occurred most often (25%) during the interval between biopsy/TRUS to receipt of the pathology report. Patient delays occurred most often (14.8%) during the interval between the date patients were informed of their results to the decision to start treatment.

Radical prostatectomy (48.4%) and radiotherapy (26.8%) accounted for three quarters (75.2%) of the treatment modalities chosen by patients.

Table 4.1: Characteristics of the Study's Sample

Characteristics	n (%)
Community of residence	
Urban (<10 000)	167 (49.0)
Rural (≥10 000)	174 (51.0)
Age	
Young (<70)	278 (81.5)
Old (≥70)	63 (18.5)
Season	
Spring	78 (23.0)
Summer	81 (23.9)
Fall	80 (23.6)
Winter	100 (29.5)
Referral reason	
PSA/DRE/Family	336 (98.5)
Other	5 (1.5)
Prostate volume	
Normal (<30cm^3)	61 (33.7)
Not normal (≥30cm^3)	120 (66.3)
DRE[a]	
Normal	65 (19.1)
Not normal	276 (80.9)
PSA[b]	
Low (< 10 ng/ml)	283 (83.0)
Medium (10-19.9 ng/ml)	40 (11.7)
High (≥20 ng/ml)	18 (5.3)
Had Diabetes	
No	211 (88.7)
Yes	27 (11.3)
Had CVD[c]	
No	100 (42.0)
Yes	138 (58.0)
Had musculoskeletal condition	
No	161 (67.6)
Yes	77 (32.4)
Had GI/Hernia[d]	
No	178 (74.8)
Yes	60 (25.2)
Had hypertension	
No	206 (86.6)
Yes	32 (13.4)
Had other comorbidity	
No	222 (93.3)
Yes	16 (6.7)
Has prostate cancer	
No - No Cancer	184 (54.0)
Yes - Has Cancer	157 (46.0)
Stage*	
Early-Stage (Gleason ≤6, ≤T2a, PSA < 10)	69 (44.0)
Late-Stage (Gleason >6, >T2a, PSA ≥10)	88 (56.0)
Clinical risk*	
Low (≤T2a)	72 (45.9)
Intermediate (T2b)	22 (14.0)

High (>T2b)	63 (40.1)
Gleason*	
Low (≤6)	69 (43.9)
Medium (7)	62 (39.5)
High (>7)	26 (16.6)
Treatment modality*	
Radical prostatectomy	76 (48.4)
Radiotherapy	42 (26.8)
Watchful waiting (includes active surveillance)	28 (17.8)
Other (brachytherapy, palliative care, hormone therapy)	11 (7.0)
Delay in GP[c] referral to first visit with urologist	
Patient	1 (0.3)
Physician	1 (0.3)
System	0 (0)
No delay	339 (99.6)
Delay in patient decision to biopsy to date of biopsy	
Patient	1 (0.3)
Physician	1 (0.3)
System	0 (0.0)
No delay	339 (99.6)
Delay in date of biopsy to date physician receives pathology report	
Patient	0 (0)
Physician	0 (0)
System	84 (24.6)
No delay	257 (75.4)
Delay in date pathology received to date patient was informed of results	
Patient	1 (0.3)
Physician	0 (0)
System	2 (0.6)
No delay	338 (99.1)
Delay in date patient was informed to decision to first treatment*	
Patient	50 (31.9)
Physician	1 (0.6)
System	7 (4.5)
No delay	99 (63.0)
Delay in decision to treatment to first treatment*	
Patient	8 (5.0)
Physician	0 (0)
System	0 (0)
No delay	149 (95.0)

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
[e] GP – General Practitioner
*Includes individuals with prostate cancer only

4.2.2 Wait Times

Table 4.2 describes the wait times experienced by men in the study. The shortest median wait time was 19 days from the date of the biopsy/TRUS to the urologist's receipt of the pathology report. The longest median wait time was 68 days from referral by the general practitioner to the first visit with the urologist. It took four weeks (median 28 days) from the decision to biopsy/TRUS until the date of biopsy/TRUS. The median wait time from date of referral to first treatment (all modalities) was 188 days. The longest median wait from referral to start of specific treatment modality was for radical prostatectomy (203 days), and the shortest was for watchful waiting (128 days).

Table 4.2: Description of Wait Time Intervals

Wait Time Intervals	Mean (SD) (days)	Median (days)	Range (min, max) (days)	90th Percentile (days)
General practitioner referral to first visit with urologist	78.0 (54.7)	68.0	310.0 (0, 310.0)	146.6
Patient decision to biopsy to date of biopsy	33.4 (29.5)	28.0	151.0 (0, 151.0)	69.0
Date of biopsy to date physician receives pathology report	20.5 (9.9)	19.0	87.0 (1.0, 88.0)	32.0
Date pathology received to date patient was informed of results	40.6 (55.6)	20.0	385.0 (0, 385.0)	119.8
Decision to treat to first treatment*	40.8 (45.7)	30.0	272.0 (0, 272.0)	91.4
Date of referral to when patient was informed of results	172.3 (85.9)	154.0	545.0 (35.0, 580.0)	292.2
Date of referral to first treatment (all modalities)*	193.3 (80.5)	188.0	456.0 (35.0, 491.0)	289.6
Date of referral to radical prostatectomy*	210.4 (67.8)	203.0	416.0 (75.0, 491.0)	289.6
Date of referral to radiotherapy*	191.7 (81.1)	172.5	392.0 (91.0, 483.0)	288.7
Date of referral to watchful waiting (includes active surveillance)*	157.0 (83.9)	128.0	300.0 (35.0, 335.0)	285.2
Date of referral to other treatment (brachytherapy, palliative care, hormone therapy)*	170.5 (119.8)	154.0	395.0 (40.0, 435.0)	412.0
Date of diagnosis to radical prostatectomy*	62.6 (41.2)	46.5	221.0 (2.0, 223.0)	121.7
Date of biopsy to radical prostatectomy*	102.2 (45.0)	85.0	224.0 (35.0, 259)	170.1
Date of biopsy to date patient was informed of results	61.1 (57.6)	40.0	391.0 (13.0, 404.0)	140.4
*Includes individuals with prostate cancer only				

4.2.3 Benchmarks

Table 4.3 describes the proportion of individuals who met and did not meet the local, national, and international benchmarks. Thirteen percent (13%) to 62.5% of men met the local NL benchmarks for referral to first treatment and date of biopsy to date pathology report received respectively. Thus, less than half the patients in the study sample met local benchmarks, with one exception: almost two-thirds of the biopsy reports were received within the local benchmark.

Low-risk individuals (91.3%) from NL were most likely to have met the SWAT Initiative benchmark for wait time between decision to operate until day of surgery. On the other hand, most urgent-patients (96.6%) did not meet the UKNHS benchmark for wait time between general practitioner referral to first treatment. With the exception of benchmarks set by the SWAT Initiative and the study by Moul et al. (2004) as cited in Saad et al. (2006), few men met the benchmarks suggested by other groups. In each of the subsequent sections, a discussion of the benchmarks, followed by a discussion of the predictors, is presented.

Table 4.3: Proportion of Men Meeting Local, National, and International Benchmarks

Benchmark Reference	Benchmark Definition	Met Benchmark n (%)	Did Not Meet Benchmark n (%)
NL Expert Opinion, 2010	GP Referral to first visit with urologist ≤60 days	145 (42.5)	196 (57.5)
NL Expert Opinion, 2010	Decision to biopsy to date of biopsy ≤14 days	114 (33.4)	227 (66.6)
NL Expert Opinion, 2010	Date of biopsy to date pathology report received ≤21 days	213 (62.5)	128 (37.5)
NL Expert Opinion, 2010	Date pathology report received to notification of results ≤7 days	53 (15.8)	282 (84.2)
NL Expert Opinion, 2010	Decision to treat to first treatment ≤14 days*	46 (30.3)	106 (69.7)
NL Expert Opinion, 2010	GP Referral to notification of results ≤102 days	56 (16.4)	285 (83.6)
NL Expert Opinion, 2010	GP Referral to first treatment ≤116 days*	21 (13.4)	136 (86.6)
CSSO, 2012	Referral to consultation ≤14 days	24 (7.0)	317 (93.0)
CSSO, 2012	Conclusion of preoperative tests to treatment ≤14 days*	52 (33.1)	105 (66.9)
UK National Health Service, 2006	GP referral to specialist assessment ≤14 days	24 (7.0)	317 (93.0)
UK National Health Service, 2006	Diagnosis to treatment ≤30 days*	80 (51.0)	77 (49.0)
UK National Health Service, 2006	Urgent GP referral to treatment ≤60 days*[a]	3 (3.4)	84 (96.6)
Ministry of Health and Long-Term Care, 2005	Radiation therapy: ready to treat to treatment ≤28 days*	15 (35.7)	27 (64.3)
Canadian Surgical Wait Times (SWAT) Initiative, 2006	Decision to operate until day of surgery Early stage ≤90 days*	63 (91.3)	6 (8.7)
Canadian Surgical Wait Times (SWAT) Initiative, 2006	Decision to operate until day of surgery Late stage ≤60 days*	61 (70.1)	26 (29.9)
Moul et al., 2004	Diagnosis to first treatment (radical prostatectomy) ≤90 days*	68 (89.5)	8 (10.5)
Esmail and Walker, 2005	Diagnosis to first treatment (radical prostatectomy) ≤28 days*	23 (30.3)	53 (69.7)

* Includes individuals with prostate cancer only

[a] Urgent patients were defined by Gleason score ≥7, Clinical Stage ≥T2b, and a PSA ≥10

4.2.4 Interval I: GP Referral to First Visit With the Urologist

Table 4.4 describes the characteristics of men who met and did not meet the benchmark for the wait time from date of referral to first visit with the urologist. A significantly larger proportion of men who met the benchmark were urban residents. There were no other significant differences between men who met and did not meet this benchmark.

Men from rural communities were 0.60 times as likely (or 1.67 times less likely) to have met the benchmark than urban men. The age and urgency variables (PSA on referral) were not significant predictors in determining whether or not men met the benchmark (Table 4.5).

