THE RELATIONSHIP OF SELECTED FACTORS TO CATHETER OCCLUSION IN POSTPROSTATECTOMY PATIENTS

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CHAPTER I

INTRODUCTION

Introduction

The use of the urethral catheter has had long-standing acceptance in the medical management of urological disease. The need for temporary artificial drainage of the urinary bladder following surgical procedures has received an even higher endorsement. However, in postprostatectomy patients the necessity to keep the bladder empty has made the use of the urethral catheter essential.

The use of the catheter to achieve bladder drainage in the postprostatectomy patient is not without consequences. One major nursing management problem has always been that of maintaining free drainage because of the occurrence of intravesicular clot formation and secondarily, catheter occlusion. One technique employed to maintain catheter patency has been the continuous through-and-through irrigation. When this procedure is used, the nurse must frequently observe the catheter for any indication of occlusion. What the signs of obstruction are and whether or not they relate to postoperative bleeding and/or the amount of continuous irrigation fluid used has not been established.

Statement of the Problem

The basic problem of the study was to determine whether or not any one or a series of selected variables was relevant to the occurrence of catheter occlusion in postprostatectomy patients.

Purpose

The purpose of the study was to determine the relationship of the occurrence of catheter occlusion following prostatectomy to:

1. Bleeding and clotting time
2. Size of the prostate gland
3. Estimated surgical blood loss
4. Type of surgical procedure
5. Method of anesthesia
6. Weight of tissue removed
7. Characteristics of the postoperative urinary drainage

Background and Significance

The disease process with which this study was concerned is known as prostatism. The syndrome is associated with classical disturbances in the voiding pattern such as frequency, urgency, painful urination, and alterations in the caliber and force of the stream. The eventual outcome of the untreated condition can be destruction of renal function.

Statistically the disease was considered of adequate frequency to justify the work of the planned study. Smith reported that some prostatic enlargement is found ". . . in most men by age 50. The majority have palpable evidence of hyperplasia by age 60" (1972, p. 272). Since the process is not always progressive, some men never experience urinary difficulties. A fraction of patients who do experience significant symptoms may not seek medical correction until age and chronic heart and respiratory diseases have made them poor surgical risks. In spite of this, the mortality rate for prostatectomy has been reported as less than one per cent (Culp 1975).

Basically four surgical approaches are used to accomplish prostate gland removal. These are transurethral, suprapubic, retropubic or perineal resection. Culp (1975, p. 44) summarizes four factors which govern the choice of the type of operation used:

> (1) anatomic and physiologic properties of the individual patient; (2) size and configuration of the prostate; (3) technical advantages and disadvantages of each operative approach; and (4) training and skill of the physician.

Postoperative bleeding and hemorrhage are a major concern with all types of prostatectomies and their incidence following transurethral resections have been reported as ". . . the most commonly encountered complication . . ." (Valk et al. 1975, p. 88). Just what intrinsic and extrinsic factors influence the amount of operative and postoperative bleeding and to what extent has not been made clear. The patient's tendency to bleed, the vascularity of the gland, the type of surgical procedure, the method of anesthesia, and the amount of prostatic tissue removed were all considerations. Literature review noted a suspected relationship between operative and postoperative bleeding as well.

An intrinsic factor of primary importance seemed to be the patient's individual tendency to bleed. Zorgniotti, Narins, and Dell'aria (1970) in their studies on the surgical enucleation of the gland stated that there is no association between intrinsic factors and the amount of blood loss. Although they listed "bleeding tendency" as one of the intrinsic factors, they neither defined it nor studied it (p. 774). Their studies did not rule out the fact that the clotting mechanism may contribute to blood loss, especially with other types of surgical procedures, such as the transurethral approach.

Another possibly important intrinsic factor to be considered was the vascularity of the gland. "Enlargement of the prostate gland is accompanied by an increase in the number and size of its blood vessels. Obstruction to urination is associated with venous engorgement of the gland" (Creevy 1965, p. 80). Greene (1971, p. 918) explained that a high postoperative blood loss can be due to ". . . numerous small arteries or veins commonly encountered during resections of large prostates." However, Perkins and Miller (1969) reported blood loss with larger glands as being variable and unpredictable.

Several extrinsic factors have also been suspected of effecting postoperative blood loss. One extrinsic factor is the type of surgical procedure. Durante et al. (1962) concentrated their studies on all four methods of surgical removal of the prostate. Using a group of 77 patients no relationship was found between the type of surgical procedure and the amount of tissue resected, the total hours of postoperative bleeding, the total postoperative blood loss, the blood pressure, the type of anesthesia, the catheter size, the catheter bulb inflation pressure or bleeding tendencies.

The effect of the method of anesthesia on prostatectomy blood loss was considered by Creevy (1965, p. 80). He stated that "the use of spinal rather than of general anesthesia is advantageous because the result of blood pressure is ordinarily lower than with other types of anesthesia." Deliberate studies were done by Zorgniotti, Narins, and Dell'aria (1970) with findings that supported the advantages of spinal anesthesia. Continuous epidural anesthesia was the method studied and proved superior to general anesthesia in decreasing postprostatectomy bleeding.

Still another extrinsic factor related to prostatectomy blood loss was the amount of tissue removed. In association with the amount of tissue removed the type of surgical procedure was suspected to have a more significant relationship to postoperative bleeding. In the studies on transurethral prostatectomies reported by Perkins and Miller

(1969) a high correlation between operative blood loss and the weight of tissue resected was demonstrated. Agreement with these findings was also set forth by Greene (1971).

Medical literature has reported several studies that have directly measured total blood loss in prostatectomy patients. Goldman and Samellas (1961) tested samples of bladder washings for conductivity to determine percentage of blood in the irrigation fluid. A colorimetric method was described by Durante et al. (1962) in which the total post-operative drainage at specified intervals was treated chemically to render the hemoglobin content readable with a standard colorimeter. Further use of the method by Perkins and Miller (1969) revealed highly accurate and rapid measurements of hemoglobin. The development of a direct method of measuring blood loss was necessary since correlations between hemoglobin and hematocrit levels and blood loss were found to be unsatisfactory (Goldman and Samellas 1961; Perkins and Miller 1969; and Zorgniotti, Narins, and Dell'aria 1970).

The relationship of operative to postoperative blood loss has been studied by other authors. Bruce (1960) concluded that the total blood loss in retropubic prostatectomy patients was twice the operative loss. Walker et al. (1968, p. 189) quotes Hubly's conclusion ". . . that the post-operative blood loss is approximately two-thirds of the operative blood loss."

On the other hand, persistence of bleeding in the postoperative period may occur without relationship to operative blood loss. Baumrueker (1968) points out that the absence of bleeding after a transurethral resection may be due to a temporary drop in blood pressure. Upon the return to normal blood pressure, which may not occur until the patient returns to his room, bleeding may resume. Another delay in bleeding may occur if the irrigation reservoir is too high during surgery. The resulting pressure in the bladder may mask bleeding which would escape cauterization. Baumrueker (1968) offers still another explanation by commenting that bleeding which does not subside following surgery may be from under formed clots in the denuded prostatic bed. These clots require surgical removal before fulguration of the bleeders can be accomplished.

The pathology present with prostatic enlargement may also contribute to postoperative blood loss.

> Recent studies regarding the rare condition of localized fibrinolysis may explain a persistent postoperative bleeding not easily stopped by postoperative fulguration or bag compression. This type of bleeding cannot be explained by infection, low prothrombin time, insufficient resection, venous sinus bleeding, arterial bleeding, or any blood dyscrasias. It is believed to occur in association with cancer of the prostate . . . (Baumrueker 1968, p. 81).

The concern for operative and postoperative blood loss is two-fold. Not only is replacement by transfusion a consideration, but also the formation of clots within the surgical bladder can contribute to serious postoperative complications. Lapides (1971, p. 913) has stated that

". . . bladder overdistention and detrusor spasm lead to sepsis, increased hemorrhage, intractable pain, debility and death."

In the discussion of the treatment of postoperative sinus bleeding, Baumrueker (1968, p. 70) suggested employment of a three-way catheter and continuous irrigation and stated that the ". . . rate of drip flow should be set to cope with the amount of bleeding." Beland and Passos (1975, p. 950) have pointed out that one objective of nursing care in the use of the continuous irrigation is to keep the bladder and catheter lumen free of blood and clots. They further state that if ". . . irrigation of the bladder is prescribed following prostatectomy, sufficient fluid should be introduced to remove blood and blood clots, and the procedure should be performed frequently enough to prevent clot formation within the bladder lumen." Regardless of the type of irrigation used, it was therefore concluded that removal of blood clots or prevention of their formation was the objective of nursing management.

Observation of the patient for the occurrence of the complications of occlusion of the catheter or continued bleeding in the postoperative period is always the responsibility of the nurse. According to Beland and Passos (1975, p. 20) ". . . observation is the act of noting and recording facts or occurrences . . ." Byers (1968, p. 14) has stressed that this must develop as a skill within the nurse based on her knowledge of physical and social science ". . . so that she may work with a constant alertness to significant observations." These recorded facts should describe rather than interpret (Beland and Passos 1975). Byers (1968) further suggested that the use of tools to assist in making observations would be considered appropriate. These tools may assist the nurse to improve her observational skills.

Hypotheses

The following hypotheses were tested in this study:

1. There is no relationship between the patient's prothrombin time and catheter occulsion in the postprostatectomy patient

2. There is no relationship between the size of the prostate gland and catheter occlusion in the postprostatectomy patient

3. There is no relationship between the estimated surgical blood loss and catheter occlusion in the postprostatectomy patient

4. There is no relationship between the type of surgical procedure and catheter occlusion in the postprostatectomy patient

5. There is no relationship between the method of anesthesia and catheter occlusion in the postprostatectomy patient

6. There is no relationship between the weight of tissue removed and catheter occlusion in the postprostatectomy patient

7. There is no relationship between the characteristics of the urinary drainage and catheter occlusion in the postprostatectomy patient

Definition of Terms

The following terms are defined in conjunction with the study:

1. Prostatectomy refers to the surgical approach in removing all or a portion of the prostate gland and included the following types of procedures:

a. transurethral prostatectomy is accomplished by inserting an electrical resectoscope into the urethra and cutting the prostate gland into small chips which can then be removed through the urethra

b. retropubic prostatectomy is done through a low abdominal incision, allowing removal of the gland from the base of the bladder without entering the bladder or the abdominal cavity

c. suprapubic prostatectomy is carried out through an abdominal incision, permitting removal of the gland through an incision in the dome of the bladder

d. perineal prostatectomy requires a subscrotal incision through which the gland and adjacent structures can be removed

2. The size of the prostate gland is the weight determined by pathological examination of excised tissue and recorded on the pathology report on the patient's record

3. The surgical blood loss is the quantitative value of blood lost during the surgical procedure estimated by the surgeon and recorded in the operative report on the patient's record

4. The characteristics of urinary return flow are the color, sediment, and clarity of the urinary drainage returning through the catheter drainage tube

5. Continuous bladder irrigation is the constant instillation and drainage of sterile solution through the urinary bladder by way of a three-way Suggs catheter

6. Catheter patency is the state in which the continuous bladder irrigation inflow volume is equal to the outflow volume

7. Catheter occlusion is partial if the continuous bladder irrigation inflow volume is greater than the outflow volume and complete in the absence of outflow when inflow volume exists

8. The Suggs catheter is a three-way, 24 French urethral catheter with an inside drainage lumen diameter of 0.1771 inches

Limitations

The following limitations were recognized:

1. No attempt was made to retrieve all prostatic tissue during transurethral prostatectomies

2. The amount of surgical blood loss was recognized as a subjective assessment

Delimitations

The following delimitations were placed on the study:

1. Observations of the urinary drainage were made only during the first 36 hours of the postoperative period

2. Only those prostatectomy patients with three-way Suggs catheters and continuous bladder irrigations were included in the study

3. Those patients requiring suprapubic bladder drainage were excluded from the study

4. The study did not include those patients who were returned to the operating room for recauterization to control bleeding during the first 36 hours past the initial surgery

5. Patients experiencing any of the four types of surgical procedures were included in the study

Assumptions

Two assumptions applied to the study:

1. Sufficient quantities of clotting factors must

be present in a given solution for clotting to occur

2. Clot formation within the bladder or prostatic fossa contributes to catheter occlusion

Summary

Because of the importance of nursing care in preventing catheter occlusion in postprostatectomy patients, a study was undertaken to test the relationship of selected factors to the occurrence of catheter occlusion. These factors included the patient's bleeding and clotting time, the size of the prostate gland, the estimated surgical blood loss, the type of surgical procedure, the method of anesthesia, the weight of tissue removed, and the characteristics of the urinary drainage as to color, sediment, and clarity. Only those patients with three-way catheters and continuous bladder irrigations were studied. These variables were studied in order to better understand the occurrence of catheter occlusion. If occlusion could be anticipated and even prevented by the nurse, then implications for nursing management would exist.

The succeeding chapter, Chapter II, contains an in-depth survey of pertinent medical and nursing literature and previous studies related to each factor studied. Special emphasis was given to surgical and postsurgical blood loss and nursing regimen in prevention of catheter occlusion. Chapter III goes on to describe the setting for data collection, the urinary drainage assessment tool and the and the postprostatectomy flow sheet. A summary of data collected and its statistical significance is presented in Chapter IV. Each factor studied is correlated with the occurrence of catheter occlusion. The final chapter presents the conclusions drawn from the study, points out implications for nursing management of the bladder irrigation, predicts further usefulness of the assessment tool and gives direction for and the feasibility of future study.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Literature related to prostatism was reviewed with regard to its pathology, surgical correction, and post-operative management. Special emphasis was given to the cause and treatment of postoperative bleeding and the resulting clot retention. Although several medical studies related to the occurrence, cause, and correction of post-prostatectomy bleeding have been done, no one recent investigation considered multiple causative or corrective factors. Reports of formal inquiry by nurses as to the effect of nursing management on postoperative bleeding, such as the use of bladder irrigation, are absent from the literature. Little evidence is available to assist the nurse in predicting the occurrence of catheter occlusion.

