

Trends in Radical Prostatectomy in New York State

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The purpose of this study was to examine trends in radical prostatectomy in New York State for the period 1991–1993. A retrospective analysis was conducted of all radical prostatectomies performed on hospitalized male Medicare beneficiaries in New York State for the period 1991–1993. Basic trend data were also analyzed for 1990. Pattern analysis was conducted on the 4,154 procedures performed between 1990–1993.

In depth hospital chart review was conducted of the 220 cases of radical prostatectomy performed in patients 75 years of age and over between 1991 and 1993 and of a random sample of 263 of 1,266 patients 70–74 years of age. A total of 452 hospital charts were examined for a broad range of information, including family history and therapeutic preferences, preoperative work-up, staging, intraoperative and postoperative transfusions, postoperative complications, and mortality.

The rate of radical prostatectomy dramatically rose among New York State male Medicare beneficiaries between 1990 and 1992 and remained at a high plateau in 1993. Pattern analysis revealed a tripling of the procedure rate among those 70–74 years of age and a doubling of the rate in those 75 years of age and older. It was also found that a high proportion of radical prostatectomies in men 70 years of age and older were performed by relatively few hospitals.

Although rates of radical prostatectomy rose in New York State during the period under study, these rates were lower than those reported several years earlier in other parts of the country. This may reflect an overall conservative approach to the management of prostate cancer, especially among older men, on the part of New York's urologic community.

The overall postoperative complication rate was 18.5% and the mortality rate 1.3%. These rates are similar to those found in other series. Prostate cancer in older men usually has a protracted course. Radical prostatectomy in such men is associated with operative risks, and significant immediate and long-term complications. In addition, the procedure provides only marginal benefit of 10 years because of competing mortality in older men.

The results of this study show a need for provider and patient focused educational efforts to reduce the numbers of radical prostatectomies in older men where the benefits are marginal compared to operative risks and significant immediate and long term complications.

The incidence of prostate cancer and death rates from it have increased in the United States over the past decade (1). In New York State, age-adjusted rates rose from 66/100,000 to 75/100,000 from 1980 to 1989 (2). Mortality rates in New York State rose slightly from 22/100,000 in 1980 to 25/100,000 in 1989 (2).

A recent national study of Medicare beneficiaries revealed a sixfold increase in the rate of radical prostatectomy (removal of the prostate gland, ejaculatory ducts, and seminal vesicles) from 1984 through 1990 (3). The increased rates of radical prostatectomy over time are due to a number of reasons, some of which are viewed as debatable by various medical and surgical specialists. Whitmore (4) recently summarized six possible reasons that might explain the dramatic increase in radical prostatectomy rates over time. They are as follows: (i) an improved nerve-sparing technique that has made prostatectomy results more acceptable to patients, referring physicians, and urologists; (ii) an increase in the proportion of urologists who have learned to perform radical prostatectomies during residency training programs; (iii) a general belief (not necessarily based on scientific proof) among both patients and physicians that radical prostatectomy produces results superior to the two other options of watchful waiting and radiation; (iv) re-defined applications for radical prostatectomy that broaden the indications for its use

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to include selected stage C (T3) tumors; (v) the increased use of prostate specific antigen testing coupled with new screening programs that have resulted in the earlier detection of prostate cancer. These earlier and supposed intracapsular tumors are believed best treated by radical prostatectomy by some, resulting in a reduced mortality, though the latter has yet to be proven; (vi) the diagnosis of most prostatic cancer by urologists, who tend, like all medical and surgical specialists, to recommend therapeutic interventions reflecting their disciplines (5). Additional reasons may be the introduction of ultrasound and the biopsy gun.

Although there has been a dramatic increase in the rate of radical prostatectomy over time in the United States, there are significant differences in the rates for the procedure across geographic areas. In a study of male Medicare beneficiaries from 1984 through 1990, Lu-Yao et al. (3) found that rates of radical prostatectomy per 100,000 varied from more than 225 to less than 75. The two lowest rate regions in their study were New England and the Mid-Atlantic, which had rates equal to or below 60 per 100,000 male Medicare beneficiaries. This compared to rates equal to or more than 130 per 100,000 for the Pacific and Mountain Regions (3).