Table 4.4: Characteristics of Men who Met and Did Not Meet The Benchmark from Date of Referral to First Visit with the Urologist (n=341)

Characteristics	Met benchmark n (%)	Did not meet benchmark n (%)	p-value
Community of residence			0.049
Urban (≥10 000)	80 (55.2)	87 (44.4)	
Rural (<10 000)	65 (44.8)	109 (55.6)	
Age			0.080
Young (<70)	112 (77.2)	166 (84.7)	
Old (≥70)	33 (22.8)	30 (15.3)	
Season on referral			0.056
Spring	38 (26.2)	40 (20.4)	
Summer	29 (20.0)	52 (26.5)	
Fall	27 (18.6)	53 (27.0)	
Winter	51 (35.2)	51 (26.0)	
Referral reason			0.426
PSA/DRE/Family	142 (97.9)	194 (99.0)	
Other	3 (2.1)	2 (1.0)	
PSA[b] on referral			0.133
Low (< 10 ng/ml)	114 (78.6)	169 (86.2)	
Medium (10-19.9 ng/ml)	20 (13.8)	20 (10.2)	
High (≥20 ng/ml)	11 (7.6)	7 (3.6)	
Had diabetes			0.307
No	131 (90.3)	183 (93.4)	
Yes	14 (9.7)	13 (6.6)	
Had CVD[c]			0.943
No	86 (59.3)	117 (59.7)	
Yes	59 (40.7)	79 (40.3)	
Had musculoskeletal condition			0.908
No	42 (41.6)	58 (42.3)	
Yes	59 (58.4)	79 (57.7)	
Had GI/Hernia[d]			0.883
No	120 (82.8)	161 (82.1)	
Yes	25 (17.2)	35 (17.9)	
Had hypertension			0.327
No	134 (92.4)	175 (89.3)	
Yes	11 (7.6)	21 (10.7)	
Had other comorbidity			0.350
No	140 (96.6)	185 (94.4)	
Yes	5 (3.4)	11 (5.6)	
Delay in GP[e] referral to first visit with urologist			0.475
Patient	0 (0)	1 (0.5)	
Physician	0 (0)	1 (0.5)	
System	0 (0)	0 (0)	
No delay	145 (100)	194 (99.0)	

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
[e] GP – General Practitioner

Table 4.5: Predictors of Men Who Met the Benchmark From Date of Referral to First Visit (n=341)

Variable	Odds Ratio	95% Confidence Interval	p-value
Community of residence			0.025
Urban (≥10 000)	1.00		
Rural (<10 000)	0.60	0.39 – 0.94	
Age			0.198
Young (<70 years)	1.00		
Old (≥70 years)	1.46	0.82 – 2.61	
PSA on referral			0.181
Low (< 10 ng/ml)	1.00		
Medium (10-19.9 ng/ml)	1.36	0.38 – 1.36	0.382
High (≥20 ng/ml)	2.44	0.89 – 6.69	0.084

4.2.5 Interval II: Decision to Biopsy to Biopsy

Table 4.6 describes the characteristics of men who met and did not meet the benchmark for the wait time from decision to have a biopsy to biopsy/TRUS. A significantly larger proportion of men who met the benchmark were rural residents. Furthermore, significant differences were detected for men that did not meet the benchmark who had neither hypertension nor other comorbidity. There were no other significant differences between men who met and did not meet this benchmark.

After controlling for other predictors (hypertension and comorbidity), men from rural communities were 2.02 times more likely to have met the benchmark than urban men. Age and urgency variables (PSA on referral and DRE) were not significant predictors in determining whether or not men met the benchmark (Table 4.7).

Table 4.6: Characteristics of Men who Met and Did Not Meet The Benchmark from Date of First Visit with the Urologist to Date of Biopsy/TRUS (n=341)

Characteristics	Met benchmark n (%)	Did not meet benchmark n (%)	p-value
Community of residence			0.001
Urban (≥10 000)	42 (36.8)	125 (55.1)	
Rural (<10 000)	72 (63.2)	102 (44.9)	
Age			0.144
Young (<70)	88 (77.2)	190 (83.7)	
Old (≥70)	26 (22.8)	37 (16.3)	
Season on referral			0.095
Spring	23 (20.2)	55 (24.2)	
Summer	20 (17.5)	61 (26.9)	
Fall	29 (25.4)	51 (22.5)	
Winter	42 (36.8)	60 (26.4)	
Referral reason			0.542
PSA/DRE/Family	112 (98.2)	224 (98.7)	
Other	2 (1.8)	3 (1.3)	
DRE[a]			0.937
Normal	22 (19.3)	43 (18.9)	
Not normal	92 (80.7)	184 (81.1)	
PSA[b] on referral			0.114
Low (< 10 ng/ml)	90 (78.9)	193 (85.0)	
Medium (10-19.9 ng/ml)	14 (12.3)	26 (11.5)	
High (≥20 ng/ml)	10 (8.8)	8 (3.5)	
Had diabetes			0.091
No	101 (88.6)	213 (93.8)	
Yes	13 (11.4)	14 (6.2)	
Had CVD[c]			0.975
No	68 (59.6)	135 (59.5)	
Yes	46 (40.4)	92 (40.5)	
Had musculoskeletal condition			0.478
No	62 (70.5)	99 (66.0)	
Yes	26 (29.5)	51 (34.0)	
Had GI/Hernia[d]			0.535
No	96 (84.2)	185 (81.5)	
Yes	18 (15.8)	42 (18.5)	
Had hypertension			0.037
No	98 (86.0)	211 (93.0)	
Yes	16 (14.0)	7 (3.1)	
Had other comorbidity			0.047
No	105 (92.1)	220 (96.9)	
Yes	9 (7.9)	7 (3.1)	
Delay in GP[e] referral to first visit with urologist			0.287
Patient	0 (0)	1 (0.4)	
Physician	1 (0.9)	0 (0)	
System	0 (0)	0 (0)	
No delay	113 (99.1)	226 (99.6)	
Delay in patient decision to biopsy to biopsy			0.603
Patient	0 (0)	1 (0.4)	
Physician	0 (0)	1 (0.4)	

System	0 (0)	0 (0)	
No delay	114 (100.0)	225 (100.0)	

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
[e] GP – General Practitioner

Table 4.7: Predictors of Men Who Met the Benchmark From Decision to Biopsy until Biopsy (n=341)

Variable	Odds Ratio	95% Confidence Interval	p-value
Community of residence			0.003
Urban (≥10 000)	1.00		
Rural (<10 000)	2.02	1.27 – 3.22	
Age			0.254
Young (<70 years)	1.00		
Old (≥70 years)	0.702	0.78 – 2.62	
PSA on referral			0.378
Low (< 10 ng/ml)	1.00		
Medium (10-19.9 ng/ml)	1.36	0.49 – 2.15	0.935
High (≥20 ng/ml)	2.44	0.75 – 5.51	0.164
DRE			0.686
Normal	1.00		
Abnormal	0.88	0.49 – 1.60	

4.2.6 Interval III: Biopsy to Receipt of Pathology Report

Table 4.8 describes the characteristics of men who met and did not meet the benchmark for the wait time from time of the biopsy until the receipt of the pathology report by the urologist. A significantly larger proportion of men who met the benchmark did not encounter a systemic delay in comparison to men who did have a systemic delay. There were no other significant differences detected between men who met and did not meet this benchmark.

After controlling for predictors (system delay in the interval between the date of biopsy and receipt of pathology report), age, urgency variables (PSA on referral and DRE), and community of residence were not significant predictors in determining whether or not men met the benchmark (Table 4.9).

Table 4.8: Characteristics of Men who Met and Did Not Meet The Benchmark from Date of Biopsy to Date Biopsy Results Received by Urologist (n=341)

Characteristics	Met benchmark n (%)	Did not meet benchmark n (%)	p-value
Community of residence			0.878
Urban (≥10 000)	105 (49.3)	62 (48.4)	
Rural (<10 000)	108 (50.7)	66 (51.6)	
Age			0.919
Young (<70)	174 (81.7)	104 (81.3)	
Old (≥70)	39 (18.3)	24 (18.8)	
Season on referral			0.841
Spring	52 (24.4)	26 (20.3)	
Summer	50 (23.5)	31 (24.2)	
Fall	48 (22.5)	32 (25.0)	
Winter	63 (29.6)	39 (30.5)	
Referral reason			0.909
PSA/DRE/Family	210 (98.6)	126 (98.4)	
Other	3 (1.4)	2 (1.6)	
Prostate volume			0.431
Normal (<30cm^3)	36 (31.6)	25 (37.3)	
Not normal (≥30cm^3)	78 (68.4)	42 (62.7)	
DRE[a]			0.690
Normal	42 (19.7)	23 (18.0)	
Not normal	171 (80.3)	105 (82.0)	
PSA[b] on Referral			0.452
Low (< 10 ng/ml)	181 (85.0)	102 (79.7)	
Medium (10-19.9 ng/ml)	22 (10.3)	18 (14.1)	
High (≥20 ng/ml)	10 (4.7)	8 (6.3)	
Had diabetes			0.194
No	193 (90.6)	121 (94.5)	
Yes	20 (9.4)	7 (5.5)	
Had CVD[c]			0.682
No	125 (58.7)	78 (60.9)	
Yes	88 (41.3)	50 (39.1)	
Had musculoskeletal condition			0.952
No	106 (67.5)	55 (67.9)	
Yes	51 (32.5)	26 (32.1)	
Had GI/Hernia[d]			0.467
No	178 (83.6)	103 (80.5)	
Yes	35 (16.4)	25 (19.5)	
Had hypertension			0.996
No	193 (90.6)	116 (90.6)	
Yes	20 (9.4)	12 (9.4)	
Had other comorbidity			0.595
No	202 (94.8)	123 (96.1)	
Yes	11 (5.2)	5 (3.9)	
Has prostate cancer			0.643
No - No Cancer	117 (54.9)	67 (52.3)	
Yes - Has Cancer	96 (45.1)	61 (47.7)	
Delay in GP[e] referral to first visit with urologist			0.322

Patient	1 (0.5)	0 (0)	
Physician	0 (0)	1 (0.8)	
System	0 (0)	0 (0)	
No delay	212 (99.5)	127 (99.2)	
Delay in patient decision to biopsy to biopsy			0.188
Patient	0 (0)	1 (0.8)	
Physician	0 (0)	1 (0.8)	
System	0 (0)	0 (0)	
No delay	213 (100.0)	126 (98.4)	
Delay in date of biopsy to receipt of pathology report			0.027
Patient	0 (0)	0 (0)	
Physician	0 (0)	0 (0)	
System	61 (28.6)	23 (18.0)	
No delay	152 (71.4)	103 (82.0)	

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
[e] GP – General Practitioner
*Includes individuals with prostate cancer only

Table 4.9: Predictors of Men Who Met the Benchmark From Biopsy Until Biopsy Results Were Received (n=341)

Variable	Odds Ratio	95% Confidence Interval	p-value
Community of residence			0.964
Urban (≥10 000)	1.00		
Rural (<10 000)	0.99	0.64 – 1.54	
Age			0.752
Young (<70 years)	1.00		
Old (≥70 years)	1.10	0.61 – 2.00	
PSA on referral			0.457
Low (< 10 ng/ml)	1.00		
Medium (10-19.9 ng/ml)	0.69	0.34 – 1.36	0.272
High (≥20 ng/ml)	0.69	0.26 – 1.85	0.458
DRE			0.752
Normal	1.00		
Abnormal	0.91	0.51 – 1.62	

4.2.7 Interval IV: Receipt of Pathology Report to Notification of Results

Table 4.10 describes the characteristics of men who met and did not meet the benchmark for the wait time from when the urologist receives the pathology report to when the patient is informed of his results. A significantly larger proportion of men who met the benchmark lived in rural communities, had cancer, and did not have a delay in

the interval patient decision to biopsy to biopsy being performed. There were no other significant differences between men who met and did not meet this benchmark.