Anatomy

The Prostate Gland

The chestnut-sized prostate is a cone-shaped, glandular body found inverted at the base of the bladder around the urethra. The urethra passes through the gland somewhat anteriorly. The ejaculatory ducts penetrate the posterior portion of the gland and terminate in the prostatic level of the urethra (Flocks and Culp 1975).

The classical division of the prostate into five lobes by Lowsley in 1912 has recently been challenged. Whereas Lowsley's orientation was an anatomical one, functional and pathological studies have divided the gland into a central zone surrounded on each side by a semi-circular peripheral zone (Blacklock 1976). Current references on the surgical anatomy of the prostate still point out that the gland consists of an anterior lobe, two lateral lobes, a middle lobe, and a posterior lobe (Flocks and Culp 1975). Only the posterior lobe lies adjacent to the rectal wall. The middle lobe is posterior but superior to the ejaculatory ducts. It is the posterior lobe that can enlarge into the bladder floor, escaping palpation through the rectal wall (Culp 1975).

Blood Supply

The vessels serving the prostate gland are found in lateral anatomic positions. The inferior vesical artery, a branch of the internal iliac artery, is the major supplier of blood. The middle hemorrhoidal and internal pudendal arteries are frequently accessory providers (Flocks and Culp 1975).

"The prostatic veins form a well-defined plexus around the base of the gland, particularly on the anterior and lateral surfaces" (Flocks and Culp 1975, p. 290).

Return of blood further unites with the pudendal venous plexus and the vesical plexus. Finally venous blood is received by the internal iliac veins. The veins around the prostate gland have large lumens; and, if interrupted during transurethral resection, they may permit irrigation solution to penetrate and dilute the returning blood supply (Flocks and Culp 1975).

The Disease Prostatism

Pathology

Nodular hyperplasia and carcinoma are both causative agents of prostatism, producing an enlargement of the prostate gland resulting in an obstruction of urine flow (Barnes et al. 1974). Since the prostate gland surrounds the urethra, any pathological enlargement readily invades its lumen (Robbins and Angell 1976). Prostatism presents symptoms related to obstructed urine flow, infection, or both. As the disease progresses, pressure and infection can back up through the ureters and will eventually destroy the kidneys (Smith 1972).

During the initial phase of prostatic enlargement, the bladder compensates for the narrowed urethral passageway and urethral resistance to urine flow by increasing detrusor muscle size and tone. Along with this compensatory hypertrophy, the bladder wall undergoes some degree of trabeculation, a separation of the hypertrophied muscle into bundles leaving thin areas of mucosa between the strands. With the increasing intravesicular pressure, these thin mucosal areas balloon out eventually forming diverticula, trapping stagnant urine, and encouraging infection. In addition the trigone muscle hypertrophies and the ureteral orifices become stretched similar to lateral tension being applied to the neck of a balloon. This produces a resistance to urine flow from the kidneys. Later, the bladder decompensates. This is demonstrated by a failure of the hypertrophied muscle to overcome urethral resistance. In the advanced stages of urinary retention, hydroureter and finally hydronephrosis develop (Smith 1972).

Specific pathology of hyperplasia

In hyperplasia, enlargement of the gland occurs in the ". . . inner periurethral glands compressing the outer paraurethral glands into a surgical false capsule" (Culp 1975, p. 29). The inner, hypertrophied tissue loosely adheres to the false capsule and is easily separated by blunt dissection (Smith 1972). Barnes *et al.* (1974) point out, however, that

> when there is a predominance of fibromuscular tissue hyperplasia, the gland is firm and there may be no line of cleavage between the adenoma and the surgical capsule; this type of enlargement is difficult or impossible to enucleate by blunt dissection (p. 288).

The blood supply is known to experience significant changes during hyperplasia. According to Flocks and Culp (1975, p. 290) the internal and urethral prostatic arteries enlarge ". . . significantly with age and very decidedly with hyperplasia." These authors further point out that

". . . this group of arteries forms the main source of blood supply to the hypertrophied portion of the prostate."

During the clinical evaluation of the patient, the physician performs a digital examination of the gland through the rectal wall. One important finding of this exam is the estimation of the size of the gland. Both the degree of protrusion of the gland into the rectal lumen and its palpable length and width are considered in evaluating size (Barnes et al. 1974). "The size can be estimated mentally by comparing it to an inflated 30 cc balloon catheter which corresponds to 30 gm" (Hodges and Barry 1975, p. 53). The estimation of gland size is governed by the following schedule.

Grade I or 1+	up to 15 grams
Grade II or 2+	15 to 50 grams
Grade III or 3+	50 to 125 grams
Grade IV or 4+	over 125 grams

(Barnes et al. 1974)

At best, rectal palpation of the gland is subjective and does not evaluate the intravesicular surface of the gland as it enlarges up into the bladder. The rectal examination, however, gives the physician valuable information for use in planning medical management.

Specific pathology of carcinoma

According to Smith (1972) carcinoma of the prostate often occurs in the presence of hyperplasia, but the coexistence is not interrelated. A recent study by Armenian shows, however, that patients with ". . . nodular hyperplasia were 3.7 times as likely to develop carcinoma of the prostate as controls" (Robbins and Angell 1976, p. 554). Most malignancies originate in the posterior lobe and are subject to palpation through the rectal wall. The induration or nodular portions may be peripheral and scattered or localized near and encroach upon the urethral lumen. Both local and distant metastasis may occur before symptoms of urinary obstruction develop. As more and more of the tissue is involved, the gland becomes fixed and hard (Barnes et al. 1974). Only rarely is the rectal wall invaded; and since the tumor does not create a false capsule, radical excision of the carcinoma, gland, capsule and adjacent structures may be necessary to achieve maximal potential for a cure (Smith 1972). If metastasis is extensive and the symptoms of prostatism are severe, partial transurethral resection may be included in the palliative treatment.

Incidence

> Beginning in the fifth decade of life, there is a progressive increase in the incidence of nodular hyperplasia with age, until about 80 per cent of men beyond the age of 80 years are affected" (Robbins and Angell 1976, p. 553).

Smith (1972) states that by age 60, hyperplasia is palpable in a majority of the male population. Even though the disease is common, Robbins and Angell (1976, p. 554) report that ". . . not more than 10 per cent of men over the age of 80 require surgical relief of the obstruction."

In comparison, it is estimated that "carcinoma of the prostate is the most common cancer of men, occurring in from 14 to 46 per cent of males over the age of 50 years" (Robbins and Angell 1976, p. 554). Most of these cases remain inert making the clinical occurrence ". . . rare before age 60 [but increasing] in frequency thereafter, probably afflicting 25% of men in the eighth decade" (Smith 1972, p. 278). In addition the occurrence sharply rises in old age (Robbins and Angell 1976).

Etiology

The etiology of both the benign and malignant causes of prostatism is poorly understood. Hyperplasia is most commonly associated with an endocrine cause (Farnsworth 1976; Barnes et al. 1974; Smith 1972). Regarding the malignant process Barnes et al. (1974, p. 302) point out that

> More is known regarding the etiology of prostatic carcinoma than about any other malignancy. Although the disease may not be caused by male sex hormones (androgens), its growth is definitely stimulated by these and other related endocrines. It is very improbable that a man's sex life has anything to do with later development of cancer in the prostate, and it is also reasonably certain that trauma is not a factor.

Mortality

Benign prostatic hyperplasia is usually correctable by surgical resection of the bladder neck obstruction. The overall mortality rate is stated by Culp (1975, p. 48) to be ". . . less than one per cent." Valk et al. (1975, p. 89) reported a series of 2,223 transurethral resections citing ". . . an overall mortality of 1.3 per cent." This represented procedures done by both staff and resident physicians. The rate is an improvement over the 1.6 per cent mortality rate for the 3,219 prostatectomies studied in Dublin by Wines, Lane, and O'Flynn (1973).

Of all the men diagnosed with prostatic cancer ". . . only 10% have lesions amenable to cure by radical surgery" and half of these are poor surgical risks (Smith 1972, p. 284). The American Cancer Society (1977) reports that prostatic cancer caused 950 deaths in Texas and 20,000 deaths nationally in 1976. At age 75, the cancerous form of prostatism is reported as the leading cause of death in males (Robbins and Angell 1976), being responsible for "2-3 per cent of all male deaths" (Guyton 1971, p. 596).

According to Robbins and Angell (1976) recent epidemiological information revealed a geographic association to death rates from prostatic malignancy. Some countries like Japan have a very low mortality rate, while others have a high mortality rate. Familial tendencies also exist, and have been demonstrated in the United States.

Surgical Correction

Types of Surgical Procedures

Four types of surgical procedures are commonly referred to in the literature. These types are the suprapubic, the retropubic, the perineal, and the transurethral approaches. The latter ". . . is not suitable for total prostatectomy but is an extremely valuable technique when total prostatectomy is not desired" (Flocks and Culp 1975, p. 295). The first three types provide for removal of the whole gland under direct vision through an incision.

Each procedure has its advantages and disadvantages, and selection of the best approach in each case depends upon the patient and the physician. Culp (1975) reviewed the patient factors which contribute to such a decision. For example, if the patient's abdomen is large, the suprapubic and retropubic approaches are more difficult because of decreased accessibility through the incision. Those patients who have a history of poor peripheral circulation, spinal fusion, or respiratory problems do not tolerate well the extreme lithotomy position required by the perineal approach. On the other hand, if the patient has a prostatic abcess, the perineal approach provides the advantage of perineal drainage. When a bladder stone coexists with the prostatic enlargement, the suprapubic approach is useful to correct both problems. Large glands that would require long transurethral resection times are best removed by the retropubic or suprapubic techniques. Another factor in the choice of an operative approach is the shape of the prostate gland. Large intravesicular lobes are best removed suprapubically whereas intraurethral enlargement of the gland may be removed by the perineal, retropubic, or transurethral methods. Since the lobe direction and degree of enlargement is an individual occurrence, the presurgical evaluation assists the physician in planning the best approach his skill is capable of carrying out for that individual patient (Barnes *et al.* 1974).

The transurethral approach

Of all four surgical procedures, the transurethral approach is most frequently used. Since no incision is required, the patient convalescence is shortened and problems with potency are avoided. Direct visualization of the surgical site provides for better control of bleeding. According to Smith (1972) the mortality rate for this type of procedure is the lowest, being recorded as one to two per cent. When the procedure is executed properly, the results can be superior to any other approach (Barnes *et al.* 1974).

The suprapubic approach

The suprapubic prostatectomy is the simplest of all four procedures since enucleation of the gland and control of bleeding points are done under direct vision through a wide opening in the bladder dome (Barnes *et al.* 1974). When the prostate gland is 50 gms or larger, and lies low in the pelvis, this procedure provides the best access. With this approach vesicular problems such as calculi or polyps can more easily be corrected at the time of surgery (Culp 1975). The mortality rate for this procedure is reported by Smith (1972) to be two to four per cent.

The retropubic approach

The retropubic form of prostatectomy is gaining in popularity and is best suited for the patient whose prostate gland is large and protrudes intraurethrally (Barnes *et al.* 1974). The bladder is not entered except through the prostatic capsule. The close contact with the prostatic fossa provided by this method enhances control of bleeding in the capsule wall and bladder neck. Extravasation of urine through the incision is, therefore, not a problem (Culp (1975). As with the suprapubic approach, mortality rates are two to four per cent (Smith 1972).

The perineal approach

The perineal approach to prostatectomy is the least often used. Although experienced urologists report post-operative urinary flow and mortality rates equal to those of the suprapubic and retropubic forms of surgery, the complications of ". . . uncontrollable hemorrhage, urethrorectal or urethroperineal fistula, . . . urinary incontinence [and] sexual impotence . . ." occur more frequently than with the other types (Barnes *et al.* 1974, p. 334). With a mortality rate of two to three per cent (Smith 1972) less than the other surgical approaches, the occurrence of the itemized complications makes the method highly unpopular.

Factors Related to Postoperative Bleeding

Patient Tendency to Bleed

Some of the studies related to postprostatectomy bleeding mention the patient's tendency to bleed, but little investigative attention has been given to this point. Zorgniotti, Narins, and Dell'aria (1970) reviewed 283 cases of prostatic enucleation with regard to the effects of anesthesia on bleeding. Bleeding tendency was listed as an intrinsic factor--one "not under the control of the surgeon" (p. 774). At the onset of the study, intrinsic factors such as age, preoperative blood pressure, preoperative blood urea nitrogen, and use of preoperative catheter were studied. No correlation between these items and blood loss was verified; therefore, the survey was abandoned. As a result bleeding tendency was neither defined nor examined.

Case study reports indicate concern over the cause and effect relationship between bleeding tendency and blood loss. Lapides (1971, p. 913) reports ". . . 4 patients with persistent post-prostatectomy hemorrhage owing to hemophilia in 1 patient and unknown blood dyscrasias in the remaining 3 patients." Likewise, concern is evidenced by the surgeon regarding the patient's predisposition to bleed. Hodges and Barry (1975, p. 51) point out that preoperative history should screen for "bleeding tendencies in the patient and his family, leukemia with thrombocytopenia, liver failure, and levodopa therapy for Parkinsonism . . . [since all have] been associated with postoperative bleeding and require a treatment plan prior to surgery."