Recently, Chodak et al. (6) performed a pooled analysis of 828 case records from six nonrandomized studies (published since 1985) of conservative treatment for clinically localized prostate cancer. Conservative treatment was defined as observation and delayed hormone therapy, and excluded radical surgery and radiation. They concluded that conservative management and delayed hormone therapy is a reasonable choice for some men with grade 1 or 2 tumors. This is especially true for those who have an average life expectancy of 10 years or less (6).

The present study was undertaken as a cooperative project within the context of the Health Care Quality Improvement Program. The objectives of this study were to examine rates of radical prostatectomy in New York State for the period 1991–1993, to study patterns of procedure utilization through small area and single institution analyses, to look at short-term morbidity and mortality rates from the procedure, to share this information with providers, and to obtain their input concerning the data to improve the quality of care for patients with prostatic cancer.

METHODS

All radical prostatectomies performed on hospitalized male Medicare beneficiaries in New York State for the period 1991–1993 were identified. Basic trend data were also obtained for 1990. Radical prostatectomy was

defined on the basis of the *International Classification of Disease, Ninth Revision, Clinical Manifestation* (ICD-9-CM) procedure code 60.5 (7). Claims were analyzed by year, age group, small geographic area, hospital, and case mix adjusted. There were 4,154 radical prostatectomies performed between 1990 and 1993. There were 220 cases of radical prostatectomy in patients 75 years of age and over during the 3-year period 1991–1993. The charts of 189 (85.9%) of these were available for in-depth review. There were 1,266 patients 70–74 years of age who underwent the procedure in the same 3-year period. Of these, 853 (67.4%) underwent the procedure in hospitals that had performed radical prostatectomies on patients 75 years of age and older. A random sample of 263 of the 853 cases was chosen. Thus a total of 452 charts of patients 70 years of age and over who underwent radical prostatectomy were carefully examined for a broad range of information including family history and therapeutic preferences, preoperative work-up, staging, intraoperative and postoperative transfusions, postoperative complications, and discharge status. We examined three groups of complications occurring within 30 days of radical prostatectomy. These were: cardiopulmonary complications (e.g., congestive heart failure, myocardial infarction, pulmonary embolus, and respiratory failure); vascular complications (arterial embolus and thrombophlebitis); and surgical complications (wound infection, wound separation, hemorrhage, return to the operating room, and colostomy/rectal repair).

RESULTS

Pattern Analysis

Pattern analysis of Medicare claims for 1990–1993 revealed the following.

Overall trends in radical prostatectomy. During the 3-year period 1990–1992, the rate of radical prostatectomy among New York State's 1,103,102 male Medicare beneficiaries dramatically rose from 43.31/100,000 male Medicare beneficiaries to 131.5/100,000 (Table 1). In 1993, the rate plateaued at 127.0/100,000. An analysis of the percentage of Medicare patients diagnosed with prostate cancer undergoing radical prostatectomy showed a similar trend, with a plateau effect in 1992.

Trends by age groups. An analysis of annual rates of radical prostatectomy by four age groups: less than 65, 65–69, 70–74, and over 74, demonstrated significant increases in the 65–69- and 70–74-year age groups from 1990 to 1992 with plateau effect in 1993 (Fig. 1). Although the rates for the procedure consistently rose in

Table 1

Cases of Prostate Cancer and Radical Prostatectomies among Medicare Patients by Year, 1990–1993, New York State

Year	No. of Cases of Prostate Cancer	No. of Radical Prostatectomies	No. of Male Medicare Claims	No. of Radical Prostatectomies per 100,000 Male Medicare Claims	No. of Radical Prostatectomies per 100,000 Male Medicare Beneficiaries ^a
1990	11,321	478	376,906	126.8	43.3
1991	10,435	824	323,219	254.9	74.7
1992	12,673	1,451	332,553	436.3	131.5
1993	13,404	1,401	367,296	381.4	127.0

^a Number of male Medicare beneficiaries = 1,103,102.

the less than 65-year age group from 7.8/100,000 in 1990 to 22.4/100,000 in 1993, the overall number of procedures per year was small, ranging from 17 (1990) to 49 (1993). In the over 74-year age group, the annual rate rose from 12.9/100,000 (1990) to 25.2/100,000 (1992), with a plateau effect at 20.3/100,000 in 1993 (Fig. 1).