After controlling for other predictors (delay in the interval patient decision to biopsy to biopsy being performed), men who were from a rural area were 1.89 times more likely to have met the benchmark than urban men. Also, men who had cancer were 2.15 times more likely to have met the benchmark than men who did not have cancer. The age and urgency variables (PSA on referral, has prostate cancer, and DRE) were not significant predictors in whether or not men met the benchmark (Table 4.11).

Table 4.10: Characteristics of Men who Met and Did Not Meet The Benchmark from When Biopsy Results Available to When Patient was Informed by Urologist (n=341)

Characteristics	**Met benchmark n (%)**	**Did not meet benchmark n (%)**	**p-value**
Community of residence			0.038
Urban (≥10 000)	19 (35.8)	148 (52.1)	
Rural (<10 000)	34 (64.2)	140 (47.9)	
Age			0.105
Young (<70)	39 (73.6)	239 (83.0)	
Old (≥70)	14 (26.4)	49 (17.0)	
Season on referral			0.252
Spring	8 (15.1)	70 (24.3)	
Summer	14 (26.4)	67 (23.3)	
Fall	17 (32.1)	63 (21.9)	
Winter	14 (26.4)	88 (30.6)	
Referral reason			0.573
PSA/DRE/Family	52 (98.1)	284 (98.6)	
Other	1 (1.9)	4 (1.4)	
Prostate volume			0.222
Normal (<30cm^3)	14 (43.8)	47 (32.4)	
Not normal (≥30cm^3)	18 (56.3)	98 (67.6)	
DRE[a]			0.739
Normal	11 (20.8)	53 (18.8)	
Not normal	42 (79.2)	229 (81.2)	
PSA[b] on referral			0.283
Low (< 10 ng/ml)	40 (75.5)	238 (84.4)	
Medium (10-19.9 ng/ml)	9 (17.0)	31 (11.0)	
High (≥20 ng/ml)	4 (7.5)	13 (4.6)	
Had diabetes			0.403
No	47 (88.7)	267 (92.7)	
Yes	6 (11.3)	21 (7.3)	
Had CVD[c]			0.091

No	26 (49.1)	177 (61.5)	
Yes	27 (50.9)	111 (38.5)	
Had musculoskeletal condition			0.662
No	28 (65.1)	133 (68.6)	
Yes	15 (34.9)	61 (31.4)	
Had GI/Hernia[d]			0.511
No	42 (79.2)	239 (83.0)	
Yes	11 (20.8)	49 (17.0)	
Had hypertension			0.799
No	49 (92.5)	260 (90.3)	
Yes	4 (7.5)	28 (9.7)	
Had other comorbidity			0.723
No	50 (94.3)	275 (95.5)	
Yes	3 (5.7)	13 (4.5)	
Has prostate cancer			0.013
No - No Cancer	20 (37.7)	159 (56.4)	
Yes - Has Cancer	33 (62.3)	124 (43.6)	
Delay in GP[e] referral to first visit with urologist			0.831
Patient	0 (0)	1 (0.4)	
Physician	0 (0)	1 (0.4)	
System	0 (0)	0 (0)	
No delay	53 (100.0)	286 (99.3)	
Delay in patient decision to biopsy to biopsy			0.004
Patient	1 (1.9)	0 (0)	
Physician	1 (1.9)	0 (0)	
System	0 (0)	0 (0)	
No delay	53 (96.2)	288 (100.0)	
Delay in biopsy to receipt of pathology report			0.714
Patient	0 (0)	0 (0)	
Physician	0 (0)	0 (0)	
System	12 (22.6)	72 (25.0)	
No delay	41 (77.4)	216 (75.0)	
Delay in pathology report to patient informed of results			0.757
Patient	0 (0)	1 (0.3)	
Physician	0 (0)	2 (0.7)	
System	0 (0)	0 (0)	
No delay	53 (100.0)	285 (99.0)	

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
[e] GP – General Practitioner
* Includes individuals with prostate cancer only

Table 4.11: Predictors of Men Who Met the Benchmark From Biopsy Results Were Received to When the Patient Were Informed of Their Results (n=341)

Variable	Odds Ratio	95% Confidence Interval	p-value
Community of residence			0.045
Urban (≥10 000)	1.00		
Rural (<10 000)	1.89	1.01 – 3.52	
Age			0.230
Young (<70 years)	1.00		
Old (≥70 years)	1.57	0.75 – 3.30	
Has prostate cancer			0.015
No Cancer	1.00		
Has Cancer	2.15	1.16 – 3.97	
PSA on referral			0.644
Low (< 10 ng/ml)	1.00		
Medium (10-19.9 ng/ml)	1.51	0.64 – 3.57	0.349
High (≥20 ng/ml)	1.11	0.33 – 3.75	0.863
DRE			0.358
Normal	1.00		
Abnormal	0.70	0.33 – 1.50	

4.2.8 Interval V: Decision to Treat to First Treatment

Table 4.12 describes the proportion of individuals who met and did not meet the benchmark for the wait time from decision to treat to the time of first treatment. This interval only includes men with prostate cancer. A significantly larger proportion of men who met the benchmark were old, had a low PSA, were early-stage, had low clinical-risk and low Gleason scores, and chose watchful waiting for their first treatment. There were no other significant differences between men who met and did not meet this benchmark.

After controlling for predictors (treatment modality), older men were 5.82 times more likely to have met the benchmark than younger men. Men with a medium Gleason score were 5.00 times less likely (0.20 as likely) to have met the benchmark than men with a low Gleason. High Gleason and community of residence score were not significant predictors in determining whether or not men met the benchmark (Table 4.13).

Table 4.12: Characteristics of Men With Prostate Cancer Who Met and Did Not Meet The Benchmark from Decision of First Treatment to First Treatment* (n=157)

Characteristics	Met benchmark n (%)	Did not meet benchmark n (%)	p-value
Community of residence			0.553
Urban (≥10 000)	22 (47.8)	54 (50.0)	
Rural (<10 000)	27 (52.2)	54 (50.0)	
Age			0.000
Young (<70)	20 (40.8)	93 (86.1)	
Old (≥70)	29 (59.2)	15 (13.9)	
Season on referral			0.299
Spring	11 (22.4)	19 (17.6)	
Summer	7 (14.3)	30 (27.8)	
Fall	12 (24.5)	20 (18.5)	
Winter	19 (38.8)	39 (36.1)	
Referral reason			1.000
PSA/DRE/Family	49 (100.0)	107 (99.1)	
Other	0 (0)	1 (0.9)	
Prostate volume			0.462
Normal (<30cm^3)	12 (46.2)	23 (37.7)	
Not normal (≥30cm^3)	14 (53.8)	38 (62.3)	
DRE[a]			0.301
Normal	10 (20.4)	15 (13.9)	
Not normal	39 (79.6)	93 (86.1)	
PSA[b] on referral			0.012
Low (< 10 ng/ml)	37 (75.5)	86 (79.6)	
Medium (10-19.9 ng/ml)	4 (8.2)	18 (16.7)	
High (≥20 ng/ml)	8 (16.3)	4 (3.7)	
Had diabetes			0.836
No	43 (87.8)	96 (88.9)	
Yes	6 (12.2)	12 (11.1)	
Had CVD[c]			0.200
No	29 (59.2)	52 (48.1)	
Yes	20 (40.8)	56 (51.9)	
Had musculoskeletal condition			0.830
No	20 (64.5)	54 (66.7)	
Yes	11 (35.5)	27 (33.3)	
Had GI/Hernia[d]			0.794
No	40 (81.6)	90 (83.3)	
Yes	9 (18.4)	18 (16.7)	
Had hypertension			0.836
No	43 (87.5)	96 (88.9)	
Yes	6 (12.2)	12 (11.1)	
Had other comorbidity			1.000
No	46 (93.9)	101 (93.5)	
Yes	3 (6.1)	7 (6.5)	
Stage			0.010
Early Stage (Gleason ≤6, ≤T2a, PSA < 10)	29 (56.5)	40 (36.8)	
Late Stage (Gleason >6, >T2a, PSA ≥10)	20 (43.5)	68 (63.2)	
Clinical risk			0.010
Low (≤T2a)	29 (59.2)	40 (37.0)	

Intermediate (T2b)	11 (22.4)	51 (47.2)	
High (>T2b)	9 (18.4)	17 (15.7)	
Gleason			0.010
Low (≤6)	29 (59.2)	40 (37.0)	
Medium (7)	11 (22.4)	51 (47.2)	
High (>7)	9 (18.4)	17 (15.7)	
Treatment modality			0.000
Radical prostatectomy	9 (18.4)	67 (62.6)	
Watchful waiting (includes active surveillance)	26 (53.1)	1 (0.9)	
Radiotherapy	7 (14.3)	35 (32.7)	
Other (brachytherapy, palliative care, hormone therapy)	7 (14.3)	4 (3.7)	
Delay in GP[e] referral to first visit with urologist			0.264
Patient	0 (0)	0 (0)	
Physician	1 (2.0)	0 (0)	
System	0 (0)	0 (0)	
No delay	48 (98.0)	107 (100.0)	
Delay in patient decision to biopsy to biopsy			0.632
Patient	0 (0)	1 (0.9)	
Physician	0 (0)	1 (0.9)	
System	0 (0)	0 (0)	
No delay	49 (100.0)	106 (98.1)	
Delay in biopsy to receipt of pathology report			0.556
Patient	0 (0)	0 (0)	
Physician	0 (0)	0 (0)	
System	13 (26.5)	24 (22.2)	
No delay	36 (73.5)	84 (77.8)	
Delay in pathology report to patient informed of results			1.000
Patient	0 (0)	1 (0.9)	
Physician	0 (0)	0 (0)	
System	0 (0)	0 (0)	
No delay	49 (100.0)	107 (99.1)	
Delay in patient informed to decision to treat*			0.281
Patient	12 (24.5)	38 (35.2)	
Physician	0 (0)	1 (0.9)	
System	1 (2.0)	6 (5.6)	
No delay	36 (73.5)	63 (58.3)	
Delay in decision to treat to treatment*			0.058
Patient	0 (0)	8 (7.4)	
Physician	0 (0)	0 (0)	
System	0 (0)	0 (0)	
No delay	49 (100.0)	100 (92.6)	

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
[e] GP – General Practitioner
* Includes individuals with prostate cancer only

Table 4.13: Predictors of Men Who Met the Benchmark From Decision to Treat to First Treatment* (n=157)

Variable	Odds Ratio	95% Confidence Interval	p-value
Community of Residence			0.216
Urban (≥10 000)	1.00		
Rural (<10 000)	1.62	0.76 – 3.46	
Age			0.000
Young (<70 years)	1.00		
Old (≥70 years)	5.82	2.43 – 13.95	
Gleason			0.003
Low (≤6)	1.00		
Medium (7)	0.20	0.08 – 0.50	0.001
High (>7)	0.52	0.19 – 1.46	0.217
*Includes individuals with prostate cancer only			

4.2.9 Interval VI: GP Referral to Notification of Results to the Patient

Table 4.14 describes the characteristics of men who met and did not meet the benchmark for the wait time from date of referral to notification of results. A significantly larger proportion of men who met the benchmark were old and had prostate cancer. Also, a significantly larger proportion of men who met the benchmark did not have a delay between the biopsy and the receipt of the pathology report than men who had a delay. There were no other significant differences between men who met and did not meet this benchmark.