Vascularity of the Gland

Increased vascularity of the prostate gland has been discussed by some authors as having a relationship to the enlarged state of the gland, hence, increased bleeding during resection. Creevy (1965, p. 80) in discussing methods of decreasing and/or controlling bleeding says

> Several factors may operate to increase bleeding during transurethral prostatic resection. Enlargement of the prostate gland is accompanied by an increase in the number and size of its blood vessels.

He goes on to point out that the preoperative obstruction of urinary flow is linked to the engorgement of veins within the enlarged gland.

Although discussions of pathological findings of enlarged prostates do not describe increased vascularity, surgeons have reported visualization of this finding during resections. In summarizing a study regarding the effectiveness of controlling hemorrhage by the use of a hemostatic bag in the prostatic fossa after transurethral prostatic resection, Greene (1971, p. 918) describes "bleeding from a perforated venous sinus or from numerous small arteries or veins commonly encountered during resections of large prostates." Not only are the vessels described as more numerous, but the surgeon may find "that the vessels in the enlarged portion of the prostate are large . . ." (Flocks and Culp 1975, p. 256).

Types of Procedures

In a discussion of any type of prostatectomy, hemorrhage is almost always cited as a major complication, but few authors consider one surgical approach over another as producing more or less operative and/or postoperative bleeding. Durante _et al._ (1962) studied the use of clotting agents and hypothermia in controlling hemorrhage. In the treatment of data, blood loss volumes for 77 control patients were arranged according to the rate and total postoperative blood loss for each type of surgical procedure. For open procedures, those requiring an incision, the results were as follows.

> During the first three postoperative hours following suprapubic prostatectomy the patient lost twice as much blood as in the following three hours. By the end of 24 hours he lost one-half of that lost throughout the total course of convalescence (p. 783).

The results for closed operations were also described.

> During the first three postoperative hours following transurethral resection the patient lost approximately as much as was lost for the following three hours, and at the end of 24 hours he had lost as much as he was going to lose, for any loss after 24 hours usually was negligible (p. 783).

Suprapubic postoperative total blood loss rated highest of all surgical approaches. In a study of 33 patients, an average total loss of 408.9 ml was noted; fourteen retropubic patients lost an average of 152.6 ml while twenty-four transurethral resections lost 79.4 ml and six perineal prostatectomy patients lost 64 ml. Operative blood loss for these patients was not measured.

> In all prostatectomies no correlation [was] found between the following 1) Amount of prostatic tissue removed; 2) Total hours of gross bleeding; 3) Total blood loss postoperatively; 4) Blood pressure of patient; 5) Anesthesia used; 6) Catheter size and degree of inflation of the Foley catheter bulb; and 7) Bleeding tendencies (p. 783).

Method of Anesthesia

In 1965 Creevy reported clinical methods useful in aiding hemostasis during transurethral resections of the prostate. One recommendation was the use of spinal rather than general anesthesia ". . . because the resulting blood pressure is ordinarily lower than with other types of anesthesia . . ." (p. 80). The findings of a study done by Zorgniotti, Narins, and Dell'aria (1970) correlate with Creevy's conclusions in that they demonstrated that 52.4 per cent of patients having general anesthesia required transfusions while 17.3 per cent of patients having epidural anesthesia required transfusions. The authors went on to state that their "impression [was] that continuous epidural anesthesia controls pain, restlessness, catheter spasm and bleeding postoperatively" (p. 776).

In 1967 Madsen and Madsen specifically studied the effects of type of anesthesia form on blood loss. In regard to 77 patients under general anesthesia, the authors discovered an average blood pressure in millimeters of mercury for general anesthesia patients to be 142/84 mm Hg in comparison to 122/67 mm Hg for spinal anesthesia patients. The average preoperative measurements were 140/83 mm Hg and 129/74 mm Hg respectively.

Amount of Tissue Removed

The Madsen and Madsen study also compared blood loss under general and spinal anesthesia to the grams of tissue resected. They found that "blood loss under spinal anesthesia was 14.6 ml per gm of resected prostatic tissue and 21 ml per gm under general anesthesia" (1967, p. 332). These findings varied slightly from those of Perkins and Miller (1969, p. 94) who studied 110 patients with transurethral resections and found that operative "blood loss averaged 22 ml. per gram of tissue resected, and 4 ml. per minute of resection time." No comparison was made, however, to type of anesthesia. Greene (1971) studied 200 transurethral resections and found that operative blood loss averaged from 9.5 ml to 13.9 ml per gram of tissue removed, depending on whether the procedure was done by residents or staff surgeons. Greene's findings support the material discussed by Madsen and Madsen (1967, p. 332);

whereas the size of the gland seems to have no influence on blood loss during open prostatectomy, blood loss during transurethral resection of the prostate is directly proportional to the amount of removed tissue.

Total Blood Loss

One of the early studies done on blood loss in prostatic surgery was done by Bruce, Zorab, and Still (1960). Estimation of blood loss was based on the hemoglobin content of urinary drainage. In 92 retropubic prostatectomy patients studied, operative and postoperative blood loss were found to be equal, even in those patients experiencing controlled hypotension.

In 1961 Goldman and Samellas studied the conductivity method as a means of directly measuring blood loss during prostatectomy. "This method depends on the change in conductivity of water when blood or electrolyte is added to the water" (p. 637). Certain electrolyte-containing irrigating solutions and urine were investigated as a possible source of error and were found ". . . not [to] detract from the significance of the blood loss determinations done in this manner" (p. 637). Operative urinary drainage from 50 randomly selected patients was tested in the blood loss monitor. The average operative blood loss for transurethral resections was found to be less than 600 cc whereas the loss during retropubic procedures was 1050 cc. These amounts exceeded the subjective estimates made by the surgeons and were not reflected by postoperative hematocrit and hemoglobin values which require more time to reflect change.

A different method of measuring postoperative blood loss was used in the previously cited study by Durante et al. (1962). All urinary drainage in the postoperative period was saved and evaluated at specific intervals.

> Total volume of fluid was measured and a standard sample was taken on which a hemoglobin determination was made by converting all hemoglobin present to cyanomethemoglobin by the addition of sodium bicarbonate, potassium cyanide and potassium ferricyanide. Cyanomethemoglobin is a stable compound the concentration of which can be determined with a colorimeter and the reading compared to a standardized curve for cyanomethemoglobin. With knowledge of total quantity of hemoglobin lost and level of hemoglobin remaining in the patient an estimate of total blood loss in milliliters can be calculated (p. 781).

In the study 55 patients received Hemostase during and following surgery compared to 83 patients in the control group who received no medication. In addition, rectal hypothermia was administered to another group of 10 suprapubic patients postoperatively for six hours. The findings demonstrated that patients ". . . given Hemostase or under going rectal hypothermia lost less blood than controls" (p. 784) and that "hemostase in transurethral prostatectomies reduced the postprostatectomy blood loss significantly in the first six hours" (p. 791).

The colorimetric method of determining blood loss was also used by Perkins and Miller (1969). In the transurethral resection patients studied "about 24 per cent received a transfusion during the operation or after for postoperative bleeding" (p. 94).

The effects of cyrosurgery on postoperative blood loss in a series of 25 prostatectomy patients was reported by Walker et al. (1968). Following cryoprostatectomy the bladder was irrigated until clear with 1.1 per cent glycine solution. The colorimetric method was employed to measure blood loss.

> Blood loss during the operation resulted from instrumentation with the cryosurgery probe and amounted to less than 2 ml. The postoperative blood loss . . . [averaged] 24.8 ml., the range was from 1 to 180 ml. (p. 188).

Serious bleeding following transurethral resections is most often due to inadvertent opening of a venous sinus according to Baumrueker (1968); only occasionally does uncontrollable arterial bleeding occur. If the irrigation fluid reservoir is too high during the resection, bleeding sites may be masked until the postoperative period. One other important factor is stressed by Baumrueker.

> Persistent postoperative bleeding is often from under organized clots in the resected prostatic fossa. This bleeding will not stop unless the clots are re-resected or scraped off the floor and sides of the prostatic fossa to which they are firmly grown. The underlying bleeder can then be quickly visualized and fulgurated (p. 80).

Fibrinolytic Intercoagulopathy

Introduction

In discussing postoperative complications of prostatectomy, Valk et al. (1975, p. 89) make the following statement.

> When the patient leaves the operating room, 10 cc of blood are withdrawn and placed in a test tube and attached to the patient's bed. If a fibrinolytic or disseminating intercoagulopathy occurs, the clotting abnormality is recognized and can be treated.

Since hemostasis is important in preventing blood loss, any abnormality of the clotting mechanism can cause postoperative hemorrhage.

<u>Mechanism of blood coagulation</u>

Some authors describe the clotting process in four or more phases (Owen *et al.* 1975). Most simply stated, however, the normal clotting process occurs in three phases: (1) formation of prothrombin activators, (2) conversion of prothrombin into thrombin, and (3) conversion of fibrinogen into fibrin (Guyton 1971).

Prothrombin activators come from two sources--extrinsic and intrinsic. The intrinsic activation is initiated by trauma to the blood cells while the extrinsic activators--the more powerful of the two--enter the blood from damaged tissues. Various clotting factors are also involved in their formation. The prothrombin activator works on prothrombin, a substance continually released into the blood by the liver to form thrombin. Prothrombin, a protein made in the liver and released into the blood stream, is affected by thrombin to form fibrin--the matrix of the clot. After formation, the clot begins to retract, expressing the plasma (Guyton 1971).

The final clot has plasminogen, another plasma protein, blended in with the fibrin. Tissue substances can act on the plasminogen to form plasmin--an enzyme which breaks down the clot (Guyton 1971). The breakdown of clots is a normal part of the body's homeostatic mechanisms.

Defibrination syndrome

The association between carcinoma and defibrination syndrome is described by numerous authors (Sherry 1968; Friedman et al. 1969; Stefanini 1972; Sodeman and Sodeman 1974; Rader 1975; Shuttleworth 1976; Colman and Robboy 1976). Beeson and McDermott point out that "metastatic carcinoma of the prostate is the most frequent of the many neoplasms that may produce hypofibrinogenemia" (1975, p. 1575).

Disseminated intravascular coagulation (DIC) is a defibrination syndrome with two possible initiating sources. First, thromboplastin--a prothrombin activator--can be released indirectly from the tissues; necrotic cancerous cells in the prostate directly release this activator into the blood. Second, thromboplastin is liberated directly from the damaged red blood cells during massive hemolysis. The consequences are two-fold. Initially fibrin deposits occur in widespread tissue capillaries and generalized bleeding ensues as clotting factors are consumed. Ischemia, secondary traumatic hemolysis, and corrective fibrinolysis occur in response to widespread clotting (Robbins and Angell 1976). Along with the corrective fibrinolytic response, Sherry (1968) states that

> . . . the most striking finding is poor and slow blood clotting (if any) even after the addition of thrombin and . . . the syndrome is usually recognized and referred to as 'pathological fibrinolysis' or 'fibrinolytic bleeding' (p. 255).

Laboratory findings must be used to distinguish disseminating intravascular coagulation from primary fibrinolysis. When defibrination occurs, the laboratory tests will show a noticeable decrease in platelets, an absence of clot retraction, a lengthening of bleeding and prothrombin times, an increased serum antithrombin activity and shortening of the euglobulin lysis time (Stefanini 1972). In fact, it is probably the euglobulin lysis test that is most valuable in diagnosis (Colman and Robboy 1976).

Primary or local fibrinolysis

The controversy over the existence of both primary fibrinolysis and diffuse intravascular coagulation is discussed by Gans (1973). In classifying the diseases Rader (1975) and Beeson and McDermott (1975) list the two separately as if to verify that each is a separate entity. Although the two share similar signs and symptoms, differences are found within laboratory findings and treatment.

The literature is obscure in regard to the mechanism triggering primary fibrinolysis. One theory is that urokinase, a thrombolytic agent produced by the kidneys and always present in the urine, causes the activation of plasminogen into plasmin. Other substances in prostatic tissue function in the same manner. Fibrinolysis is the net result (Sherry 1968; Shuttleworth 1976). Because of the release of plasminogen activators from prostatic tissue, some authors associate primary fibrinolysis with benign prostatic hypertrophy rather than carcinoma (Colman and Robboy 1976; Shuttleworth 1976; and Friedman et al. 1969).

Differential diagnosis of primary fibrinolysis as compared to diffuse intravascular coagulation is discussed by several authors (Sherry 1968; Colman and Robboy 1976; and Stefanini 1972). The major point of determination is that in primary fibrinolysis the platelet count remains normal. Stefanini points out why correct diagnosis is so important in regard to treatment.

> Recognizing the conditions in which fibrinolysis can occur is of great practical importance because epsilon aminocaproic acid very effectively controls fibrinolytic states. However, it may cause irreversible and fatal intravascular clotting when used in the course of the defibrination syndrome (p. 218).

Clot retraction

One laboratory test used to evaluate the stability of the third phase of coagulation is clot retraction (Bauer, Ackermann, and Toro 1974; Linman 1975).

> Clot retraction is influenced by the number and functional activity of platelets, although a rise in the number of platelets does not shorten the clot retraction time. Other factors include temperature, quantity and quality of fibrinogen, thrombin, and hematocrit. Clot retraction is inversely proportional to fibrinogen contents and red cell mass (Bauer 1974, p. 206).