During the period 1990–1993, more radical prostatectomies were performed on patients between the ages of 65 and 69 than on patients in any other age group. These absolute numbers ranged from 269 in 1990 to a high of 833 in 1992. Between 1990 and 1993, a total of 1,414 radical prostatectomies were performed on those in the 70–74-year age group. These numbers increased from 148 in 1990 to 500 in 1992. In the over 74-year age group, the number of procedures almost doubled from 44 in 1990 to 86 in 1992.

Trends by hospital. Figures 2 and 3 are Pareto diagrams that, respectively, present the frequency of radi-

cal prostatectomy by number of hospitals for the two age groups, 70–74 years of age and 75 years of age and older. A total of 1,266 radical prostatectomies were performed in the 70–74-year age group in 170 hospitals. The “vital few” were 38 hospitals which performed 57.0% of all radical prostatectomies in this age group (Fig. 2). A total of 215 radical prostatectomies were performed in the 75 years and older group by 72 hospitals. In this age group, 59 hospitals represented the “vital few” which accounted for 57.2% of the radical prostatectomies (Fig. 3). The 20 hospitals that performed 583 (46.5%) of the 1,253 radical prostatectomies in the 70–74-year age group were responsible for 65 (30.2%) of the 215 procedures done on patients 75 years of age and older during the period 1991–1993. These same 20 hospitals performed 857 (41.1%) of the 2,085 procedures done in the 65–69-year age group and 1,491 (41.1%) of the total of 3,676 procedures done in all age

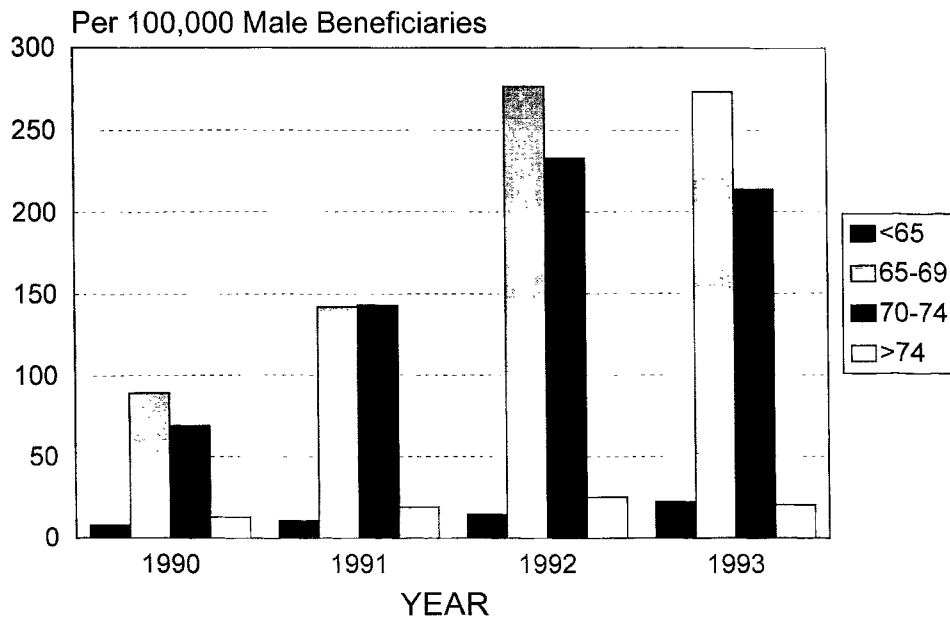


Fig. 1. Radical prostatectomy rates by age, New York State Medicare patients.