After controlling for other predictors (delay in biopsy to receipt of pathology report and has prostate cancer), older men were 3.12 times more likely to have met the benchmark than younger men. Moreover, men who had a system delay between biopsy to date physician receives pathology report were 0.41 times as likely (or 2.44 times less likely) to have met the benchmark than men who did not have a delay. Community of residence and urgency variables (has prostate cancer, PSA on referral, and DRE) were not significant predictors of men who met or did not meet the benchmark (Table 4.15).

Table 4.14: Characteristics of Men who Met and Did Not Meet The Benchmark from Date of Referral to Notification of Results (n=341)

Characteristics	Met benchmark n (%)	Did not meet benchmark n (%)	p-value
Community of residence			0.867
Urban (≥10 000)	28 (50.0)	139 (48.8)	
Rural (<10 000)	28 (50.0)	146 (51.2)	
Age			0.000
Young (<70)	36 (64.3)	242 (84.9)	
Old (≥70)	20 (35.7)	43 (15.1)	
Season on referral			0.251
Spring	10 (17.9)	68 (23.9)	
Summer	12 (21.4)	69 (24.2)	
Fall	11 (19.6)	69 (24.2)	
Winter	23 (41.1)	79 (27.7)	
Referral reason			0.152
PSA/DRE/Family	54 (96.4)	282 (98.9)	
Other	2 (3.6)	3 (1.1)	
DRE[a]			0.904
Normal	11 (19.6)	54 (18.9)	
Not normal	45 (80.4)	231 (81.1)	
PSA[b] on referral			0.003
Low (< 10)	40 (71.4)	243 (85.3)	
Medium (10-19.9)	8 (14.3)	32 (11.2)	
High (≥20)	8 (14.3)	10 (3.5)	
Had diabetes			0.177
No	49 (87.5)	265 (93.0)	
Yes	7 (12.5)	20 (7.0)	
Had CVD[c]			0.920
No	33 (58.9)	170 (59.6)	
Yes	23 (41.1)	115 (40.4)	
Had musculoskeletal condition			0.248
No	33 (75.0)	128 (66.0)	
Yes	11 (25.0)	66 (34.0)	
Had GI/Hernia[d]			0.660
No	45 (80.4)	236 (82.8)	
Yes	11 (19.6)	49 (17.2)	
Had hypertension			0.898
No	51 (91.1)	258 (90.5)	
Yes	5 (8.9)	27 (9.5)	
Had other comorbidity			0.733
No	53 (94.6)	272 (95.4)	
Yes	3 (5.4)	13 (4.6)	
Has prostate cancer			
No - No Cancer	23 (41.1)	161 (55.1)	0.034
Yes - Has Cancer	33 (58.9)	124 (43.9)	
Delay in GP[e] referral to first visit with urologist			0.821
Patient	0 (0)	1 (0.4)	
Physician	0 (0)	1 (0.4)	
System	0 (0)	0 (0)	

No delay	56 (100.0)	283 (100.0)	
Delay in patient decision to biopsy to biopsy			0.821
Patient	0 (0)	1 (0.4)	
Physician	0 (0)	1 (0.4)	
System	0 (0)	0 (0)	
No delay	56 (100.0)	283 (99.3)	
Delay in biopsy to receipt of pathology report			0.049
Patient	0 (0)	0 (0)	
Physician	0 (0)	0 (0)	
System	8 (14.3)	76 (26.7)	
No delay	48 (85.7)	209 (73.3)	
Delay in pathology report to patient informed of results			0.743
Patient	0 (0)	1 (0.4)	
Physician	0 (0)	0 (0)	
System	0 (0)	2 (0.7)	
No delay	56 (100.0)	282 (98.9)	
Delay in patient informed to decision to treat*			0.214
Patient	6 (10.7)	44 (15.4)	
Physician	0 (0)	1 (0.4)	
System	3 (5.4)	4 (1.4)	
No delay	47 (83.9)	236 (82.8)	

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
[e] GP – General Practitioner
* Includes individuals with prostate cancer only

Table 4.15: Predictors of Men Who Met the Benchmark From Referral to Notification of Results (n=341)

Variable	Odds Ratio	95% Confidence Interval	p-value
Community of residence			0.572
Urban (≥10 000)	1.00		
Rural (<10 000)	0.84	0.46 – 1.55	
Age			0.002
Young (<70 years)	1.00		
Old (≥70 years)	3.12	1.54 – 6.31	
Has prostate cancer			0.088
No Cancer	1.00		
Has Cancer	1.70	1.16 – 3.97	
Delay in date of biopsy to date physician receives pathology report			0.037
No Delay	1.00		
System Delay	0.41	0.18 – 0.95	
PSA on referral			0.072
Low (<10)	1.00		
Medium (10-19.9)	1.09	0.44 – 2.70	0.845
High (≥20)	3.41	1.20 – 9.78	0.022
DRE			0.232
Normal	1.00		
Abnormal	0.70	0.29 – 1.36	

4.2.10 Interval VII: GP Referral to First Treatment

Table 4.16 describes the characteristics of men who met and did not meet the benchmark for the wait time between referral to first treatment. A significantly larger proportion of men who met the benchmark were urban, young, and chose watchful waiting as their first treatment. There were no other significant differences between men who met and did not meet this benchmark.

After controlling for predictors (treatment modality), older men were 3.53 times more likely to have met the benchmark than younger men. Also, urgency variable (Gleason) and community of residence were not significant predictors of whether or not men met the benchmark (Table 4.17).

Table 4.16: Characteristics of Men who Met and Did Not Meet The Benchmark from Date of Referral to First Treatment*(n=157)

Characteristics	Met benchmark n (%)	Did not meet benchmark n (%)	p-value
Community of residence			0.023
Urban (≥10 000)	15 (71.4)	61 (44.9)	
Rural (<10 000)	6 (28.6)	75 (55.1)	
Age			0.008
Young (<70)	11 (52.4)	111 (81.6)	
Old (≥70)	10 (47.6)	25 (18.4)	
Season on referral			0.053
Spring	5 (23.8)	25 (18.4)	
Summer	0 (0)	38 (27.2)	
Fall	5 (23.8)	27 (19.9)	
Winter	11 (52.4)	47 (34.6)	
Referral reason			0.134
PSA/DRE/Family	20 (95.2)	136 (100.0)	
Other	1 (4.8)	0 (0)	
Prostate volume			0.187
Normal (<30cm^3)	9 (52.9)	26 (35.6)	
Not normal (≥30cm^3)	8 (47.1)	47 (64.4)	
DRE[a]			0.335
Normal	5 (23.8)	20 (14.7)	
Not normal	16 (76.2)	116 (85.3)	

PSA[b] on referral			0.084
Low (< 10)	18 (85.7)	105 (77.2)	
Medium (10-19.9)	0 (0)	22 (16.2)	
High (≥20)	3 (14.3)	9 (6.6)	
Had diabetes			0.712
No	18 (85.7)	121 (89.0)	
Yes	3 (14.3)	15 (11.0)	
Had CVD[c]			0.584
No	12 (57.1)	69 (50.7)	
Yes	9 (42.9)	67 (49.3)	
Had musculoskeletal condition			0.467
No	17 (81.0)	100 (73.5)	
Yes	4 (19.0)	36 (26.5)	
Had GI/Hernia[d]			0.762
No	17 (81.0)	113 (83.1)	
Yes	4 (19.0)	23 (16.9)	
Had hypertension			1.000
No	19 (90.5)	120 (88.2)	
Yes	2 (9.5)	16 (11.8)	
Had other comorbidity			1.000
No	20 (95.2)	127 (93.4)	
Yes	1 (4.8)	9 (6.6)	
Stage*			0.191
Early Stage (Gleason ≤6, ≤T2a, PSA < 10)	12 (57.1)	57 (41.9)	
Late Stage (Gleason >6, >T2a, PSA ≥10)	9 (42.9)	79 (58.1)	
Clinical risk*			0.051
Low (≤T2a)	14 (66.7)	58 (42.6)	
Intermediate (T2b)	0 (0)	22 (16.2)	
High (>T2b)	7 (33.3)	56 (41.2)	
Gleason*			0.117
Low (≤6)	12 (57.1)	57 (41.0)	
Medium (7)	4 (19.0)	58 (42.6)	
High (>7)	5 (23.8)	21 (15.4)	
Treatment modality*			0.000
Radical prostatectomy	5 (23.8)	71 (52.6)	
Watchful waiting (includes active surveillance)	11 (52.4)	16 (11.9)	
Radiotherapy	0 (0)	42 (31.1)	
Other (brachytherapy, palliative care, hormone therapy)	5 (23.8)	6 (4.4)	
Delay in GP[e] referral to first visit with urologist			0.855
Patient	0 (0)	1 (0.7)	
Physician	0 (0)	1 (0.7)	
System	0 (0)	0 (0)	
No delay	21 (100.0)	134 (98.5)	
Delay in patient decision to biopsy to biopsy			0.855
Patient	0 (0)	1 (0.7)	
Physician	0 (0)	1 (0.7)	
System	0 (0)	0 (0)	
No delay	21 (100.0)	134 (98.5)	
Delay in biopsy to receipt of pathology report			0.784
Patient	0 (0)	0 (0)	
Physician	0 (0)	0 (0)	
System	4 (19.0)	33 (24.3)	
No delay	17 (81.0)	103 (75.7)	

Delay in pathology report to patient informed of results			1.000
Patient	0 (0)	1 (0.7)	
Physician	0 (0)	0 (0)	
System	0 (0)	0 (0)	
No delay	21 (100.0)	135 (99.3)	
Delay in patient informed to decision to treat			0.495
Patient	5 (23.8)	45 (33.1)	
Physician	0 (0)	1 (0.7)	
System	0 (0)	7 (5.1)	
No delay	16 (76.2)	83 (61.0)	
Delay in decision to treat to treatment*			0.599
Patient	0 (0)	8 (5.9)	
Physician	0 (0)	0 (0)	
System	0 (0)	0 (0)	
No delay	21 (100.0)	128 (94.1)	

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
[e] GP – General Practitioner
*Includes individuals with prostate cancer only

Table 4.17: Predictors of Men Who Met the Benchmark From Referral to First Treatment* (n=157)

Variable	Odds Ratio	95% Confidence Interval	p-value
Community of residence			0.999
Urban (≥10 000)	1.00		
Rural (<10 000)	1.00	0.45 – 2.24	
Age			0.003
Young (<70 years)	1.00		
Old (≥70 years)	3.53	1.52 – 8.19	
Gleason			0.865
Low (≤6)	1.00		
Medium (7)	1.04	0.42 – 2.55	0.940
High (>7)	1.34	0.45 – 4.02	0.600

CHAPTER 5

DISCUSSION

This study used a retrospective chart audit data collection to examine wait times for prostate cancer care in NL. The chart audits were designed to analyze wait times for prostate cancer patients awaiting various levels of care. Key findings from the study included: (a) patients in Newfoundland and Labrador waited longer than recommended wait time benchmarks set by local experts, surgical committees, and governments during most intervals in the prostate cancer care pathway. The longest wait existed between the GP referral and the first visit with the urologist (68 days [0, 310.0]). Patients experienced a median wait time of 188 days (35.0, 491.0) from GP referral to first treatment (all modalities). Even though the majority of people were found to have not met the benchmarks in our analysis, our results suggests some triaging of patients based on residency (rural patients seen faster between decision to biopsy to biopsy). However, there appeared to be a lack of evidence to support urologists triaging patients based on age or urgency throughout the prostate cancer care pathway. Patients in Newfoundland and Labrador are waiting longer periods than provincially generated reports currently indicate.