Bauer goes on to say that during hypofibrinogenemia and fibrinolysis "the clot is small and the red cell fallout is increased . . ." (p. 260). This finding interrelates with the statement by Miale (1972) that the concentration of fibrinogen has an effect on clot quality and retraction time. Sherry (1968) states that during hypofibrinogenemia ". . . if a clot forms, it is loose and friable. Subsequently the clot may undergo spontaneous dissolution in a matter of minutes to hours . . ." (p. 255).

Two laboratory methods for evaluating clot retraction are described by Linman.

> At 37° C in a water bath, blood is permitted to clot and allowed to stand for an hour, after which the degree of clot retraction is determined. A clot normally retracts 50 to 60 per cent of its original volume within 1 to 3 hours. A commonly used modification involves the evaluation of retraction at 2 and 24 hours in tubes maintained at room temperature (p. 886-887).

Postoperative Bleeding and Catheter Occlusion

Aside from the kinds of complications to which all surgical patients are susceptible, prostatic surgery has its special problems. The literature records occurrence statistics and describes treatment regimens regarding loss of urinary control, hyponatremia and loss of sexual potency. Most authors seem to be greatly concerned in regard to operative and postoperative blood loss, hemorrhage and secondary clot retention, with or without catheter occlusion (Bodman 1959; Bruce, Zorab, and Still 1960; Creevy 1965;

Madsen and Madsen 1967; Baumrueker 1968; Perkins and Miller 1969; Zorgniotti, Narins, and Dell'aria 1970; and Lapides 1971). Valk et al. in discussing the transurethral removal of the gland describe hemorrhage as the complication seen most frequently in the 4,000 patients they studied. The fact that major bleeding is possible after any type of prostatectomy is also stressed by Keuhnelian and Sanders (1970).

Literary descriptions of postoperative care associate clot formation in the prostatic fossa with postoperative bleeding (Hodges and Barry 1975; Hudson 1975). Baumrueker points out that "persistent postoperative bleeding is often from under organized clots in the resected prostatic fossa" (1968, p. 80). In addition association between bleeding and frequent catheter occlusion is made by Lapides (1971). Regardless of whether the bleeding is venous or arterial in origin, clots may still form (Keuhnelian and Sanders 1970).

Postoperative Nursing Management

The fact that the catheter can become clot-obstructed is clearly pointed out as a major nursing management problem (Keuhnelian and Sanders 1970). The nursing intervention employed to resolve catheter obstruction depends in part on the medical regimen. Some physicians prefer to irrigate the bladder internally by diuresis and hydration (Essenhigh and Eustace 1969; Fam and Barsoum 1971; Madsen et al. 1970; and Goldfarb and Kase 1976). Intermittent bladder irrigation with a piston syringe as described by Keuhnelian and Sanders (1970) may also be used. Still a third technique utilizes a through-and-through or continuous bladder irrigation.

Continuous bladder irrigation may be accomplished through either the suprapubic catheter and the urethral catheter or it may be done through a three-way urethral catheter (Baumrueker 1968; Keuhnelian and Sanders 1970; Lippincott Manual of Nursing Practice 1974). In regard to this procedure the nurse's main function is to watch for increased bleeding and bladder distention secondary to clot formation (Beland and Passos 1975).

The purpose of the through-and-through irrigation is to keep the blood washed from the bladder and, thus, prevent clot formation and retention. The Lippincott Manual of Nursing Practice points out that the irrigation rate is set ". . . at [a] sufficiently rapid rate to keep the drainage clear" (p. 496) and that "if [the] drainage is bright red, [the nurse should] allow irrigation solution to run rapidly until drainage becomes lighter" (p. 469).

The use of the three-way catheter is not without its hazards.

> The use of these double-lumen catheters is not particularly rewarding: the diameters of the channels are necessarily narrower, so drainage is not as free as with a comparably sized single-lumen catheter; the irrigations may seem to function well, giving a false sense of security, when actually the bladder is overdistended with clots. A catheter that is draining well is ordinarily best left alone and not irrigated routinely. If drainage stops or the bladder is distended, gentle irrigation is tried. Often the

> dislodging of a small plug in the catheter is all that is needed. Occasionally a mere squeeze of the tubing may suffice. If 5 or 6 oz have been introduced but the returns are inadequate, the physician is best called. More vigorous methods should be left to the urologist's direction (Keuhnelian and Sanders 1970, p. 280).

Summary

Literature reviewed clearly demonstrated that catheter occlusion is a major postoperative management problem even when through-and-through irrigation of the bladder is used. Although many related studies have been documented in the medical literature, nursing research on the subject is lacking. Little information exists to assist the nurse in predicting or preventing the occurrence of urinary clot retention and catheter occlusion following prostatectomy.

CHAPTER III

PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

Introduction

This non-experimental study was conducted for the purpose of determining the relationship of catheter occlusion following prostatectomy to selected quantitative variables. The selection of a suitable design required an empirical investigation utilizing hypotheses as a source for direction in the research process. Fellin, Tripody, and Mayer (1969) classify such a study as a quantitative-descriptive one done for the purpose of hypothesis testing since it meets three requirements: (1) it is nonexperimental; (2) measurable variables are included, and (3) the purpose of the study relates to the acquisition of knowledge.

The basic design chosen for the study was a one-group pretest-posttest design (Campbell and Stanley 1963). In the application of this research pattern, the sample population is measured in regard to the occurrence of variables prior to and following an event, in this case, the prostatic resection.

This chapter reports the procedure for collection and treatment of data as employed in the study. The setting for data collection and the population involved are described.

A description of the tool and its development is followed by a discussion of how the tool was administered.

Setting

The study was carried out in an East Texas metropolitan area in two private, acute care, general hospitals of approximate size--250 to 350 beds. Both hospitals are staffed by the same group of physicians including six urologists, all of whom permitted their patients to be included in the study. The surgical departments and segregated urological units are comparably sized, proportionally staffed, and similarly equipped.

All urology patients are admitted to a designated unit in each hospital pending availability of beds on that unit. Mother Frances Hospital, with 255 beds, admits urology patients to a 26-bed unit which is jointly used with orthopedic patients. Medical Center Hospital, having 327 beds, assigns urology patients to rooms on a 42-bed unit which is also utilized for general surgical and some medical patients.

Population

The target population for the study was defined as all middle-aged and older males with a medical diagnosis of prostatism undergoing prostatic resection in general hospitals in the East Texas area. Study findings were to apply to only those individuals who received continuous bladder irrigation as part of the postoperative regimen of care. Sampling of the population was done by convenience (Abdellah and Levine 1965). All prostatectomy patients who were admitted to the two hospitals chosen for the setting of the study were included in the sample. Approximately 25 prostatectomies were done between the two hospitals every month. It was, therefore, reasonable to expect that 75 consecutive patients could be included in the study sample. All patients who were admitted to the urology unit and signed the consent form (see Appendix A) were entered into the process of data collection. The final study sample consisted of forty-one of the seventy-five consecutive patients.

Tool for Data Collection

Description of the Tool

The tool for data collection (see Appendix B) developed for use in the study consisted of three parts: (1) the Urinary Drainage Assessment Tool, (2) the Post-prostatectomy--GU Drip Flow Sheet, and (3) the Demographic Data Sheet. Since no reliable tools for measuring and recording observations of the characteristics of hematuria were available in the literature, the assessment tool and the genitourinary (GU) drip flow sheet were developed specifically for use in the study.

The Postprostatectomy--GU Drip Flow Sheet was designed to provide space for the entry of observations regarding the characteristics of urinary drainage and the occurrence of catheter occlusion. Use of the flow sheet involves the portion entitled Urinary Drainage Assessment Tool. In the assessment tool, three basic characteristics of hematuria--color, sediment, and clarity--were selected as category labels and described in three levels. The lowest level description for each category was written to represent normal urine. Each description at this level was assigned a score of one (1). The highest level descriptions indicative of severe urinary bleeding were given a score of three (3). The middle level descriptions pictured minimal or old urinary bleeding. At this level each description was valued with a score of two (2).

The numerical scores were assigned for ease and consistency in recording by observers. Space for recording observations of catheter occlusion was also included on the flow sheet. The inflow and outflow rate columns were constructed to display the speed of the GU drip. Comparative alterations in the two speeds--inflow rate faster than outflow rate--were used to document the occurrence of partial or complete catheter occlusion.

The remainder of the flow sheet was designed to make the tool more useful clinically and to meet institutional requirements for a medical record form. The

Comment/Procedure column was designed for other pertinent information such as nursing procedures. The addressograph space, the top-to-bottom reverse format, hospital name, and Directions for Use gave the form equal authority with other hospital chart forms.

The Demographic Data Sheet was developed to document information regarding the variables in the study not found on the flow sheet. Information was gathered from the chart and transformed into numerical data.

Validation of the Tool

The Urinary Drainage Assessment Tool and the flow sheet were developed and utilized in a previous study involving a group of eight patients. Following the pilot test, personnel who had used the flow sheet participated in evaluating it by means of a questionnaire. Using the comments and suggestions modifications were made in both the assessment tool and the flow sheet. The medical records of the eight patients were also reviewed to verify that all items pertaining to the demographic data were available.

According to Van Dalen (1973) the instrument must be evaluated as to its objectivity, validity, reliability and suitability. The pilot test revealed that the tool was suitable, that is, it obtained the type of data needed. The tool was also evaluated in regard to objectivity--the fact that the scale ". . . produces the same score regardless of who marks it. . ." (Van Dalen 1973, p. 336). The pilot test revealed a degree of inconsistency in the scores of the characteristics of the urine by use of the middle level descriptions in the Urinary Drainage Assessment Tool. Based on this information the number of levels was decreased from the original four to three levels.

Objectivity closely relates to reliability in tool evaluation. Reliability is defined as ". . . the proportion of accuracy to inaccuracy in measurement" (Treece and Treece 1973, p. 179). Since the pilot test did not demonstrate consistent urinary drainage scores taken on the same patient by various staff members, it was decided to develop a staff orientation posttest. This posttest was to be used in the study to more closely examine the reliability of the assessment tool.

Validity is defined as the ability of the tool to ". . . measure what it claims to measure . . ." (Van Dalen 1973, p. 337). It was determined from the results of the pilot test that the instrument possessed content validity in that it measured the quantitative variables to be included in the study (Issac and Michael 1971).

Administration of the Tool

The Postprostatectomy--GU Drip Flow Sheet was instituted as a part of patient care on all prostatectomy patients admitted to the two urology units from May 15th through August 8th, 1977. Nursing staff were instructed by supervisory personnel as to the authority of its use. For ease in recording, the form was to be placed on a clipboard at the patient's bedside.

The researcher was responsible for orientation and follow-up on all appropriate nursing staff as to the use of the flow sheet and the assessment tool. To assist in this process a slide-tape series was prepared reviewing the content and use of the assessment tool and the flow sheet. (See Appendix C for a transcript of the program.) Multiple color slides of urine illustrating the varying levels of each characteristic of hematuria were included. In the narration each slide was described and scored using the descriptions in the assessment tool. The method of recording all observations on the flow sheet was demonstrated with examples.

The training sessions ended with a posttest of 15 slides of urine samples representative of all levels of the characteristics on the assessment tool. During the test, each staff member used a recording sheet (see Appendix D) and the assessment tool to score each sample. Following the test the slides were reviewed with staff and their evaluations and ratings were discussed. The recording sheets were then analyzed for consistency among the ratings.

Throughout the data collection period, the staff's recordings on the flow sheet were evaluated on a daily basis. Questions were answered and clarifications were made as often as necessary. The Comment/Procedure column on the flow sheet was initialed by staff as they recorded observations. This practice allowed prompt clarification of recordings. Contact was made with all shifts when necessary. The Demographic Data Sheet was filled out by transferring information from the patient's chart prior to or following dismissal. The flow sheet and consent form were removed from the record when all demographic data was obtained.

Collection of Data

Preinvestigational Phase

Agency preparation

The preparational phase of data collection started six months prior to implementation. Initially, conferences were arranged with administrators of each hospital to explain the purpose of the study and the procedure for data collection. Agency consent forms (see Appendix E) were signed at this time.

After official consent was obtained, conferences were held with key members of appropriate hospital departments and medical and nursing staff. Agreement to assist with the study was verbally obtained. The urology and anesthesiology medical staff sections voted in their sectional meetings to support the study. The medical staff medical records committee in each agency approved the flow sheet and adopted it as an official chart form for the duration of data collection. Required assistance from the laboratory, medical records and operating room departments and the business office was verified in each agency. The responsibilities of the researcher were also outlined. An agreement deliniating the data collection arrangements was written and distributed to the administration of each agency and departments involved (see Appendix F).

Training of observers

Because the nature of the research design required frequent visual examination of postoperative urinary drainage and the GU Drip inflow and outflow rates, observers were utilized in data collection. Since surveillance of urinary drainage was an existing function of nursing staff, all staff members on each shift were trained as observers.

Abdellah and Levine (1965) outline observer bias in the potential weaknesses in research methodology. To lessen this effect, a standardized slide-tape orientation presentation was utilized along with the closely scrutinized evaluation of observer recordings during data collection previously cited. Each staff member was asked to attend one orientation session. By offering the sessions at several times during each shift, small groups were accomodated without competing with patient care responsibilities. The orientation posttest was administered at the close of each session.

Investigational Phase

Population identification

In order to discover patients who were to be admitted for prostatic surgery, the surgery schedule was checked three times a week with a central posting office. Records of all surgeries posted at both hospitals are channeled through this department. The day or evening prior to surgery, those patients admitted to or to be transferred postoperatively to the urology unit were interviewed to obtain informed consent for inclusion in the study. Anonymity and the right to withdraw from the study were assured.