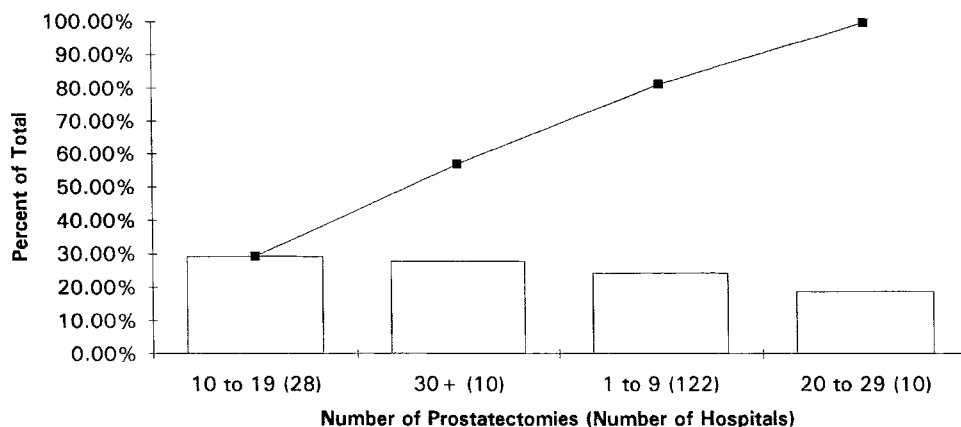


Fig. 2. Radical prostatectomies in men 70–74 years of age.

groups between 1991 and 1993. A Spearman rank-order correlation coefficient analysis of the relationship between overall high volume radical prostatectomy hospitals and their prostatectomy volumes on men 75 years of age and older did not show a strong correlation.

Chart Review

Chart review of 452 hospital charts of patients 70 years of age and older revealed the following.

Patient and family treatment preferences. In 60.2% of cases, a discussion with the patient of alternative options other than radical prostatectomy was documented on the hospital chart. Patient preference for radical prostatectomy was documented in 59.1% of cases. Family treatment preferences were documented in 27.0% of cases.

Preoperative work-up. Table 2 presents the preoperative work-up documented in the 452 charts examined. Preoperative biopsies (92.9%), bone scans (76.8%), and prostate specific antigen (PSA) measurements (82.1%)

were documented in the majority of patients. Preoperative sonograms (55.3%) and pelvic computerized tomography (CT) scans (58.0%) were documented in slightly more than half the patients. Preoperative acid phosphatase determinations were documented in only 93 (20.6%) patients. However, results were returned in only 70 of the 93 patients. Among the 70, the testing laboratory's normal values were provided only in 40.

Preoperative staging. Preoperative staging was documented in 267 (59.1%) of 452 cases. Among these, staging systems other than the Jewett and tumor, node, metastasis (TNM) systems were used in 164 (61.4%). Among the 95 cases in which the Jewett system was used, the majority of cases (85.3%) were classified as B1 (a palpable lesion, not circumscribed, occupying one lobe <1.5 cm in size) or B2 (a palpable lesion, occupying two lobes >1.5 cm in size). The TNM system was used in only eight cases.

Intraoperative and postoperative transfusions. Reported estimated blood loss ranged from 120 to 9,500 ml with a mean of 1,343 ml and a median of 1,100 ml. Intraoperative transfusions were given in 339 (75.0%)

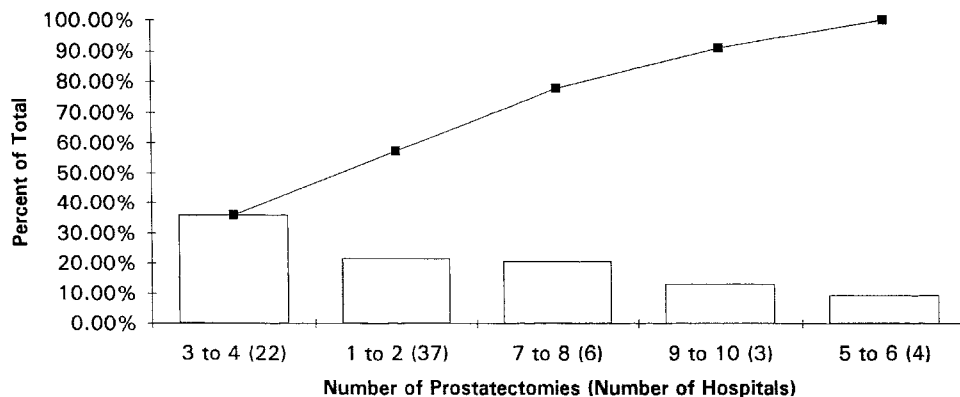


Fig. 3. Radical prostatectomies in men 75 years of age and older.