5.1 Wait Time Intervals

Many studies measuring wait times for prostate cancer care only examined a small portion of the wait intervals that patients' experience (Simonovic et al., 2001; Simonovic et al., 2005; Cancer Care Ontario, 2004; Cole et al., 2011). For instance, several studies in the United Kingdom examining wait time guarantees for the GP referral to specialist interval demonstrated that wait times have decreased in the targeted wait

time interval (Robinson et al., 2003; Blick C et al., 2010). However, these studies also demonstrated that while targeting specific intervals may decrease wait time for that interval, wait times across the spectrum of care remain roughly the same. Therefore, it can be suggested that focusing on, and improving only one interval may shift waiting periods to other intervals.

5.2 Objective I: Wait Times in NL

For objective one, we compared wait times obtained from the retrospective chart audit to benchmarks set by local experts (Table 3.2). Specifically, our objective was to obtain the wait times the following intervals: (a) GP referral to first visit with the urologist, (b) decision to biopsy to date of biopsy, (c) date of biopsy to receipt of the pathology report, (d) receipt of the pathology report to when the patient is informed of the pathology results, (e) decision to treat to date of first treatment, (f) GP referral to notification of results, and (g) GP referral to first treatment.

5.2.1 Interval I: GP Referral to First Visit

A significantly larger proportion of men who met the benchmark were urban residents (55.2%). Men from rural communities were 0.60 times as likely (or 1.67 times less likely) to have met the benchmark than urban men. This interval between GP referral to first visit with the urologist was the longest median wait time in the entire prostate cancer pathway (68 days). GP letters requesting an appointment were typically sent by fax or mail. These letters ranged from thoroughly detailed (identifying all of the patients' symptoms) to vague (only requesting an appointment). In some cases of emergencies, phone calls were made for same day appointments. Although there were few overt clinical notes suggesting delays during this interval, the charts did highlight the

need for re-mailing or re-faxing because letters were lost, which inevitably caused further delays to the patient. In many cases, urologists required a second PSA test, which may have contributed to longer wait times experienced at this interval. Since communication between GPs and urologists appears to have its challenges, a standardized referral system, that informs the urologist of the patients' symptoms and other pertinent information could be explored. This may not only shorten wait times at this interval, but it could allow the urologists to triage men who have more urgent symptoms of prostate cancer and decrease the likelihood of a delay.

Comparatively, this study reported this wait interval as longer than other Canadian studies (Cole et al., 2011; Kavanagh et al., 2008; Stevens et al., 2010). NL men who were referred to a urologist waited a mean of 78 days (median 68 days) compared to men from Toronto, Ontario (Stevens et al., 2010) who waited a mean of 40 days. Another study (Cole et al., 2011) reported a mean of 37.5 days in Kingston, Ontario whereas in Calgary, Alberta, men were reported to wait a mean of 8.7 days (median 7 days) to be seen at a rapid access clinic (Kavanagh et al., 2008). Collectively, these data suggest that men from NL are waiting longer than men in the other areas of the country to see a urologist for prostate cancer care. The Rapid Access clinic in Calgary discussed above was set up as a collaborative program by urologists, the Prostate Cancer Centre, and the Calgary Health Region, with the intention of decreasing the time it takes from GP referral to first visit with the urologist for men with suspected prostate cancer (Prostate Cancer Centre, 2011). As this interval is the longest wait time of the prostate cancer pathway for men seeking care for prostate cancer in NL, such a clinic may be of strong benefit in when monitoring or decreasing this wait time in NL.

According to the College of Physicians and Surgeons of Newfoundland and Labrador (2012) the number of practicing urologists in St. John's, NL has not changed since the completion of this study. Considering the rising trends in the incidence of prostate cancer thus the increasing demand for urologists in NL, it may be beneficial to examine benefits of increasing urology supply in NL.

5.2.2 Interval II: Decision to Biopsy to Date of Biopsy

A significantly larger proportion of men who met the benchmark were rural residents (63.2%). Men from rural communities were 2.02 times more likely to meet the wait time benchmark than men from urban communities. This interval was one of the shortest wait times in the prostate cancer pathway (28 days). For many rural men with prostate cancer symptoms, biopsies were scheduled on the same-day as their first consultation. This practice suggests that urologists in St. John's are recognizing that rural patients are often waiting longer for consultation and face more barriers accessing urological care. Although this form of triaging significantly shortens the wait for rural men, future research should examine the psychological impact of same-day biopsies and the possibility of this practice for urban men. This practice may be adding to the stress of men who may not have adequate time to make informed decisions about their health. To lessen the psychological stress, rural GPs referring men to urologists in St. John's, NL could inform their patients of the possibility of having a biopsy on the same day as their consultation and offer information about the procedure.

5.2.3 Interval III: Biopsy to Receipt of Pathology Report

During this interval, 25% of all pathology reports encountered a systematic delay, which also was a significant predictor in determining whether or not men met the wait

time benchmark between GP referral and notification of results. Reasons for these delays included: (a) manpower issues where a pathologist was unavailable to complete the report, (b) a borderline (high-grade prostatic intraepithelial neoplasia [PIN]) diagnosis requiring a second opinion from the Toronto General Hospital (TGH) or the Calgary General Hospital (CGH) ordered by the pathologist, or (c) a second opinion to confirm a positive cancer diagnosis from the TGH or the CGH. In some cases, physicians were required to cancel and reschedule follow-up appointments due to the pathology reports being unavailable. Although this interval was the shortest reported wait (19 days), further investigation should be done as to when the pathology reports are officially completed and signed. Some speculation existed on the validity of these reported wait times. To the knowledge of the investigator, no other study has examined this wait interval.

5.2.4 Interval IV: Receipt of Pathology Report to Patient Informed of Results

This interval illustrates how differences in urology practices in St. John's can affect prostate cancer care wait times. Even though the median wait was relatively short compared to other intervals, men with prostate cancer were 2.15 times more likely to have met the wait time benchmark than men who did not have cancer. However, only 15.8% of men actually met the locally established benchmarks. In some practices, there was little evidence in the charts to suggest that men who were not diagnosed with cancer were scheduled for a follow-up visit. Therefore, it is understandable to see how men with prostate cancer were more likely to have met this benchmark. According to local urologist Dr. Chris French (personal communication, May 16, 2011), men who are not seen for a follow-up are typically informed by telephone of their biopsy results. Our data suggests this practice is effective for shortening wait times for rural patients and for

keeping costs low for patients who otherwise would need to travel long distances for such appointments. Further investigation should look at whether phoning patients and potentially giving a cancer diagnosis by phone has an impact on quality of life. Dr. French noted that men from rural areas are often unable to attend the clinic and require a phone call to inform them of the biopsy results. Moreover, due to the urologists' heavy clinical caseload, patients that do not require further care under their supervision are typically discharged and managed by the patients' family physician who would also inform patients of their negative biopsy results and manage their care. However, one of the study limitations is that we could not capture data on how long it took patients to see their GP for biopsy results.

Some differences in practice affected this wait interval among urologists. Some urologists would book a follow-up appointment on the day of biopsy regardless of the result, where others would wait until receiving the results. These variations in practice may be attributed to the common delays experienced by urologists when waiting for the pathology report. In almost 25% of cases, urologists were faced with waiting longer to receive proper diagnoses due to pathology reports being sent out for second opinion.

No other Canadian study has explored the wait time for the interval between receipt of pathology report to the patient being informed of results. Literature suggests that waiting extended periods of time can have a deleterious effect on the health of men awaiting diagnosis due to psychological stress (Saad et al., 2006; Siemens et al., 2005; Derrett et al., 1999; Spurgeon, Barwell, and Kerr, 2000). Further research should examine the differences between men waiting longer for diagnoses than other men in NL.

Source of delays within the lab system are perhaps different from those within the clinical care system. Lab work flow may indeed not in any way related to patient characteristics by design and our data supports this assumption as this wait interval is not related to age, urgency, or community of residence.

5.2.5 Interval V: Decision to Treat to First Treatment

A significantly larger proportion of men who met the benchmark were old (59.2%), had a low PSA (75.5%), were early-stage (56.5%), had low clinical-risk (59.2%) and low Gleason scores (59.2%), and chose watchful waiting (53.1%) for their first treatment. After controlling for predictors, older men were 5.82 times more likely to have met the benchmark than younger men. Men with a medium Gleason score were 5.00 times less likely (0.20 as likely) to have met the benchmark than men with a low Gleason. About two-thirds of all men did not meet either the local or provincial benchmarks for this interval. In some cases this may be explained by older men choosing a watchful waiting treatment option and not choosing a more invasive treatment which would most certainly diminish the waiting period compared to those who proceed on to further treatment.

The Department of Health and Community Services of NL reported (2012) that the median and 90th percentile wait time for general curative radiation was 14 and 26 days respectively. In contrast, our findings suggest that prostate cancer patients are waiting significantly longer than reports by the provincial government. As a result, informing men that waiting for curative radiation can take up to a month (26 days) can be extremely misleading for prostate cancer patients. Moreover, the province does not differentiate between different types of cancer when reporting the wait time data. Above

all, reporting on this interval only reflects a small fraction of what men experience while waiting for prostate cancer care in NL.