Measurement of presurgical variables

Once the patient consented, the medical orders were reviewed. If the physician had not written an order for a prothrombin time test, the nursing personnel were asked to order the test based on a standing order written by the urology section of the medical staff (see Appendix G). In this case, the requisition for the test was labeled so that the charge would not be made to the patient.

Routinely, the urologist completed his preoperative physical examination of the patient, including the rectal palpation of the prostate gland. In the summary of physical findings, the recording of the gland's size--1+, 2+, et cetera--was made. This information was available for transfer to the Demographic Data Sheet.

Measurement of postoperative variables

After the surgical procedure was completed, physicians prepared the operative report containing the patient's estimated surgical blood loss, the type of surgical procedure, and the type of catheter inserted at the close of the procedure. The surgical blood loss volume was recognized in the limitations of the study as a subjective assessment. No attempt was made to measure directly the blood loss. If any urinary drainage device other than the three-way Suggs catheter was utilized, the subject was dropped from the study sample. The anesthesia report on the chart recorded the use of either spinal or general anesthesia, and this information was transferred to the Demographic Data Sheet.

Within two or three postoperative days the pathology report was available in the record and identified the direct weight of the tissue removed. No attempt was made to improve the operating room technique for retrieving the quantity of prostatic tissue removed during transurethral resections. This limitation was noted prior to initiation of the study.

When the patient returned from surgery, nursing staff instituted the Postprostatectomy--GU Drip Flow Sheet. Recordings were made by all shifts as long as the GU Drip was in progress even though the occurrence of catheter occlusion after the first 36 hours would not be utilized in data collection. When completed, each page of the flow sheet was placed in the patient's medical record. Once the drip was discontinued, the flow sheet was surveyed for the occurrence of catheter occlusion.

Rounds were made daily to verify that the subjects in the sample had not been returned to surgery for correction of bleeding. According to the delimitations of the study, such patients were to be excluded from the analysis of data.

By agreement with the anesthesiology section of the medical staff, a notice was placed on the patient's chart cover preoperatively to remind the anesthesiologist to draw a 2 cc blood clot at the close of the surgical procedure, place it in a type and crossmatch tube, label it, and tape it to the patient's chart. When the patient returned from the recovery room, the clot was removed and retained for observation. The blood sample was kept upright at room temperature for 24 hours and observed for an occurrence of clot disintegration. The presence or absence of firmness of the clot at 24 hours was then recorded on the Demographic Data Sheet.

Treatment of Data

Frequency distributions of the data from the Demographic Data Sheets and the Postprostatectomy--GU Drip Flow Sheets were tabulated overall and for the groups who either experienced or did not experience catheter occlusion. Since the findings regarding the prothrombin time value, estimated surgical blood loss, and pathological weight of the tissue removed represented continuous variables, summary statistics (mean, standard deviation, range) were calculated for both groups individually and for the two groups combined. Pearson correlation coefficients were used to assess the strength of relation between pairs of these variables. To relate presence or absence of occlusion to each of these variables, point biserial correlation coefficients were calculated. For the data representing the preoperative estimate of the size of the gland, the type of surgical procedure, and the method of anesthesia, Chi square contingency table analysis was used. Data related to the characteristics of urinary drainage were organized by frequency distributions of ratings for subjects with catheter occlusion and examined for a preponderance of higher numbers on the rating scale.

Data collected from the nursing staff orientation posttest were tabulated by hospital, skill level, shift, and urine sample rating on each of three characteristics for fifteen specimens. The data were then examined for per cent of agreement among ratings by skill level, shift, and hospital using contingency table analysis.

Summary

This chapter reviews the procedure used in data collection and treatment in regard to the purpose of this study. The development and administration of the Demographic Data Sheet and the Postprostatectomy--GU Drip Flow Sheet was discussed. The correlation of catheter occlusion with each of the seven variables in the study was examined by using Chi square contingency tables or Pearson and point biserial correlation coefficients.

CHAPTER IV

ANALYSIS OF DATA

Introduction

A descriptive research study was undertaken to determine if significant correlations existed between selected factors and catheter occlusion following prostatectomy. Observations were made following prostatic resection in two general acute care hospitals. This chapter presents the analysis of data collected through the use of the Demographic Data Sheet, the Postprostatectomy--GU Drip Flow Sheet, and the staff orientation posttest.

Description of the Sample

The sample population represented in the study consisted of consecutive postprostatectomy patients in two private 250-to-350 bed general acute care hospitals. A total of seventy-five patients were reviewed. All patients scheduled for prostatic resection who consented to participate in the study and who were admitted to the segregated urology units were included in the sample. Of the seventy-five patients in the survey population, forty-one were admitted to the final sample. A total of sixteen patients did not consent to participate in the study; thirteen were admitted to other nursing units. Six patients, after consenting, either experienced complications requiring cancellation of the surgery or had a change in diagnosis. The final sample population, summarized by hospital in table 1, consisted of 54 per cent of the total number of patients surveyed.

TABLE 1

TOTAL SURVEY POPULATION (n=75)

Population Description	Mother Frances Hospital	Medical Center Hospital	Total (%)
Included in the sample	10	31	41 (55%)
Refused to consent	9	6	15 (20%)
Not admitted to urology unit	4	9	13 (17%)
Procedure cancelled or changed	3	3	6 (8%)
Totals	26	49	75 (100%)

The distribution of the sample population by attending physician is displayed in table 2. The sample approximates a nearly equal representation of the five physicians cooperating in the study.

TABLE 2

DISTRIBUTION OF SAMPLE BY PHYSICIAN (n=41)

Physician	No. subjects (%)
1	9 (22.0%)
2	10 (24.3%)
3	5 (12.4%)
4	10 (24.3%)
5	7 (17.0%)
Total	41 (100.0%)

Presentation and Analysis of Data

Catheter Occlusion by Hospital and Physician

Tables 3 and 4, respectively, show a comparison of the occurrence of catheter occlusion by hospital and physician. The occurrence of catheter occlusion in sample patients at Mother Frances Hospital was 50 per cent and 36 per cent at Medical Center Hospital.

TABLE 3

PERCENT OF CATHETER OCCLUSION BY HOSPITAL GROUP (n=41)

Hospital	Number Occluded (%)	Group Number
Mother Frances	5 (50%)	10
Medical Center	11 (36%)	31
Totals	16 (39%)	41

TABLE 4

PERCENT OF CATHETER OCCLUSION
BY PHYSICIAN GROUP (n=41)

Physician	Number Occluded (%)	Group Number
1	4 (44.4%)	9
2	5 (50.0%)	10
3	0 (0.0%)	5
4	4 (40.0%)	10
5	3 (43.9%)	7
Totals	16 (39.0%)	41

The occurrence of catheter occlusion in regard to physician ranged from 40 to 50 per cent except for one physician--number three--whose patients did not experience catheter occlusion. It was noted that this physician had the smallest number of subjects in the study.

Relationship of Occlusion to Continuous Variables

Prothrombin time

Tables 5 and 6 show the frequency distributions for prothrombin time values for the subjects in the study.

TABLE 5

OVERALL FREQUENCY DISTRIBUTION FOR PROTHROMBIN TIME (n=41)

Value	Frequency	(%)
72.0 %	3	(7.3%)
83.5 %	1	(2.4%)
90.7 %	1	(2.4%)
100.0 %	36	(87.9%)
Totals	41	(100.0%)

TABLE 6

PROTHROMBIN TIME FREQUENCY DISTRIBUTION FOR SUBJECTS WITH OCCLUDED AND NONOCCLUDED CATHETERS (n=41)

Value	Nonoccluded Frequency (%)	Occluded Frequency (%)
72.0%	2 (8.0%)	1 (6.3%)
83.5%	1 (4.0%)	0 (0.0%)
90.7%	1 (4.0%)	0 (0.0%)
100.0%	21 (84.0%)	15 (93.7%)
Totals	25 (100.0%)	16 (100.0%)

The prothrombin time levels ranged from 72 per cent to 100 per cent. The mean value for all subjects was 97.3 per cent with a standard deviation of 7.77 showing narrow dispersion. The summary statistics for the occluded and nonoccluded catheter groups are shown in comparison with those in the overall group in table 7. Negligible difference is seen in the statistics for the sample groups with occluded and nonoccluded catheters in relation to the overall group.

TABLE 7

SUMMARY STATISTICS FOR PROTHROMBIN TIME (n=41)

Group	Minimum Value %	Maximum Value %	Mean	Standard Deviation
Nonoccluded	72%	100%	96.7	8.3
Occluded	72%	100%	98.3	7.0
Overall	72%	100%	97.3	7.77

To test hypothesis one, there is no relationship between the patient's prothrombin time and catheter occlusion in the postprostatectomy patient, point biserial correlation coefficients were used. When one variable is continuous, such as prothrombin time levels, and the other variable is dichotomous, as in the presence or absence of catheter occlusion, the point biserial correlation is used to test for an association between the variables (Koenker 1971). The correlation coefficient for catheter occlusion and prothrombin time levels was 0.0967 with a probability of significance of 0.55 demonstrating that the two variables are not related. The first hypothesis was therefore supported.

Estimated surgical blood loss

Table 8 shows the frequency distributions for the surgeon's estimate of blood loss during surgery.

TABLE 8

FREQUENCY DISTRIBUTION FOR SURGICAL BLOOD LOSS (n=41)

Blood Loss in ccs.	Combined Frequency (%)	Nonoccluded Frequency (%)	Occluded Frequency (%)
40	1 (2.4%)	1 (4%)	0 (0%)
50	2 (4.8%)	2 (8%)	0 (0%)
75	2 (4.8%)	2 (8%)	0 (0%)
100	6 (14.6%)	4 (16%)	2 (13%)
150	4 (9.7%)	1 (4%)	3 (19%)
175	1 (2.4%)	0 (0%)	1 (6%)
200	2 (4.8%)	2 (8%)	0 (0%)
225	1 (2.4%)	1 (4%)	0 (0%)
250	5 (12.2%)	4 (16%)	1 (6%)
300	3 (7.3%)	2 (8%)	1 (6%)
350	8 (19.5%)	3 (12%)	5 (32%)
375	1 (2.4%)	0 (0%)	1 (6%)
400	1 (2.4%)	1 (4%)	0 (0%)
450	1 (2.4%)	0 (0%)	1 (6%)
500	1 (2.4%)	1 (4%)	0 (0%)
550	1 (2.4%)	1 (4%)	0 (0%)
1250	1 (2.4%)	0 (0%)	1 (6%)
Totals	41 (100.0%)	25 (100%)	16 (100%)

The overall frequency distribution shows a range of 40 to 1250 cc. The frequency for the subjects is shown by overall group, occluded catheter group, and nonoccluded catheter group.

Table 9 shows an overall mean blood loss of 262.6 cc and a standard deviation of 205.1 cc. Those subjects with occluded catheters, however, show a much higher mean and standard deviation than those subjects with nonoccluded catheters. The mean for subjects with occluded catheters was 325 cc, whereas subjects with nonoccluded catheters averaged a 96.7 cc blood loss. In addition, those subjects whose catheters occluded were commonly found to lose more blood with a wider dispersion of values during surgery as indicated by a standard deviation of 270.6 cc. This compares to a narrow standard deviation of 8.3 cc for those subjects who did not experience catheter occlusion.

TABLE 9

SUMMARY STATISTICS FOR SURGICAL BLOOD LOSS (n=41)

Group	Minimum Value cc	Maximum Value cc	Mean	Standard Deviation
Nonoccluded	40	100	96.7	8.3
Occluded	100	1250	325.0	270.6
Combined	40	1250	262.6	205.1

To test hypostheis three, there is no relationship between the estimated surgical blood loss and catheter occlusion in the postprostatectomy patient, a point biserial correlation coefficient again was applied. A coefficient of 0.247 and a probability of significance of 0.12 demonstrates that the two variables are positively related with boderline significance ($p = .12$). The hypothesis was, therefore, not supported. Increased blood loss during surgery is mildly associated with the presence of catheter occlusion in the postoperative period.

Weight of the tissue removed

The frequency distribution for the weight of prostatic tissue removed during surgery is displayed in table 10. A range of four grams to 130 grams existed in the sample population. The overall mean and standard deviation for the weight of tissue removed are shown in table 11.

TABLE 10

FREQUENCY DISTRIBUTION FOR GRAMS OF TISSUE REMOVED (n=41)

Grams of Tissue	Overall Frequency (%)	Nonoccluded Frequency (%)	Occluded Frequency (%)
4	1 (2.4%)	1 (4%)	. . . .
5	3 (7.4%)	2 (8%)	1 (6.25%)
7	1 (2.4%)	1 (4%)	. . . .
8	4 (9.8%)	3 (12%)	1 (6.25%)
9	1 (2.4%)	1 (4%)	. . . .
10	5 (12.4%)	3 (12%)	2 (12.50%)
12	4 (9.8%)	2 (8%)	2 (12.50%)
14	2 (4.9%)	1 (4%)	1 (6.25%)
17	1 (2.4%)	1 (4%)	. . . .
18	3 (7.4%)	1 (4%)	2 (12.50%)
22	1 (2.4%)	1 (4%)	. . . .
25	1 (2.4%)	. . . .	1 (6.25%)
30	3 (7.4%)	1 (4%)	2 (12.50%)
32	2 (4.9%)	2 (8%)	. . . .
36	1 (2.4%)	1 (4%)	. . . .
40	1 (2.4%)	1 (4%)	. . . .
46	1 (2.4%)	. . . .	1 (6.25%)
54	1 (2.4%)	. . . .	1 (6.25%)
58	1 (2.4%)	1 (4%)	. . . .
65	1 (2.4%)	. . . .	1 (6.25%)
88	1 (2.4%)	. . . .	1 (6.25%)
110	1 (2.4%)	1 (4%)	. . . .
130	1 (2.4%)	1 (4%)	. . . .
Totals	41 (100.0%)	25 (100%)	16 (100.00%)

TABLE 11

SUMMARY STATISTICS FOR GRAMS OF TISSUE REMOVED (n=41)

Group	Minimum Value	Maximum Value	Mean	Standard Deviation
Nonoccluded	4	130	25.9	31.4
Occluded	5	88	27.8	23.8
Overall	4	130	26.6	28.4

The mean and standard deviations of weight of the tissue removed show little variation in both average and dispersion of values between subjects with occluded and nonoccluded catheters. The findings, in fact, are similar to those of the overall group.