Table 2

Preoperative Work-up for Radical Prostatectomy among Male Medicare Patients, New York State, 1991-1993 (N = 452)

Procedure or Test Documented	Yes		No	
	No	%	No	%
Preoperative biopsy	420	92.9	32	7.1
Preoperative sonogram	250	55.3	202	44.7
Preoperative pelvic CT scan	262	58.0	190	42.0
Preoperative pelvic MRI ^a	49	10.8	403	89.2
Preoperative bone scan	347	76.8	105	23.2
Preoperative acid phosphatase	93	20.6	359	79.4
Preoperative PSA	371	82.1	81	17.9

^a Magnetic resonance imaging.

cases and postoperative transfusions in 111 (24.6%) cases. In those patients who received intraoperative transfusions, the mean volume was 2.5 units with a range of 1 to 16 units. The mean volume of postoperative transfusions was 1.9 units with a range of 1 to 10 units.

Among the 339 patients who received intraoperative transfusions, 208 (61.4%) received autologous blood. Ninety-six (28.3%) did not receive autologous blood, and in 35 (10.3%) the character of the blood was not specified.

Among the 111 patients who received postoperative transfusions, 43 (38.7%) received autologous blood, 57 (51.4%) did not, and in 11 (9.9%) the character of the blood was not specified.

Postoperative complications. Cardiopulmonary complications occurred in 10.2% of the 452 patients, vascular complications in 0.9%, and surgical complications in 7.4%. The overall complication rate was 18.5% (Table 3).

Mortality. Six (1.3%) of the 452 patients died after undergoing the procedure and while still hospitalized. Pattern analysis for all cases 65 years of age and older for 1991-1993 revealed mortality rates of 0.77% for low volume and 0.43% for high volume providers. Pattern analysis for all cases 65 years of age and older for 1991-1993 revealed the following mortality rates by age group: 65-69 (0.24%), 70-74 (0.9%), 75-79 (0.5%), and 80 plus (0%).

Length of stay. The mean length of stay was 8.5 days and the median 7.0 days. The minimum length of stay was 2 days and the maximum 73 days.

DISCUSSION

The results of this study show that there was a marked increase in the rate of radical prostatectomies

Table 3

Postoperative Complications among Male Medicare Patients Undergoing Radical Prostatectomy, New York State, 1991-1993 (N = 452)

Complications	No.	Percent of Complications	Percent of Patients with Complication
Cardiopulmonary	46	55.4	10.2
Congestive heart failure	8	9.6	1.8
Acute myocardial infarction	2	2.4	0.4
Other cardiac complications	21	25.3	4.7
Respiratory failure	11	13.3	2.4
Pulmonary embolism and infarction	4	14.8	0.9
Vascular	4	4.8	0.9
Arterial embolism	2	2.4	0.4
Phlebitis and thrombophlebitis	2	2.4	0.4
Surgical	33	39.8	7.4
Wound infection	13	15.7	2.9
Wound separation	7	8.4	1.6
Hemorrhage	7	8.4	1.6
Return to operating room	5	6.0	1.1
Colostomy/rectal repair	1	1.2	0.2
Total	83	100.0	18.5

among Medicare patients over the 4-year period 1990-1993. During this time there was only a modest increase in the number of reported cases of prostate cancer. However, the percentage of diagnosed patients undergoing radical prostatectomy sharply increased from 4.2% in 1990 to 11.4% in 1993. Increased radical prostatectomy rates have been documented nationally since the mid-1980s (3). A principal reason for this is thought to be an increase in the rate of reported prostate cancer resulting from increased detection associated with new screening programs and the expanded use of prostate specific antigen testing (4, 8). However, New York State's modest increase in prostate cancer cases of 18.4% between 1990 and 1993 would seem to have only partially contributed to the 93.1% increase in radical prostatectomies over the same time period. Thus the increase in radical prostatectomies in New York State over this time frame would seem to have been due to other factors.

Whitmore (4) has outlined some of the other reasons why radical prostatectomy rates have sharply risen in recent years. These include: an improved nerve-sparing procedure claimed by proponents to result in a more acceptable outcome in terms of postoperative potency morbidity; an increase in the proportion of urologists who have learned to perform radical prostatectomies during residency training; a widespread belief (not based on scientific proof) among both patients and physicians that the results of radical prostatectomy in terms of long-term survival are superior to the options

of watchful waiting and radiation; a relaxation of criteria used for the procedure; and the diagnosis of most prostate cancer by urologists who are inclined to recommend therapeutic interventions reflecting their discipline (4). It is reasonable to conclude that the sharp increase in the rate of radical prostatectomies in New York State has been due to a combination of these other factors.