Delays during this interval were not uncommon. In fact, in nearly 15% of cases, men required more time to contemplate their treatment options causing a further delay in their overall wait time. Interestingly, older men were more than five times more likely to have met the local benchmarks than younger men. This result may be explained by older men with cancer were less likely to choose surgery (RP) than young men, and were more likely to chose watchful waiting in consultation with the urologists, which dramatically decreased their waits (Appendix I). Lu-Yao et al. (2009) reported that older men diagnosed with prostate cancer rarely die from prostate cancer and chose a less invasive treatment option like watchful waiting. We defined the watchful waiting first treatment date as the day patients decided on this treatment option. In many cases, this was the same day men were informed of their results, which significantly reduced their wait times.

It was not unusual for men to travel outside of the province for brachytherapy and return to NL for follow-up. At this time, brachytherapy is not offered as a treatment option for men diagnosed with prostate cancer in NL. Further research should explore whether this would be a desired treatment option for urologists and men diagnosed with prostate cancer in NL.

In a CIHI (2011) report, the NL provincial government reported that 94% of patients are meeting the benchmark for radiotherapy. However, variations still exist among provinces with respect to how they are defining the wait interval, which contributes to the uncertainty surrounding the data. Moreover, reporting on only one

interval of wait can be misleading for the total waiting time a patient may experience before radiation therapy.

5.2.6 Interval VI: GP Referral to Notification of Results

The majority of men (83.6%) with suspected prostate cancer did not meet the local benchmarks, and waited a median of 154 days. Our results suggest that older men were more than three times more likely to meet the benchmarks than younger men. PSA remains one of the main reference points for how men are triaged, and older men were more likely to have a medium to high PSA score, thus resulting in faster waiting periods (Appendix I). Considering older men are more likely to have non-life-threatening slow growing prostate cancer, further examination of why older men are triaged for earlier diagnosis should take place. Our results also suggest that men who encountered a systematic delay for biopsy results were less likely to have met the benchmarks. Further examination should take place as to how the pathology reports are being managed.

Men in NL waited a median of 154 days compared to men in Calgary who experienced a median of 46 days (Kavanagh et al., 2008). Some of the differences between these studies may be accounted for because the urologists in the Kavanagh study fast tracked patients between GP and urologists. In 2004, Moul et al. presented research at the American Urological Association annual conference suggesting that a wait longer than three months may significantly increase the risk of biochemical reoccurrence. Although they defined their benchmark from diagnosis to radical prostatectomy, our study suggests that men from NL are clearly waiting longer than three months and are possibly at increased risk for biochemical reoccurrence following therapy.

5.2.7 Interval VII: GP Referral to First Treatment

As depicted in Figure 1, the GP referral to first treatment interval encompasses all of the preceding intervals and as a result, indicates the total wait time that men may wait for prostate cancer care. Based on the chart review, men seeking urological care waited an overall median of six months (188 days) for care from referral to time of first treatment. These results suggest little evidence of triaging and interestingly, older men were 3.53 times more likely to have met the benchmark than younger men. This can be explained by the fact that a greater percentage of older men having prostate cancer choose to have less invasive treatments, which resulted in less waiting.

Comparing our findings to a Canadian study that looked at similar intervals (Kavanaugh et al., 2008), our study reported that wait times were longer at all intervals except the median wait between diagnoses and radical prostatectomy (RP). Another Canadian study by Cole et al. (2011), recently described wait times for all intervals of urological care from GP to surgical treatment. Although this study did not look specifically at prostate cancer, men from NL experienced longer wait times at all intervals, with the exception of the decision to treat to first treatment interval.

In the diagnosis to surgery (RP) interval, Esmail and Walker (2005) and Simens et al. (2005) reported a median wait of 42 days and 91 days respectively, compared to men in NL waiting 46.5 days. Shorter median waits exist in NL between diagnosis and surgery (RP) compared to Nam et al. (2003) who reported 68 days. Unfortunately, due to a lack of a consistent definition of wait time intervals for prostate cancer, data from this study could not be compared to other Canadian research studies on wait times for prostate

cancer (Simonovic et al., 2001; Simonovic et al., 2005; Cancer Care Ontario, 2004; Stevens et. al., 2010).

Comparing results from this study to studies in the United States, in all but one study, men from NL waited longer from biopsy and diagnosis to surgery (radical prostatectomy) (Boorjian et al., 2005; Lee et al., 2006; Moul et al., 2004). Findings also suggest that NL men experience shorter waits from GP referral to first treatment than men from the UK (Subramonian, Puranik, & Mufti, 2003).

Although wait time definitions vary (due to study designs and data availability), there is a clear lack of consistency on the reporting of the full spectrum of wait times across Canada and internationally, making it difficult to make important comparisons.

5.3 Objective II: Differences Related to Variables of Interest

We examined the differences in wait times related to community of residence, urgency and age. Our results suggest that little triaging is taking place based on urgency and age. In fact, in the decision to treat to first treatment interval, older men were more than five times likely to have met the benchmark than younger men. However, this result is still complicated by those patients choosing watchful waiting and those patients who go on to further treatment naturally encounter a delay in their management.

Evidence suggests that in the decision to biopsy to biopsy interval, urologists in NL are triaging rural residents more urgently than urban residents. This is likely due to the inevitable burden rural patients face when accessing specialized care from their rural community and traveling long traveling distances to consult with a urologist. According to local urologist Dr. Chris French (personal communications, November 10, 2010), this

is common practice among urologists in St. John's for urologists' rural patients. Our results suggest that rural patients indeed wait longer from GP referral to first visit with the urologist; however, our data also suggest that triaging is taking place from decision to biopsy to date of biopsy for rural patients. This practice has diminished the wait times experienced by rural patients with suspected prostate malignancy.

5.4 Study Strengths

This study has a number of strengths. First, the literature supporting cancer wait times in NL is limited, especially for prostate cancer. This study examines the entire prostate cancer care pathway, which has not been previously explored in NL. The results identify gaps in the delivery of specialized care in NL and can be used to identify strategies to improve the timeliness of specialist care in the province. Findings will also provide the groundwork for ongoing monitoring and interprovincial comparisons. Second, this study begins to inform specialists on current wait times for their patients. With the exception of one interval, urologists in NL have little idea about how long men are waiting for prostate cancer care.

Methodologically, this study was made robust as urologists in St. John's, NL reviewed and agreed upon the benchmarks used in our primary analyses based on their clinical knowledge and expertise in urological care. Moreover, a presentation was made to the genitourinary tumor board rounds at the Health Science Centre in St. John's, NL where both radiation and medical oncologists provided feedback on the study design.

Finally, the study followed the recommendations by the Western Canada Wait List Project for moving towards the development of standard definitions of wait times for

prostate cancer care. This will allow other researchers and provinces to make valuable and accurate comparisons of their wait time data.

5.5 Study Limitations

Even though men from rural areas were captured in the study, the study sample may not be representative of all prostate cancer wait times in NL. Our study involved six urologists based in St. John's, NL at the Health Science Centre and did not encompass the practice of the two remaining urologists working in the west coast of the province.

The chart audit method relies on the urologists dictating important information into patients' charts. In some cases, patients' referral, follow-up, and other appointment dates were unavailable due to communication taking place informally over the phone. Moreover, the chart audits were unable to capture the data for the wait time interval between when a patient makes a request for an appointment with the GP until the first consultation occurs. We were also unable to capture the information on how patients were triaged by the GPs.

CHAPTER 6

SUMMARY, IMPLICATIONS AND RECOMMENDATIONS

6.1 Summary

Wait times have been the focus of the provinces across Canada throughout the last decade. In 2004, Canada's First Ministers met and identified five priority areas for a reduction in wait times. Cancer care was one of the top priority areas identified with the goal for each province to reduce those wait times by 2007. Benchmarks were established in December, 2005 and NL began reporting on those wait times through press releases from the Ministry of Health and Community Services. The latest press release suggests that waiting for radiotherapy treatment in NL may take up to 28 days; however, this does not represent how long a patient may wait throughout the entire care pathway. At this time, there are no nationally recognized definitions for measuring wait times in Canada, nor a standardized measure to report wait times (e.g. mean, median, or 90^{th} percentile). Therefore, making comparisons of the data and informing the public on realistic waiting times for care remains difficult.

This study, employed quantitative methods to examine wait times for prostate cancer care in NL. A chart audit was used to review every man who had a prostate biopsy in St. John's, NL between April 1, 2009 – March 31, 2010 at the Health Science Centre.

Key findings from the study included:

1. When compared to wait time benchmarks set by local experts, surgical committees, and governments, patients in Newfoundland and Labrador

wait longer than recommended during most intervals in the prostate cancer care pathway.

2. The longest wait existed between the GP referral and the first visit with the urologist (68 days [0, 310.0]). Patients experienced a median wait time of 188 days (35.0, 491.0) from GP referral to first treatment (all modalities).
3. Even though the majority of people were found to have not met the benchmarks in our analysis, our results suggest some triaging of patients based on residency (rural patients seen faster between decision to biopsy to biopsy).
4. There appeared to be little evidence to suggest that urologists were triaging patients based on age or urgency throughout the prostate cancer care pathway.
5. Patients in Newfoundland and Labrador are waiting longer periods than provincially generated reports currently indicate.

Knowledge of the current wait times for prostate cancer in NL can be used to provide the groundwork for ongoing monitoring and interprovincial comparisons while identifying strategies to improve the timeliness of specialist care in the province.

6.2 Implications for Future Research

This study begins to provide wait time data that reflects more accurately the wait times patients experience when accessing the health care system for prostate cancer care in the province of Newfoundland and Labrador. The data suggests key areas within the care pathway that clinicians, provincial health authorities, and policy makers may focus on to improve patient wait times, in particular, the period from when the patient first

accesses a general practitioner to the time when the patient first sees the urologist. Since the completion of this study, NL has seen a loss of full-time practicing urologists, which may result in longer waiting periods to see a urologist for patients with suspected malignancy. Further research is needed to: (a) examine in greater detail the disparities that may exist between urban and rural patients and patients with and without a family doctor; and (b) the impact of different referral practices among primary care medical providers.

Retrospective chart audit remains the most feasible methodological approach to studying wait times but data completeness was an issue in this study, as it has been in other studies. Most studies examining wait times for prostate cancer illustrated internally consistent results; however comparable wait time definitions still remain elusive. Moreover, suggestions for improving the quality of data available on paper and electronic charts are provided below in the discussion of implications of the study for medical practice.

6.3 Recommendations for Practice

Recommendations for practice emerging from this study include:

1. *Develop a standardized referral system for general practitioners (GPs).* The interval between GP referral to first visit with the urologist was the longest wait in the prostate cancer care pathway. Evidence suggests there is a lack of triaging taking place based on age, community of residence, and urgency. Referral letters ranged from informative to vague description of the patients' symptoms. A standardized referral system may not only shorten wait times at this interval, but could allow the urologists

to triage men who have more urgent symptoms of prostate cancer and decrease the likelihood of a delay. Currently, a similarly desired standardized referral form exists for men being referred by urologists to medical oncologists for treatment to ensure that the necessary information including the pathology report, radiological investigations, and other important clinical information is included to alleviate any delays in NL.