To test hypothesis six, there is no relationship between the method of anesthesia and catheter occlusion in the postprostatectomy patient, a point biserial correlation was used. A coefficient of 0.034 and a probability of 0.83 resulted from the statistical treatment of the data, demonstrating that the two variables are not related. The sixth hypothesis was supported by the statistical analysis.

Relationship of Continuous Variable Pairs

After frequency distributions were constructed and the summary statistics (range, mean, and standard deviation) were calculated, separate point biserial correlation coefficients were used to evaluate the relationship between the weight of tissue removed, surgical blood loss, and prothrombin time. Pearson correlation coefficients were utilized to assess the strength of the relationship among weight of tissue removed, surgical blood loss, and the prothrombin time. This was done for the overall sample as well as for the groups with occluded and nonoccluded catheters.

<u>Overall group</u>

Table 12 displays the analysis of relationship among the absence or presence of occlusion, prothrombin time, estimated surgical blood loss, and the weight of the tissue removed.

TABLE 12

RELATIONSHIP BETWEEN PAIRS OF VARIABLES
IN THE COMBINED GROUP (n=41)

	Prothrombin Time	Surgical Blood Loss
Prothrombin Time	. . . .	. . . .
Surgical Blood Loss	.044* .79	. . . .
Weight of Tissue Removed	-.284* .07	.446* .0035

*Point biserial correlation coefficients; all others are Pearson correlation coefficients.

Estimated surgical blood loss and the pathological weight of tissue removed were found to have a correlation coefficient of 0.446 and a probability of significance of 0.0035. These two continuous variables are, therefore, positively correlated ($p < .005$). It can be said, therefore, that as the weight of the tissue removed increases, the estimate of surgical blood loss increases.

The prothrombin time and the weight of the tissue removed exhibited a negative correlation coefficient of -0.284 with a probability of 0.07. This relationship is an inverse one with borderline statistical significance ($p = .07$). Based on these findings, the prothrombin time level tends to decrease as the weight of the removed tissue increases.

Nonoccluded catheter group

Table 13 shows the analysis of relationships among the prothrombin time, surgical blood loss, and weight of tissue removed for the nonoccluded group. For each pair both the correlation coefficient and probability are stated.

As was found for the total sample, the estimated surgical blood loss and the weight of the tissue removed were strongly related though to a lesser degree of significance. The correlation coefficient of 0.471 and the probability of 0.017 suggest that the pair are positively related ($p < .02$).

In comparison with the general population, prothrombin time and weight of the tissue removed again demonstrated an inverse relationship, but with stronger significance ($p < .02$).

TABLE 13

RELATIONSHIP BETWEEN PAIRS OF VARIABLES IN THE NONOCCLUDED GROUP (n=25)

	Prothrombin Time	Surgical Blood Loss
Surgical Blood Loss	.129* .54	. . . . . .
Weight of Tissue Removed	-.475* .016	.471 .017

*Point biserial correlation coefficients; all other are Pearson correlation coefficients.

Occluded catheter group

Table 14 shows the relationship between continuous variable pairs for the sample's occluded population.

TABLE 14

RELATIONSHIP BETWEEN PAIRS OF VARIABLES IN THE OCCLUDED GROUP (n=16)

	Prothrombin Time	Surgical Blood Loss
Surgical Blood Loss	.172* .52	. . . . . .
Weight of Tissue Removed	.177* .51	.534* .03

*Point biserial correlation coefficients; all others are Pearson correlation coefficients.

The only relationship demonstrated by the analysis in this group is between surgical blood loss and the weight of tissue removed. The strength of the relationship in patients experiencing catheter occlusion ($p = .03$), though significant, is less than that for the total sample ($p = .0035$).

Relationship of Occlusion to Noncontinuous Variables

Preoperative size of the prostate

Table 15 shows the cross tabulation of the sample by preoperative size of the prostate gland.

TABLE 15

CATHETER OCCLUSION BY SIZE OF THE PROSTATE GLAND (n=41)

Group	1+	2+	3+	Total
Nonoccluded	11	14	0	25
Occluded	8	5	3	16
Total	19	19	3	41

Eight of the 19 subjects with 1+ glands, and 5 of the 19 subjects with 2+ glands experienced occluded catheters. All three subjects with 3+ glands sustained catheter occlusion.

To test hypothesis two, there is no relationship between the size of the prostate gland and catheter occlusion in the postprostatectomy patient, Chi square contingency table analysis was used. Chi square is a statistical test of significance used to determine ". . . whether the frequencies in [the] sample differ significantly from some assumed or expected population frequencies" (Koenker 1971, p. 104). Although catheter occlusion occurred with all three patients whose prostates were classified preoperatively by the physician as 3+, no significant relationship was demonstrated by a Chi square of 0 and a probability of 0.95. The hypothesis was accepted.

Type of surgical procedure

Table 16 displays the occurrence of catheter occlusion by type of surgical procedure.

TABLE 16

CATHETER OCCLUSION BY TYPE OF SURGICAL PROCEDURE (n=41)

Group	T.U.R.	Suprapubic	Retropubic	Perineal	Total
Nonoccluded	22	0	3	0	25
Occluded	12	0	4	0	16
Total	34	0	7	0	41

Transurethral and retropubic prostatectomies were the only two types performed on the subjects in the sample. Of the 34 transurethrally resected subjects, 12 experienced catheter occlusion. Four of the seven retropubic prostatectomy subjects had catheter occlusion.

Chi square contingency table analysis was applied to test hypothesis four, there is no relationship between the type of surgical procedure and catheter occlusion in the postprostatectomy patient. The hypothesis was supported by a Chi square of 1.165 and a probability of 0.28.

Method of anesthesia

The occurrence of catheter occlusion by method of anesthesia is portrayed by table 17.

TABLE 17

CATHETER OCCLUSION BY METHOD OF ANESTHESIA (n=41)

Group	General	Spinal	Total
Nonoccluded	6	19	25
Occluded	7	9	16
Total	13	28	41

Thirteen subjects were administered general anesthesia. Of this group 7 encountered catheter occlusion in the postoperative period. Spinal anesthesia was given to 28 subjects; 9 of these had catheters that occluded.

To test hypothesis five, there is no relationship between the method of anesthesia and catheter occlusion in the postprostatectomy patient, Chi square contingency table analysis was again used. Statistical analysis of frequencies resulted in a Chi square value of 1.757 and a probability of 0.185. The hypothesis was supported by these findings.

Relationship of Occlusion to Characteristics of Urinary Drainage

Tables 18 and 19 compare the characteristics of urinary drainage at the first occurrence of catheter occlusion to the numerical rating given by nursing staff. The clot retraction findings on all subjects in the sample were firm at 24 hours. Bleeding secondary to fibrinolytic intercoagulopathy did not occur in any patient with high scores, preventing the occurrence of catheter occlusion.

TABLE 18

CATHETER OCCLUSION AND SCORE FOR EACH CHARACTERISTIC OF URINARY DRAINAGE (n=16)

Score	Color (%)	Sediment (%)	Clarity (%)
3	9 (56.3%)	6 (37.5%)	9 (56.2%)
2	2 (12.5%)	4 (25.0%)	1 (6.3%)
1	5 (31.2%)	6 (37.5%)	6 (37.5%)
Totals	16 (100.0%)	16 (100.0%)	16 (100.0%)

TABLE 19

CATHETER OCCLUSION BY COMBINATION SCORE FOR CHARACTERISTICS OF URINARY DRAINAGE (n=16)

Color--Sediment--Clarity			Tally	Per cent
3	3	3	6	38
3	2	3	3	19
2	2	2	1	6
2	1	1	1	6
1	1	1	5	31
Totals			16	100

To test hypothesis seven, there is no relationship between the characteristics of urinary drainage and catheter occlusion in the postprostatectomy patient, data was organized into frequency distributions of ratings for subjects who experienced catheter occlusion. Both single scores for each characteristic and combination ratings were anlayzed. The distributions were then examined for a preponderance of higher scores on the rating scale.

When reviewing ratings for separate characteristics of urinary drainage, scores of three and one were found to be recorded more frequently than a score of two. In examining ratings for color, 56.3 per cent of the 16 subjects whose catheters occluded were draining urine scored by staff as a three. A rating of one was assigned to urinary drainage in 31.2 per cent of the same group. Ratings for sediment were more evenly distributed: 37.5 per cent of the subjects were rated a two, and 37.5 per cent were rated a one. In regard to clarity, 56.2 per cent of the subjects were rated a three; 6.3 per cent were given a two, and 37.5 per cent were given a one.

In summary, a score of three or one was more frequently recorded for each characteristic than was a score of two. It was also noted that occlusion occurred slightly more frequently with a score of three than with a score of two or one. In analysis of combination ratings the same pattern was demonstrated in that catheter occlusion occurred in a greater frequency with higher or lower ratings than with mid-range ratings. No preponderance of scores, either higher, lower, or mid-range could be identified. As a result the hypothesis was considered to be supported.

Analysis of the Use of the Urinary Drainage Assessment Tool

Characteristics of nursing staff

A total of thirty-two nursing staff members participated in making observations of urinary drainage and recording the findings on the Postprostatectomy--GU Drip Flow Sheet. Tables 20 and 21 summarize the characteristics of staff according to hospital, shift, and skill level. The staff members were evenly divided between hospitals, with skill level and shift groups compatable with expected staffing patterns. A greater number of professional and technical staff--registered nurses and vocational nurses--participated than ancillary personnel. The largest group of staff was concentrated on the day shift.

TABLE 20

STAFF DISTRIBUTION AT MEDICAL CENTER HOSPITAL (n=16)

Skill Level	Day Shift	Evening Shift	Night Shift
Registered nurse or graduate nurse	3	2	2
Licensed vocational nurse	4	1	2
Nurse aide	. . .	. . .	1
Student nurse	1	. . .	. . .
Totals	8	3	5

TABLE 21

STAFF DISTRIBUTION AT MOTHER FRANCES HOSPITAL (n=16)

Skill Level	Day Shift	Evening Shift	Night Shift
Registered nurse or graduate nurse	3	1	. . .
Licensed vocational nurse	2	. . .	1
Nurse aide	3	3	1
Urology technician	1	. . .	1
Totals	9	4	3

Analysis of staff orientation posttest

The color, sediment, and clarity ratings for each of the fifteen items in the staff orientation posttest were tabulated and examined for highest per cent of agreement by skill level, shift, and hospital. Tables 22 through 24 display the test item analysis data for each characteristic of urinary drainage in reference to a 75 per cent or higher level of agreement.

TABLE 22

POSTTEST ITEM ANALYSIS BY SKILL LEVEL (n=15)

Skill Level	No. with 75% or Higher Agreement		
	Color	Sediment	Clarity
Registered/Graduate Nurse	12	5	4
Licensed Vocational Nurse	12	5	1
Nurse Aide	13	6	5
Urology Technician	11	12	10
Student Nurse	13	11	6
Average	12.2	7.8	5.2

TABLE 23

POSTTEST ITEM ANALYSIS BY SHIFT (n=15)

Shift	No. with 75% or Higher Agreement		
	Color	Sediment	Clarity
Day	12	5	8
Evening	12	2	3
Night	13	5	2
Average	12.3	2.4	4.3

TABLE 24

POSTTEST ITEM ANALYSIS BY HOSPITAL (N=15)

Hospital	No. with 75% or Higher Agreement		
	Color	Sediment	Clarity
Mother Frances	14	5	6
Medical Center	13	5	4
Average	13.5	5	5

In comparing skill level, shift, and hospital, the percentages of agreement for a single characteristic of urinary drainage were found to be highly consistent. Regardless of skill level, a consistent number of items were rated the same by all skill level groups. The urology technicians--a skill level employed only by Mother Frances Hospital--demonstrated a much more consistent number of items with a 75 per cent or better level of agreement for all characteristics of urinary drainage. This fact was not true of any other skill level group. When examined by shift and hospital, ratings within each of the urinary drainage characteristic categories were consistent. Table 25 displays a composite of the average number of items with 75 per cent or higher agreement for each characteristic of urinary drainage. Neither skill level, shift, nor hospital altered the consistency of the ratings. It should be noted that the characteristic of color enjoyed a much higher frequency of agreement on test items than did either sediment or clarity.

TABLE 25

POSTTEST ITEM ANALYSIS COMPOSITE (n=15)

Staff Characteristic	No. with 75% or Higher Agreement		
	Color	Sediment	Clarity
Skill level	12.2	7.8	5.2
Shift	12.3	2.4	4.3
Hospital	13.5	5.0	5.0

Summary

The analysis of data presented in this chapter was concerned with the relationship of catheter occlusion to both continuous and dichotomous variables in forty-one postprostatectomy patients. Frequency distributions were tabulated and statistical tests were applied to determine the presence or absence of significant relationships.