Between 1984 and 1990, New York State's rate for radical prostatectomy for male Medicare beneficiaries was 50/100,000 (3). During that same period, much higher rates were observed in many other states including Alaska (429/100,000), California (170/100,000), Utah (299/100,000), and Washington (327/100,000). By comparison, New York's highest overall reported rate of 131.5/100,000 in 1992 was significantly lower than that observed in the 1980s in a number of states. Lu-Yao et al. (3) demonstrated that the rate of radical prostatectomy in New York and other Mid-Atlantic states was significantly lower in the 70–74- and 75–79-year age groups compared to rates in the central, southern, and western parts of the country. This may reflect the relatively conservative use of radical prostatectomy on the part of the urologic community in New York in elderly patients at that time. Radical prostatectomy rates among those below 70 years of age have been significantly lower in New York than those in many parts of the country (3). This may reflect both a conservative use of the procedure and inadequate patient access to diagnosis and treatment. This problem could be remedied in part by provider- and patient-focused educational efforts.

Increases in rates of radical prostatectomy were observed in this study across all age groups. These increased rates are of concern in older men who are, according to a number of studies, unlikely to die of prostate cancer before they succumb to other causes (9–13). Expectant treatment (watchful waiting) is advocated by a number of authorities for men who have a life expectancy of less than 10 years (6, 12). Expectant treatment has also resulted in low death rates of from 9 to 15% among men with local disease, putting into question the need to treat them at all (6, 10, 12, 14). Walsh (15), a leading prostate surgeon, has stated that he has “. . . never been enthusiastic about radical prostatectomy in men older than 70 years.” The reasons he puts forth for this position are that the shorter longevity of older men supports the objective of palliation as opposed to that of cure, the higher rates of incontinence and impotency in older men, and the frequently more advanced tumor stage in older men from that indicated by clinical staging (15).

A recent meta-analysis by Adolfsson et al. (16) concluded that “clinically localized prostate cancer often

has a protracted course associated with a significant competing mortality and marginal benefit from radical prostatectomy at 10 years in terms of the endpoints used.” Fowler et al. (17) have shown that the overall postoperative morbidities associated with radical prostatectomy are more frequent and more severe than previously described in series reporting on carefully selected patients. In their series over 30% of patients reported using pads to deal with wetness, 60% reported having no full or partial erections, and only 11% had erections sufficient for intercourse. Although potency might be susceptible to a range of psychological and emotional variables, the data from this study on incontinence are clearly of concern. Likewise of concern is the fact that 20% of patients had postsurgical treatment for urethral strictures; 6% were surgically treated for incontinence, and 15% had treatments or used devices to help with sexual function (17).

Litwin et al. (18) recently conducted a cross-sectional analysis of health-related quality of life (HRQOL) among 528 men of whom 214 were treated for localized prostate cancer. They analyzed cancer patients in three different treatment groups: radical prostatectomy ($N = 98$), primary pelvic irradiation ($N = 56$), and expectant treatment ($N = 60$). Prostate cancer patients treated with surgery or radiation reported significantly worse sexual, urinary, and bowel function than men with expectant treatment. Interestingly, men who had undergone nerve-sparing prostatectomy did not differ in terms of HRQOL from those who had the standard procedure. Overall, those who received radiation or underwent prostatectomy had poorer sexual function scores than those who were observed. These authors point out that the usually slow course of prostate cancer should compel physicians to focus on the quality aspects of patients' survival time (18).

As Chodak et al. (6) conclude, initial conservative management of grade 1 or grade 2 prostate cancer produces the same clinical outcome for at least 10 years as aggressive therapy. This coupled with the higher risks of surgery in older men and significant postoperative morbidity, specifically incontinence, impotence, and urethral stricture, make for a persuasive argument against radical prostatectomy in men 70 years of age and older.