2. *Inform rural men upon referral to a urologist about the likelihood of same-day biopsies and offer information about the procedure.* This study highlighted that rural men were triaged faster between decision to biopsy and date of biopsy due to the likelihood of same-day biopsies. Offering rural men information about the procedure may allow them to prepare psychologically for the procedure and decrease the stress level patients may experience.
3. *Further examine how the pathology reports are managed.* During the interval between biopsy and receipt of the pathology report, one-quarter (25%) of all reports encountered a systematic delay – more commonly due to the pathology report unavailable for the urologist, which later became a significant predictor in determining whether or not men met the benchmark between GP referral and notification of results. This study's results suggest no specific triaging of these reports. In many cases pathology specimens were sent out of province for second opinion or for further review which may have caused longer delays to patients care. According to the clinical notes, some urologists at times were unable to

proceed with the next appointment due to the (un) availability of the biopsy reports. Some speculation existed on the validity of these reported wait times. Further studies should explore how these biopsies are managed and reported.

4. *Offer a follow-up appointment to all men regardless of biopsy result.* Practices among urologists differed greatly regarding the wait time between receipt of pathology report to notification of results. Our study highlighted that some men were not seen in the clinic after a negative biopsy result due to either the patients' or urologists' circumstances. Patients' symptoms such as an elevated PSA may be due to other urological conditions such as BPH and may require further care from the urologist. A follow-up appointment with the urologist may improve patient continuity of care. The option of having urologists sending the GP a negative pathology report with suggestions for further management should be explored.
5. *Further investigate the expansion of brachytherapy as a treatment option.* Our study found that interstitial brachytherapy was a desired treatment option nearly 7% of the time. Patients who decide on brachytherapy are required to leave the province for Ontario to receive this treatment. Further examination of the demand for and feasibility of offering this treatment option in the province is necessary.
6. *Move towards standardizing definitions, monitoring, and reporting on relevant wait times to the public.* Men waiting for prostate cancer care are

experiencing lengthy wait times in the prostate cancer care pathway, which are not regularly reported by the province. Moreover, reporting only on radiotherapy does not capture nearly three-quarters of men diagnosed with prostate cancer. Comparing wait times with other provinces and current literature remains difficult due to the lack of nationally recognized definitions for measuring wait times in Canada, as well as, a standardized measure to report on those wait times.

7. *Future research to examine the biochemical recurrence in men undergoing definitive therapy for clinically localized prostate cancer.* Our results suggested the majority of men are not meeting the locally established benchmarks and it would be important for future studies to examine if any delays were related to the recurrence of prostate cancer.
8. *Improve the quality of data available on paper and electronic charts.* Consistent inclusion of referral letters, key dates, patient characteristics, comorbidities, and patient decisions on treatment should be included in the clinical notes. Our study revealed a great deal of variation among urologists' clinical notes ranging from highly comprehensive to general. Moving towards developing a standard of reporting in the paper and electronic charts may improve ability to assess wait time data for future studies.

This study found that men seeking care for suspected or confirmed prostate cancer in Newfoundland and Labrador might experience lengthy delays throughout the care pathway. Although provincial reporting suggests men with cancer are waiting a month

(28 days) for treatment, men with prostate cancer can experience median waits of 188 days ranging from 35 to 491. Where comparisons could be made to other areas across Canada, men from Newfoundland and Labrador usually waited longer at all intervals throughout the care pathway. With the exception of one benchmark, the majority of men did not meet the locally established benchmarks. Although efforts have focused on improving wait times across the province, increased emphasis should be placed on the longer waiting periods such as GP referral to first consultation with the specialist. Additionally, future initiatives should be made to target and triage men with more urgent symptoms or signs of prostate cancer.

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APPENDIX A

Chart Audit and Review Form

Study ID: _____ Date: _____

Date of Birth: _____ Hospitalization #: _____

Community of Residence: _____

Referral Reason: _____

Key Dates	Date
General practitioner referral	
First visit with the urologist	
Decision to biopsy/TRUS	
Date of biopsy/TRUS	
Date pathology report received	
Date patient was informed of results	
Decision of first treatment	
First treatment date	

Patient Attributes	Description
PSA on referral	
DRE findings	
Prostate volume	
Gleason score	
Prostate cancer	❑ Yes ❑ No
Clinical stage of cancer	
Season upon referral	❑Spring ❑Summer ❑Fall ❑Winter

Delays or Cancellations	Reason
First visit with the urologist ❑ Yes ❑ No	
Decision to biopsy/TRUS ❑ Yes ❑ No	
Date of biopsy/TRUS ❑ Yes ❑ No	
Date pathology report received ❑ Yes ❑ No	
Date patient was informed of results ❑ Yes ❑ No ❑ Person ❑ Phone	
Decision of first treatment ❑ Yes ❑ No	
First treatment ❑ Yes ❑ No	

First treatment modality:

- ❑ Chemotherapy
- ❑ Radiation
- ❑ Surgery
- ❑ Palliative Care
- ❑ Watchful Waiting
- ❑ Other _____

Comorbidities:

_____

_____

_____

_____

Additional Comments:

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX B

Dependent Study Variables, Categories, and Code Groups

Dependent Study Variables, Categories, and Code Groups

Dependent Variables	Categories	Code Group
Referral from GP to first visit with the urologist	Met benchmark Did not meet benchmark	1 0
Decision to biopsy to date of the biopsy	Met benchmark Did not meet benchmark	1 0
Date of biopsy to date the pathology report received	Met benchmark Did not meet benchmark	1 0
Date the pathology report received to the date the patient was informed of the results	Met benchmark Did not meet benchmark	1 0
Decision to treat to first treatment*	Met benchmark Did not meet benchmark	1 0
Referral to notification of results	Met benchmark Did not meet benchmark	1 0
Referral to first treatment*	Met benchmark Did not meet benchmark	1 0

[a] These are benchmarks based on expert opinion of Dr. Chris French. He is a urologist located in St. John's, NL

*Includes individuals with cancer only

APPENDIX C

Independent and Covariate Study Variables, Categories, and Code Groups

Independent and Covariate Study Variables, Categories, and Code Groups

Variables	Categories	Code Groups
Community of Residence	Urban (≥10 000) Rural (<10 000)	0 1
Age	Young (< 70) Old (≥70)	0 1
Season On Referral	Spring Summer Fall Winter	0 1 2 3
Referral Reason	DRE/PSA/Family History Urinary Problems	0 1
Prostate Volume	Normal (<30 cm^3) Abnormal (≥30 cm^3)	0 1
Digital Rectal Exam (DRE)	Normal Abnormal	0 1
Prostate Specific Antigen (PSA) on Referral	Low (< 10 ng/ml) Medium (10-19.9 ng/ml) High (≥20 ng/ml)	0 1 2
Had Diabetes	No Yes	0 1
Had Cardiovascular Disease (CVD)	No Yes	0 1
Had Musculoskeletal Condition	No Yes	0 1
Had Gastrointestinal Disease/Hernia	No Yes	0 1
Had Hypertension	No Yes	0 1
Had Other Comorbidity	No Yes	0 1
Had Prostate Cancer*	No (no cancer) Yes (has cancer)	0 1
Clinical Risk*	Low-risk (PSA < 10, <T2b, Gleason <7) Medium-risk (PSA 10-19.9, T2b, Gleason 7) High-risk (PSA ≥20, >T2b, Gleason >7)	0 1 2
Stage of Cancer*	Early-stage (PSA < 10, ≤T2b, Gleason <7) Late-stage (PSA ≥10, >T2b, Gleason ≥7)	0 1
Gleason*	Low (<7) Medium (7) High (>7)	0 1 2
Delay in General Practitioner Referral to First Visit with Urologist	Patient delay Physician delay System delay No delay	0 1 2 3
Delay in Decision to Biopsy to Biopsy	Patient delay Physician delay System delay	0 1 2

	No delay	3
Delay in Biopsy to Receipt of Pathology Report	Patient delay Physician delay System delay No delay	0 1 2 3
Delay in Receipt of Pathology Report to Patient Informed of Results	Patient delay Physician delay System delay No delay	0 1 2 3
Delay in Patient Informed to Decision to First Treatment*	Patient delay Physician delay System delay No delay	0 1 2 3
Delay in Decision to Treat to First Treatment*	Patient delay Physician delay System delay No delay	0 1 2 3
*Includes individuals with cancer only		

APPENDIX D

Characteristics of Men who are Young and Old

Appendix D shows the characteristics of men who were considered young and old. Compared to older men, a significantly larger proportion of young men had an abnormal (not normal) DRE, a low PSA, did not have diabetes, chose radical prostatectomy as a first treatment, and encountered no delay between decision to biopsy to date of biopsy. There were no other significant differences in the characteristics of young and old men in the study sample.

Characteristics of Men who are Young and Old (n=341)

Characteristics	Young n (%)	Old n (%)	p-value
Community of residence			0.605
Urban (≥10 000)	138 (49.6)	29 (46.0)	
Rural (<10 000)	140 (50.4)	34 (54.0)	
Season on referral			0.576
Spring	61 (21.9)	17 (27.0)	
Summer	70 (25.2)	11 (17.5)	
Fall	64 (23.0)	16 (25.4)	
Winter	83 (29.9)	19 (30.2)	
Referral reason			1.000
PSA/DRE/Family	274 (98.6)	62 (98.4)	
Other	4 (1.4)	1 (1.6)	
Prostate volume			0.388
Normal (<30cm^3)	52 (35.1)	9 (27.3)	
Not normal (≥30cm^3)	96 (64.9)	24 (72.7)	
DRE[a]			0.001
Normal	62 (22.3)	3 (4.8)	
Not normal	216 (77.7)	60 (95.2)	
PSA[b] on referral			0.000
Low (< 10 ng/ml)	245 (88.1)	38 (60.3)	
Medium (10-19.9 ng/ml)	23 (8.3)	17 (27.0)	
High (≥20 ng/ml)	10 (3.6)	8 (12.7)	
Had diabetes			0.017
No	261 (93.9)	53 (84.1)	
Yes	17 (6.1)	10 (15.9)	
Had CVD[c]			0.118
No	171 (61.5)	32 (50.8)	
Yes	107 (38.5)	31 (49.2)	
Had musculoskeletal condition			0.843
No	130 (67.4)	31 (68.9)	
Yes	63 (32.6)	14 (31.1)	
Had GI/Hernia[d]			0.151