The analysis revealed a significant relationship between surgical blood loss and the weight of the tissue removed. This relationship, however, was not as strong in the patients who experienced catheter occlusion as in those of the combined and nonoccluded groups. An inverse relationship between prothrombin time levels and the weight of tissue removed was demonstrated in both the combined and nonoccluded catheter populations. In the nonoccluded catheter group significance was stronger. Blood loss and catheter occlusion were found to be positively related in the overall group.

The characteristic of urinary drainage that appeared to be associated with catheter occlusion was color. This relationship, however, could not be analyzed statistically based on the type of data collected. The nursing staff orientation posttest was analyzed for per cent of agreement by skill level, shift, and hospital. Consistency was found in relation to identification of these three factors. The characteristic of urinary drainage most frequently rated the same by all staff was color.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Summary

A quantitative-descriptive research study was conducted to determine whether or not any one or a series of selected variables was relevant to the occurrence of catheter occlusion in postprostatectomy patients. The purposes of the study were to define the relationship of catheter occlusion following prostatectomy to: (1) bleeding and clotting time, (2) size of the prostate gland, (3) estimated surgical blood loss, (4) type of surgical procedure, (5) method of anesthesia, (6) the weight of the tissue removed, and (7) the characteristics of urinary drainage. This chapter contains a summary of the study and its conclusions. Implications for nursing and medicine are presented along with recommendations for further study.

Literature was reviewed in regard to the pathology, surgical correction, and postoperative management of prostatism. Special attention was given to the course and treatment of postoperative bleeding and the occurrence of catheter occlusion. Medical studies have been done related to factors associated with postoperative bleeding, but no one recent study investigated multiple causative factors. Management of bleeding is emphasized in medical studies, but no correlations with catheter occlusion are made. Nursing research regarding management of urinary bleeding and catheter occlusion have not been conducted.

A tool for data collection was developed that had three components: (1) Demographic Data Sheet, (2) Urinary Drainage Assessment Tool, and (3) the Postprostatectomy--GU Drip Flow Sheet (see Appendix B). The assessment tool and the flow sheet were developed for use in the study since applicable tools were not available in the current literature.

Eight patients admitted to one hospital were utilized for a pilot study. Nursing staff recorded observations of the urinary drainage in the postoperative period, and medical records were reviewed for content related to the demographic data. Following the trial period, minor alterations were made in both the assessment tool and the flow sheet based on nursing staff feedback. The pilot test established that the tool possessed content validity. Further testing for reliability was planned during the data collection by means of an observer-orientation posttest.

Data were collected by a convenience sampling technique over a three-month period from forty-one patients in one of two general hospitals in the same geographical location. Nursing staff in each hospital were trained as observers. The orientation posttest was administered.

Responsibilities of all staff and departments were outlined and necessary policies and agreements were written. Surgery schedules were periodically reviewed to identify sample members and arrange for a preoperative interview to obtain written consent.

Measurement of variables included preoperative prothrombin time levels and size of the prostate gland by rectal examination per physician as well as postoperative observations related to the estimated surgical blood loss, type of surgical procedure, method of anesthesia, pathologist's weight of prostatic tissue removed, the characteristics of urinary drainage, and the occurrence of catheter occlusion. A postoperative clot retraction time was done to screen for fibrinolytic intercoagulopathy.

Computer analysis was used to tabulate frequency and summary statistics as well as evaluate correlation coefficients and probability. Statistical analysis of the collected data was conducted by using the Chi square Test and point biserial and Pearson correlation coefficients. The data were then organized into summary tables.

Conclusions

Using Chi square contingency table analysis a positive relationship between the estimated surgical blood loss and postoperative catheter occlusion was demonstrated. This means that subjects who lost greater volumes of blood during the surgical procedure experienced postoperative catheter occlusion more often than those subjects who lost smaller volumes of blood during surgery. None of the medical studies reviewed in the literature examined this exact relationship. However, Creevy (1965) and other authors (Flocks and Culp 1975) have reported visual hypervascularization of enlarged glands, a finding which they associated with increased bleeding during surgical removal. In addition, Bruce, Zorab, and Still (1960) found that operative blood loss equaled postoperative blood loss in retropubic resections. The combined work of these authors support the relationship of estimated surgical blood loss to catheter occlusion in that patients who lose more blood during surgery lose more in the postoperative period. The greater the volume of blood in the urine, the greater the likelihood of clot formation and secondary catheter occlusion. It was recognized in the study limitations that the amount of surgical blood loss was a subjective assessment. This fact coupled with the borderline significance found from statistical analysis ($p = .12$) must be considered in evaluating the finding. Those patients whose estimated surgical blood loss is 325 cc or greater may be expected to experience catheter occlusion; however, a definite prediction of such cannot be made.

In examining the relationship between prothrombin time levels and catheter occlusion as well as between the weight of tissue removed and catheter occlusion, the hypotheses were supported. However, when biserial and Pearson correlation coefficients were applied to pairs of these variables, two important relationships were determined. First, the estimated surgical blood loss and the weight of prostatic tissue removed were found to be positively related. This means that as the estimated surgical blood loss increased, the actual weight of the tissue removed increased. This finding coincides with the work previously referred to by Creevy (1965), Flocks and Culp (1975) and Bruce (1960). In addition, the positive association between surgical blood loss and catheter occlusion is reinforced. On the other hand, Durante _et al._ (1962) found no association between blood loss and the weight of the prostatic tissue removed.

It should be noted that there was no attempt to improve the method of retrieval of all prostatic chips during transurethral resection. As a limitation of the study, this factor could not have negatively influenced the relationship since the weight of the tissue removed would have been increased if retrieval had been controlled.

Second, an unexpected inverse relationship was found to exist between prothrombin time level and the weight of tissue removed. In other words, as the weight of the removed tissue increased, the preoperative prothrombin time level decreased. No indication of this relationship was found in the literature review, nor is any reason known to explain the relationship. Furthermore, the relationship was most significant in the nonoccluded catheter group (p = .02). A possible interpretation of this and previous findings is that subjects with large glands and lower prothrombin time levels would not experience catheter occlusion because of low levels of clotting factors. Again, more adequate retrieval of the prostatic tissue during tranurethral resections may have served to positively reinforce the finding.

All other hypotheses expressed in the null were supported by the findings of the study. Chi square contingency table analysis did not demonstrate a relationship between catheter occlusion and preoperative estimate of the size of the prostate, the type of surgical procedure, or the method of anesthesia used. Likewise, no relationship of catheter occlusion to urinary drainage characteristics was revealed by examination of frequency distributions of the urinary drainage assessment scores.

By an item analysis of the urinary drainage scores on the staff orientation posttest it was found that staff agreement at a 75 per cent or better level was highly consistent, regardless of hospital of employment, skill level, or shift. The characteristic of color enjoyed a much higher frequency of agreement than did sediment or clarity. This means that the tool as revised from the pilot test has increased to a higher level of reliability.

Implications

Based on the findings of this study, implications have been observed which have relevance to both nurse and physicians. The quality of postoperative care of the prostatectomy patient is to be the major focus of the discussion. In the immediate postoperative period the recovery room and urology unit nurses should routinely seek and share information regarding the patient's estimated surgical blood loss and use this information to plan frequency of patient observation. This is not to say, however, that all postprostatectomy patients do not require frequent observation. Nurses should continue to watch closely the inflow and outflow rates of the patient's GU drip for occurrence of occlusion and carry out appropriate intervention measures when this occurs. The results of the study have no implications for altering the rate of the GU drip in keeping the urinary drainage as clear as possible. Current clinical practice, therefore, should not be altered.

Urology unit staff should institute the use of the Urinary Drainage Assessment Tool and the Postprostatectomy Flow Sheet on a permanent basis since the tool was found to be a more effective method of communicating the postoperative status of the patient to the physician than the periodic, random notations in the nurses' notes on the medical record. Additional medical and nursing staff orientation and reinforcement by institutional authority could increase the reliability of the tool above the level determined in the study.

Nurse educators should use the Urinary Drainage Assessment Tool in teaching students to observe and record the characteristics of urinary drainage any time hematuria is a patient problem. This would provide for consistency in communication of observations.

The urologist should make information related to the patient's surgical blood loss available to nursing staff in the immediate postoperative period, rather than providing that information only in the delayed report of the operation. Physicians should take under consideration the finding that preoperative prothrombin time levels and the weight of the tissue removed were inversely related in the sample population. Although an indirect finding, the relationship inspires questions regarding the influence of such factors and the type of pathology in the prostate gland.

Recommendations

Based on the findings of this study, the following recommendations have been made:

1. That a similar study be conducted relating the characteristics of urinary drainage and the number of catheter occlusions per patient with controlled staff observations and a larger population

2. That a study be conducted to define more clearly the inverse relationship between preoperative prothrombin

time levels and the weight of the tissue removed

3. That a similar study be conducted correlating the occurrence of catheter occlusion with the inflow rates of the GU drip as well as the characteristics of urinary drainage

4. That a study be conducted to correlate catheter occlusion following spinal anesthesia with the characteristics of urinary drainage

5. That a study be conducted to compare the effectiveness of nursing procedures, such as milking the tubing, flushing the catheter, irrigating with a piston syringe, et cetera, in the management of catheter occlusion

APPENDIX A

TEXAS WOMAN'S UNIVERSITY
CONSENT TO ACT AS A SUBJECT FOR RESEARCH AND INVESTIGATION

The following information is to be read to or read by the subject:

1. I hereby authorize M. McBryde, R.N., and designees to perform the following procedure(s) or investigation(s):

   To perform a review of the medical record to utilize information regarding blood samples and information obtained from observations related to the surgical procedure and the urinary drainage system following surgery

2. The procedure of investigation listed in Paragraph 1 has been explained to me by ______________________.
   (name)

3. I understand that the procedures or investigations described in Paragraph 1 involve the following possible risks or discomforts: None

4. I understand that the procedures and investigations described in Paragraph 1 have the following potential benefits to myself and/or others:

   To validate a system of nursing observation that would prevent or detect early development of complications in bladder drainage following prostatic surgery.

5. An offer to answer all of my questions regarding the study has been made. If alternative procedures are more advantageous to me, they have been explained. I understand that my name will not be used in any release of information and that I may terminate my participation in the study at any time.

______________________ ______________________
(Signature) (Date)

If subject is a minor, or otherwise unable to sign, complete the following:

Subject is a minor (age ____), or is unable to sign because:

Signatures (one required)

______________________ ______________________
Father Date

______________________ ______________________
Mother Date

______________________ ______________________
Guardian Date

APPENDIX B

ASSESSMENT TOOL AND FLOW SHEET

(Addressograph)

DIRECTIONS: When the patient returns from surgery, begin observations of the urinary drainage on the following schedule: q̄ 15 min. X's 4, q̄ 30 min. X's 10, q̄ H. X's 30 and PRN until the G.U. Drip is discontinued. With each observation, compare each of the three characteristics: color, sediment, and clarity with the descriptions in the Urinary Drainage Assessment Tool and record the score for each in the columns provided below. As each observation of urinary drainage is made, also note and record the inflow and outflow rates of the G.U. Irrigation.

URINARY DRAINAGE ASSESSMENT TOOL

COLOR	SEDIMENT	CLARITY
Red (3)	Fine and suspended or Opalescent (3)	Opaque (3)
Pink Orange or Brown (2)	Observable particles Small clots or Fine and settled (2)	Slightly to Highly opaque (2)
Colorless or Yellow (1)	Absent (1)	Clear (1)

Return from surgery:
Date__________
Time __________AM/PM

POSTPROSTATECTOMY--G. U. DRIP FLOW SHEET

Date	Time	G.U. Drip Inflow Rate				Urinary Outflow Rate				Urinary Drainage Score			Comments/Nursing Procedures
		F	M	S	0	F	M	S	0*	Color	Sediment	Clarity	

*LEGEND: F=fast or above 150 gtts./min.; M=medium or 80-149 gtts./min.; S=slow or below 80 gtts./min.; 0=occluded or no flow.

7/76

DEMOGRAPHIC DATA

1. Name ______________________________ Hospital # ________

---

2. Physician: 1 2 3 4 5 6
   1. Chenoweth
   2. Clawater
   3. Greenberg
   4. Roberts
   5. Warren
   6. Wiles

---

3. Preoperative size of the prostate: 1+ 2+ 3+

---

4. Preoperative prothrombin time: __________ %

---

5. Type of procedure: 1 2 3 4
   1. T. U. R.
   2. Suprapubic
   3. Retropubic
   4. Perineal

---

6. Type of anesthesia: 1 2
   1. General
   2. Spinal

---

7. Estimated surgical blood loss: __ __ __ __ cc

---

8. Weight of tissue removed: __ __ __ Gm

---

9. Clot retraction firm at 24 Hrs.: 1 2
   1. Yes
   2. No

APPENDIX C

STAFF ORIENTATION SLIDE-TAPE PROGRAM SCRIPT

"Postprostatectomy Observation of Urinary Drainage"

(Show title slide and begin tape) * * * * (* = Slide change)

The use of the urethral catheter has had long-standing acceptance in the medical management of urological diseases. Following surgical procedures on the urinary bladder, the urethral catheter is frequently used to provide temporary artificial drainage. * Even more, in patients who have undergone prostatic surgery, the necessity to keep the bladder empty has made the use of the uretheral catheter essential. * However, the use of the catheter to achieve bladder drainage in the presence of urinary bleeding is not without risk. * For the frequent occurrence of gross hematuria following * prostatic resection presents a major nursing management problem, that is, * maintaining free drainage. If catheter occlusion is allowed to occur, serious complications will rapidly develop.