No	233 (83.8)	48 (76.2)	
Yes	45 (16.2)	15 (23.8)	
Had hypertension			0.360
No	250 (89.9)	59 (93.7)	
Yes	28 (10.1)	4 (6.3)	
Had other comorbidity			0.746
No	264 (95.0)	61 (96.8)	
Yes	14 (5.0)	2 (3.2)	
Has prostate cancer*			0.093
No - No Cancer	156 (56.1)	28 (44.4)	
Yes - Has Cancer	122 (43.9)	35 (55.6)	
Stage*			0.191
Low Risk (Gleason ≤6, ≤T2a, PSA < 10)	57 (46.7)	12 (34.3)	
High Risk (Gleason >6, >T2a, PSA ≥10)	65 (53.3)	23 (65.7)	
Clinical risk*			0.575
Low (≤T2a)	55 (45.1)	17 (48.6)	
Intermediate (T2b)	19 (15.6)	3 (8.6)	
High (>T2b)	48 (39.3)	15 (42.9)	
Gleason*			0.339
Low (≤6)	57 (46.7)	12 (34.3)	
Medium (7)	47 (38.5)	15 (42.9)	
High (>7)	18 (14.8)	8 (22.9)	
Treatment modality*			0.000
Radical prostatectomy	71 (58.7)	5 (14.3)	
Watchful waiting (includes active surveillance)	16 (13.2)	11 (31.4)	
Radiotherapy	29 (24.0)	13 (37.1)	
Other (brachytherapy, palliative care, hormone therapy)	5 (4.1)	6 (17.1)	
Delay in GP[e] referral to first visit with urologist			0.796
Patient	1 (0.4)	0 (0)	
Physician	1 (0.4)	0 (0)	
System	0 (0)	0 (0)	
No delay	276 (99.3)	63 (100.0)	
Delay in patient decision to biopsy to biopsy			0.012
Patient	0 (0)	1 (1.6)	
Physician	0 (0)	1 (1.6)	
System	0 (0)	0 (0)	
No delay	278 (100.0)	61 (96.8)	
Delay in biopsy to receipt of pathology report			0.422
Patient	0 (0)	0 (0)	
Physician	0 (0)	0 (0)	
System	66 (23.7)	18 (28.6)	
No delay	212 (76.3)	45 (71.4)	
Delay in pathology report to patient informed of results			0.461
Patient	1 (0.4)	0 (0)	
Physician	0 (0)	0 (0)	
System	1 (0.4)	1 (1.6)	
No delay	276 (99.3)	62 (98.4)	
Delay in patient informed to decision to treat*			0.027
Patient	46 (37.7)	4 (11.4)	
Physician	1 (0.8)	0 (0)	
System	5 (4.1)	2 (5.7)	
No delay	70 (57.4)	57 (82.9)	
Delay in decision to treat to treatment*			0.120

Patient	8 (6.6)	0 (0)	
Physician	0 (0)	0 (0)	
System	0 (0)	0 (0)	
No delay	114 (93.4)	35 (100.0)	

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
[e] GP – General Practitioner
*Only patients who have prostate cancer

APPENDIX E

Characteristics of Men from an Urban and Rural Community

Appendix E shows the characteristics of men from urban and rural communities. There were no significant differences in the characteristics of urban and rural residents in the study sample.

Characteristics of Men from an Urban and Rural Community (n=341)

Characteristics	Urban n (%)	Rural n (%)	p-value
Age			0.605
Young (<70)	138 (82.6)	140 (80.5)	
Old (≥70)	29 (17.4)	34 (19.5)	
Season on referral			0.717
Spring	38 (22.8)	40 (23.0)	
Summer	40 (24.0)	41 (23.6)	
Fall	43 (25.7)	37 (21.3)	
Winter	46 (27.5)	56 (32.2)	
Referral reason			0.686
PSA/DRE/Family	165 (98.8)	171 (98.3)	
Other	2 (1.2)	3 (1.7)	
Prostate volume			0.404
Normal (<30cm^3)	26 (30.6)	35 (36.5)	
Not normal (≥30cm^3)	59 (69.4)	61 (63.5)	
DRE[a]			0.550
Normal	34 (20.4)	31 (17.8)	
Not normal	133 (79.6)	143 (82.2)	
PSA[b]			0.061
Low (< 10 ng/ml)	144 (86.2)	139 (79.9)	
Medium (10-19.9 ng/ml)	19 (11.4)	21 (12.1)	
High (≥20 ng/ml)	4 (2.4)	14 (8.0)	
Had diabetes			0.090
No	158 (94.6)	156 (89.7)	
Yes	9 (5.4)	18 (10.3)	
Had CVD[c]			0.898
No	100 (59.9)	103 (59.2)	
Yes	67 (40.1)	71 (40.8)	
Had musculoskeletal condition			0.689
No	75 (66.4)	86 (68.8)	
Yes	38 (33.6)	39 (31.2)	
Had GI/Hernia[d]			0.457
No	135 (80.8)	146 (83.9)	
Yes	32 (19.2)	28 (16.1)	
Had hypertension			0.224
No	101 (89.4)	105 (84.0)	
Yes	12 (10.6)	20 (16.0)	
Had other comorbidity			0.551
No	158 (94.6)	167 (96.0)	
Yes	9 (5.4)	7 (4.0)	
Has prostate cancer*			0.847

No - No Cancer	91 (54.5)	93 (53.4)	
Yes - Has Cancer	76 (45.5)	81 (46.6)	
Stage*			0.139
Early-stage (Gleason ≤6, ≤T2a, PSA < 10)	38 (50.0)	31 (38.3)	
Late-stage (Gleason >6, >T2a, PSA ≥10)	38 (50.0)	50 (61.7)	
Clinical risk*			0.099
Low (≤T2a)	38 (50.0)	34 (42.0)	
Intermediate (T2b)	6 (7.9)	16 (19.8)	
High (>T2b)	32 (42.1)	31 (38.3)	
Gleason*			0.237
Low (≤6)	38 (50.0)	31 (38.3)	
Medium (7)	25 (32.9)	37 (45.7)	
High (>7)	13 (17.1)	13 (16.0)	
Treatment modality*			0.500
Radical prostatectomy	37 (49.3)	39 (48.1)	
Watchful waiting (includes active surveillance)	16 (21.3)	11 (13.6)	
Radiotherapy	17 (22.7)	25 (30.9)	
Other (brachytherapy, palliative care, hormone therapy)	5 (6.7)	6 (7.4)	
Delay in GP referral to first visit with urologist			0.368
Patient	1 (0.6)	0 (0)	
Physician	0 (0)	1 (0.6)	
System	0 (0)	0 (0)	
No delay	166 (99.4)	173 (99.4)	
Delay in patient decision to biopsy to biopsy			0.381
Patient	0 (0)	1 (0.6)	
Physician	0 (0)	1 (0.6)	
System	0 (0)	0 (0)	
No delay	167 (100.0)	172 (98.9)	
Delay in biopsy to receipt of pathology report			0.591
Patient	0 (0)	0 (0)	
Physician	0 (0)	0 (0)	
System	39 (23.4)	129 (74.1)	
No delay	128 (76.6)	129 (74.1)	
Delay in pathology report to patient informed of results			0.207
Patient	1 (0.6)	0 (0)	
Physician	0 (0)	0 (0)	
System	2 (1.2)	0 (0)	
No delay	164 (98.2)	174 (100.0)	
Delay in patient informed to decision to treat			0.509
Patient	28 (16.8)	22 (12.6)	
Physician	1 (0)	0 (0)	
System	3 (1.8)	4 (2.3)	
No delay	135 (80.5)	148 (85.1)	
Delay in decision to treat to treatment*			0.526
Patient	3 (3.9)	5 (6.2)	
Physician	0 (0)	0 (0)	
System	0 (0)	0 (0)	
No delay	73 (96.1)	76 (93.8)	

[a] DRE – Digital Rectal Examination
[b] PSA – Prostate Specific Antigen
[c] CVD – Cardiovascular Disease
[d] GI – Gastrointestinal Disease
*Includes individuals with prostate cancer only

APPENDIX F
Human Investigation's Committee Approval Letter

MEMORIAL

Faculty of Medicine

August 3, 2010

Mr. Taylor Ferrier
Community Health and Humanities
Health Sciences Centre
St. Johns NL A1B 3V6

Dear Mr. Ferrier:

Reference #10.118

Re: Prostate Cancer: Wait Times to See a Urologist

Your application received an expedited review by a Sub-Committee of the Human Investigation Committee and **full approval** was granted effective **August 2, 2010**.

This approval will lapse on **August 1, 2011**. It is your responsibility to ensure that the Ethics Renewal form is forwarded to the HIC office prior to the renewal date. *The information provided in this form must be **current to the time of submission** and submitted to the HIC **not less than 30 nor more than 45 days** of the anniversary of your approval date.* The Ethics Renewal form can be downloaded from the HIC website http://www.med.mun.ca/hic/downloads/Annual%20Update%20Form.doc

The Human Investigation Committee advises THAT IF YOU DO NOT return the completed Ethics Renewal form prior to date of renewal:

- *Your ethics approval will lapse*
- *You will be required to stop research activity immediately*
- *You may not be permitted to restart the study until you reapply for and receive approval to undertake the study again*

Lapse in ethics approval may result in interruption or termination of funding

It is your responsibility to seek the necessary approval from Eastern Health, other hospital boards and/or organizations as appropriate.

Modifications of the protocol/consent are not permitted without prior approval from the Human Investigation Committee. Implementing changes in the protocol/consent without HIC approval may result in the approval of your research study being revoked, necessitating cessation of all related research activity. Request for modification to the protocol/consent must be outlined on an amendment form (available on the HIC website) and submitted to the HIC for review.

APPENDIX G
Research Proposals Approval Committee of Eastern Health

Eastern Health

Department of Research
5th Floor Agnes Cowan Hostel
Health Sciences Centre
300 Prince Philip Drive
St. John's, NL A1B 3V6
Tel: (709) 752-4636
Fax: (709) 752-3591

September 14, 2010

Mr. Taylor Ferrier
Community Health and Humanities
Health Sciences Centre
300 Prince Philip Drive
St. John's, NL
A1B 3V6

Dear Mr. Ferrier:

Your research proposal *HIC # 10.118: "Prostate cancer: Wait times to see a Urologist"*, was reviewed by the Research Proposals Approval Committee (RPAC) of Eastern Health at its meeting on September 14, 2010, and we are pleased to inform you that the proposal has been granted full approval.

The approval of this project is subject to the following conditions:

- The project is conducted as outlined in the HIC approved protocol;
- Adequate funding is secured to support the project;
- In the case of Health Records, efforts will be made to accommodate requests based upon available resources. If you require access to records that cannot be accommodated, then additional fees may be levied to cover the cost;
- A progress report being provided upon request.

If you have any questions or comments, please contact Donna Bruce, Manager of the Patient Research Centre at 777-7283.

Sincerely,

Mike Doyle, PhD
Director of Research
Chair, RPAC

cc: Ms. Donna Bruce, Manager Patient Research Centre

MD/jmps