(pause) *

One technique used to keep the catheter open, is continuous through-and-through irrigation, more commonly known as the "GU Drip". Following prostatectomies, this procedure usually uses the three-way Suggs catheter. Despite its large size, the drainage lumen is small and can easily be plugged by small clots. * Therefore, nursing staff must frequently observe the catheter for any indication of occlusion. However, just what the early signs of catheter obstruction are and whether or not they relate to the amount of bleeding or the flow rate of the continuous irrigation fluid, is not known.

In observing the urinary drainage of a postprostatectomy patient, the nurse, or the nursing assistant, should look for three characteristics. * These are: color, sediment, and clarity. Regardless of the amount of bleeding or the type of irrigation procedure used, these three characteristics are always important. * Normally, urine is straw or yellow in color. When blood is present, urine shows variations of red. However, when a GU Drip is in progress, the color may be diluted and appear absent. * In summary, the three groups of colors important to notice are yellow or colorless, (pause) a range of pink-orange or brown, (pause) and red. The red may be dark or bright depending on whether the blood is coming from a small vein or an artery. * The second characteristic to observe for during hematuria is sediment. * Sediment is absent in normal urine. However, in hematuria blood cells may be seen in the form of small clots or as fine settled particles; sometimes numerous cells are suspended in the urine and give it an opalescent appearance. * The third characteristic is clarity. * Normally urine will let light shine through it. In this state it is known as non-opaque or clear. When blood is present in small amounts, urine takes on a smoky appearance and begins to become opaque, letting only some light shine through it. When large amounts of blood are in the urine, light is not able to pass through, making the urine opaque. *

The variations in these three characteristics--color, sediment, and clarity--have been grouped into a small chart called the

"Urinary Drainage Assessment Tool". The variations in each characteristic have been divided into three levels and given a numerical score of one, two, or three. Notice that the highest score is given to those variations that are danger signals. * The postprostatectomy patient whose urinary drainage is red, (pause) * opalescent, (pause) * and opaque--that is, cannot be seen through--needs immediate nursing attention. These characteristics have each been given a score of three. (pause) * The variations in the three characteristics that have each been given a score of two are of intermediate importance. These are pink, orange, or brown color; * observable particles, small clots, (pause) or fine, settled sediment; * and some degree of opaqueness. (pause) * A score of one has been given to each variation that is normal for urine: colorless or yellow, (pause) * has no sediment, (pause) * and can easily be seen through. (pause) *

The "Urinary Drainage Assessment Tool" can be used to evaluate any urine sample. First * consider the color of this sample of urine. (pause) In charting its color, the word "orange" would be used. * Using the assessment tool, the color of the sample would be rated two. (pause) * Another variation, color, is seen in this sample. (pause) In charting the color of this specimen, the nurse would say that it is red. * Based on the "Urinary Drainage Assessment Tool", the score for the color red is three. (pause) * The next specimen is normal in color. (pause) * Yellow is rated a one on the assessment tool. Still another variation in color is pink * as seen in this specimen. (pause) * This sample is likewise scored as a two. (pause) Sediment found in postprostatectomy patients' urine can also be given a numerical score by using the tool. * Normally urine has no sediment. Even when slight bleeding causes urine to have a smoky appearance, as in this sample, no sediment is seen. * The sediment rating for this sample would therefore be a one. (pause) * Sediment may be settled in the bottom of the catheter drainage tubing or glass container as illustrated here, (pause) * or take on the appearance of stringy clots. Either of these conditions, or both occurring together, * would be rated a two. (pause) * When bleeding is recent and heavy, the red blood cells will be suspended in the urine, giving the urine a solid, sparkling appearance. This is known as opalescence and though difficult to demonstrate by photograph, is easily detected by the observing eye. * Urine of this type (pause) is given a score of three. * Examine this sample of urine for clarity. Although the color is pink, the light completely penetrates or passes through it. An object behind the sample, such as the bold line on the background, is clearly seen. Using the assessment tool * such a sample would be rated a one. (pause) * A sediment rating of two would be given to this sample of smoky yellow urine (pause) * as well as to this sample of pink-red urine. (pause) * A wide variation in clarity falls into this middle category; however, all such specimens permit some light to pass through them. They all receive a rating of two. * When the degree of urinary bleeding is great enough so that light no longer can be seen through the sample, such as demonstrated here, the sample is described as opaque. * A clarity rating of three is given to urine when light cannot pass through it. *

When observing urinary drainage following prostatic resection, the nurse should consider all three characteristics--color, sediment, and clarity--with each observation. * By using the assessment tool, the findings may be translated into numerical scores for easy recording. *

A flow sheet such as the one seen here can be used to keep a record of the urinary scores * in the column designated by an "A", which is labeled "Urinary Drainage Score". * The sample recording is of a patient who's urinary drainage scores were: color--two (pause) * sediment--two (pause) * and clarity--two (pause). * Notice that all three characteristics were observed and recorded. This should be the case with each observation. Date and time are also noted on the record. * The flow sheet also provides a place to record the rates of the GU drip. Columns "B" and "C" are used to record the inflow rate of the drip and the outflow rate of the urinary drainage. * The key at the bottom of the page provides a quick reference showing how FAST, MEDIUM, and SLOW are defined. * The flow rate may be faster than 150 drops per minute or so fast that it forms a solid line of fluid. This rate is recorded by placing a mark in the "F" column. A drip rate of 80 to 150 drops per minute is said to be "Medium", and "Slow" if below 80 drops per minute. * The observer should make it a habit to always look at the inflow and outflow rates with each observation of the drainage and * record them on the flow sheet. (pause) * When the catheter is occluded--that is the urinary return and/or irrigation fluid ceases to flow, the observer should make a mark in the column labeled "0." *

The directions on the flow sheet describe a time schedule which should be followed for monitoring patients following surgery. * This schedule is started when the patient returns from surgery and continues as follows: every 15 minutes the first hour, every 30 minutes for the next 5 hours, and then hourly. Of course more frequent observations may be necessary, and all observations should be recorded on the flow sheet. * Space is also provided on the flow sheet for periodic notations of procedures, patient information and other comments associated with observations of the urine. (pause) * The date and time of the patient's return from surgery should be recorded on the flow sheet. Since the record is kept as long as the GU drip is in progress, this information keeps all staff aware of the length of time since surgery. Additional copies of the form can be added to the chart as necessary. *

In summary, the urinary drainage assessment tool * and the flow sheet are used to capture pertinent observations of post-prostatectomy urinary drainage. * The observations of inflow and outflow rates, the color, sediment, and clarity of the urinary drainage and the nurses' comments all provide vital information about the patient's postoperative course and nursing management.*

APPENDIX D

URINARY DRAINAGE ASSESSMENT TOOL

Orientation Posttest

Skill Level (check one):

_____ R.N./G.N.
_____ L.V.N.
_____ Nursing Assistant
_____ Other (specify)

Shift:

_____ 7-3
_____ 3-11
_____ 11-7

DIRECTIONS: Observe the samples of urine in the slides provided. Use the "Urinary Drainage Assessment Tool" to rate each of the samples. Record the number score for each characteristic in each sample in the space provided below.

SAMPLE	COLOR	SEDIMENT	CLARITY
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

APPENDIX E

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
DENTON, TEXAS

DALLAS CENTER
1810 Inwood Road
Dallas, Texas 75235

HOUSTON CENTER
1130 M.D. Anderson Blvd.
Houston, Texas 77025

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE Mother Frances Hospital

GRANTS TO Merry McBryde, R. N.

a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem:

The relationship of selected factors to the occurrence of catheter occlusion following prostatectomy

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. The agency is (willing) (unwilling) to allow the completed report to be circulated through interlibrary loan.
5. Other The agency wants a copy of the final report.

Date 5-16-77

Sister M. Honesta, Adm.
Signature of Agency Personnel

M. McBryde, R.N.
Signature of student

Lois Haugh
Signature of Faculty Advisor

*Fill out and sign three copies to be distributed as follows: Original -- Student; first copy -- agency; second copy -- T.W.U. College of Nursing.

TEXAS WOMAN'S UNIVERSITY
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Houston, Texas 77025

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE Medical Center Hospital

GRANTS TO Merry McBryde, R. N.

a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem:

The relationship of selected factors to the occurrence of catheter occlusion following prostatectomy

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. The agency is (willing) (unwilling) to allow the completed report to be circulated through interlibrary loan.
5. Other The agency wants a copy of the final report.

Date 5-19-77

[signature]
Signature of Agency Personnel

Merry McBryde
Signature of student

Lois Hough
Signature of Faculty Advisor

*Fill out and sign three copies to be distributed as follows: Original -- Student; first copy -- agency; second copy -- T.W.U. College of Nursing.

APPENDIX F

TEXAS WOMAN'S UNIVERSITY

GRADUATE NURSING RESEARCH PROJECT

Data Collection Arrangements

RESEARCHER

1. Keep a log of all patients entered in the study. Make a copy of the log available to any department when necessary.
2. Monitor the surgery schedule on a daily and weekly basis.
3. Orient nursing staff to the use of the flow sheet.
4. Evaluate the use of the flow sheet and provide staff with feedback and assistance whenever necessary.
5. Monitor the progress of the study, keeping in close contact with nursing units.
6. Monitor and double check lab work billing.
7. Obtain demographic data and flow sheets from charts in medical records at regular intervals during the study.
8. Calculate and initiate billing for type and cross-match tubes and syringes used to draw clot retraction samples in the operating room at the end of the study.
9. Obtain the signed patient consents.

NURSING SERVICE OFFICE

1. Permit Mrs. McBryde access to unit staffing patterns and staffing assignments on a daily basis.
2. Write a temporary policy for standing prothrombin time orders on admission for all patients to be included in the study.
3. Cooperate with M. McBryde to set up orientation sessions for all appropriate nursing unit staff to familiarize them with their responsibilities in the study.
4. Permit M. McBryde access to the OR schedule book and the OR daily schedule.

NURSING UNIT

1. Review physician's orders on admission of prostatectomy patients and if an order for a prothrombin time has not already been written by the physician, write the order signed "Standing Order/Signature."
2. Make out prothrombin time requistion:
   a. At Mother Frances Hospital use the "Prothrombin-Coagulation" requisition
   b. At Medical Center Hospital use the "Miscellaneous Laboratory" requisition
   c. Addressograph as usual
   d. Write "CHARGE TO M. MCBRYDE" in red letters above the right top line on the requisition
   e. Send to lab with other routine lab requisitions
3. When patient is prepared for surgery, check to see that the notice to the anesthesiologist is attached to the front of the chart with an addressographed label for the clot retraction tube.

4. Initiate and maintain "Postprostatectomy—GU Drip Flow Sheet" as patients return from surgery to be continued until the GU drip is discontinued.
5. Participate in orientation sessions.
6. Permit M. McBryde to evaluate the use of the flow sheet and provide staff with feedback.
7. Permit selected staff to participate in the orientation posttest on the Assessment Tool.
8. Assist in setting up orientation sessions for staff.
9. Orient Mrs. McBryde to unit procedures, supplies, and policies.
10. Keep Mrs. McBryde informed of problems and questions.
11. Assist Mrs. McBryde in placing clot retraction tubes in a designated place on the unit as the patient returns from surgery, checking to see that the label is secure.

LAB

1. Orient staff to watch for requisitions for prothrombin times marked "CHARGE TO MCBRYDE" in large red letters above the upper right hand line on the requisitions. These requisitions should not be charged to the patient's account.
2. Maintain these requisitions in the lab for designated time period for double checking by M. McBryde.
3. Hand carry requisitions (as checked) to business office (Mrs. Keaton at Medical Center and Mr. Lancaster at Mother Frances).
4. The lab work will be billed to M. McBryde at the following rates:
   a. Medical Center Hospital: $2.50/test
   b. Mother Frances Hospital: $3.00/test

OPERATING ROOM

1. Inform appropriate staff regarding the study (clot retraction reminders on tube labels).
2. Allow staff to assist in reminding the anesthesiologist to draw the clot retraction specimen, label it, and note the time on the label.
3. At the end of the study, submit to M. McBryde's account a charge for T&C tubes and syringes used on study patients.
4. Provide M. McBryde with a copy of the surgery schedule on a daily basis and permit access to the surgery schedule book for long range evaluation.

MEDICAL RECORDS

1. Designate a place for dismissed prostatectomy patients' charts for weekly review by Mrs. McBryde.
2. Permit Mrs. McBryde to have access to prostatectomy patients' charts for tabulation of "Demographic Data Sheet" and to remove the copies of the "Postprostatectomy--GU Drip Flow Sheet" (see attachments).

BUSINESS OFFICE

1. Set up a procedure for billing M. McBryde for lab work and supplies.
2. Receive hand carried requisitions from lab. Requisitions will be taken to Mr. Lancaster at Mother Frances Hospital and Mrs. Keaton at Medical Center Hospital.
3. If patients are inadvertantly charged for lab work, the department will assist in correcting the billing error.
4. At the end of the study, M. McBryde will submit a statement for supplies used through the purchasing department (T&C tubes and syringes). This amount will be billed to her account.

APPENDIX G

MOTHER FRANCES
HOSPITAL

UROLOGY NURSING SERVICE POLICY

Temporary Prothrombin Time Standing Order

POLICY: From May 1 through August 31, 1977, nursing staff may order a preoperative prothrombin time on all prostatectomy patients, if such an order is not written by the physician in the admission or preoperative orders.

The policy is written to compliment a graduate level nursing research project being conducted by M. McBryde, R. N., in cooperation with the urology medical staff.

Approved by the Mother Frances Hospital Medical Staff Urology Section, April 12, 1977.

May 5, 1977

MEDICAL CENTER
HOSPITAL

UROLOGY NURSING SERVICE POLICY

Temporary Prothrombin Time Standing Order

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May 5, 1977

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