Expectant management of prostate cancer has been the focus of several recent studies and some sharp differences of opinion. Using decision analyses, Fleming et al. (19) of the Prostate Patient Outcomes Research Team (PORT) examined the impact of radical prostatectomy, external beam radiation therapy, and watchful waiting with delayed hormonal therapy if metastatic disease develops, on quality-adjusted life expectancy of patients between 60 and 75 years of age with

clinically localized prostate cancer. These authors concluded that “the choice of watchful waiting is a reasonable alternative to invasive treatment for many men with localized prostatic carcinoma” (19). These PORT conclusions have been criticized for the analysis itself, its structure, and for the probabilities and utilities used in the model. Beck et al. (20) recently pointed out that some of the probabilities in the PORT analysis may be understated, resulting in an understatement of life expectancy for surgical treatment. Beck et al. (20) concluded on the basis of their analysis that the data support the decision to operate on all grades of prostate cancer. This conclusion of theirs contradicts that of the PORT group (20).

As summarized by Adolfsson et al. (16), a number of studies have shown that clinically localized prostate cancer has a protracted course. These studies have also demonstrated significant competing mortality and only a marginal benefit from prostatectomy at 10 years (16). These conclusions have been challenged by Catalona (21) on the grounds that they are biased by the inclusion of “highly select patient groups enriched with older men, men with low grade and low stage tumors, and men whose cancer has not progressed during a period of observation.” However, as Catalona points out, expectant management is still the most common form of therapy in men with low grade, low stage prostate cancer whose life expectancy is less than 10 years. Although he expresses a strong difference of opinion about the conclusions of a number of expectant management studies, he considers that this form of therapy should be experimental for “patients whose life expectancy is greater than 10 years” (21). The substantial controversy created by the PORT’s conclusion concerning expectant management primarily relates to younger men with prostate cancer who have a life expectancy of greater than 10 years. As Catalona has observed, for this group radical prostatectomy offers the best chance of eradicating the disease (21). Schellhammer (22) recently analyzed several currently published series for which selection criteria for expectant management were clearly stated. He concluded that expectant management is appropriate for minimally significant tumors, specifically when life expectancy is less than 10 years (22).

Some urologists have reasoned that a proportion of men 70 years of age and older are biologically younger than their stated chronological age and might therefore live well beyond 10 years. They have advocated radical prostatectomy for such men, especially if they have high grade tumors. However, as Litwin et al. (18) point out, this focus on attempting to maximize the duration of survival also tends to minimize or ignore the impact of both surgery and radiation on the subsequent quality

of life. HRQOL is now increasingly used as an outcome in both clinical trials and quality of care research. This is largely because the measures used have repeatedly been shown to be both valid and reliable (23). Its use in the case of radical prostatectomy, as shown by Litwin et al., introduces an important new clinical outcome variable that must receive serious consideration above the alive versus dead outcome. In the final analysis, radical prostatectomy in most older men may confer little quality-adjusted survival advantage (18, 24).

There are of course rare exceptional circumstances in which an extremely healthy man 70 years of age or older presents with a high grade tumor. Such patients may opt for surgery after being told of its risks and benefits and of the treatment alternatives. In addition older men with a history of diverticular disease may choose surgery over radiation because of the risks posed by the latter.

Over the 3-year period of this study, 1,266 radical prostatectomies were performed in men 70–74 years of age in 170 hospitals. However, almost half were done in 20 hospitals and three-quarters in 48 hospitals. Thirty-eight hospitals accounted for 57.0% of all prostatectomies in this age group (Fig. 2). Although radical prostatectomies were performed in men 75 years of age and older in 72 hospitals, 42.8% were done in just 13 hospitals. Fifty-nine hospitals accounted for 57.2% of the procedures in this age group (Fig. 3). The hospitals performing the procedure in both age groups are heterogeneous (e.g., teaching and community) as well as being dispersed throughout the state. The concentration of the procedure in a definable group of institutions should facilitate provider education with regard to radical prostatectomy in older men.

During this study, the charts of 452 patients 70 years of age and older who had radical prostatectomies were carefully studied for a number of variables. This direct examination provided an opportunity to assess preoperative work-up, preoperative staging, postoperative complications, as well as length of stay and mortality.

An important finding was documentation in 60.2% of cases that options other than radical prostatectomy had been discussed with patients and documentation in 59.1% of cases that patients had opted for it. These figures probably represent significant underreporting, as the usual time for discussing alternatives with patients and their families is during prehospitalization office visits. A number of urologists may very well have had these discussions with patients but did not record them on the hospital charts.

Most of the preoperative work-up for radical prostatectomy is done on an ambulatory basis prior to hospitalization. In the current study it was found that among the 452 charts examined 92.9% contained results of pre-

operative biopsies, 76.8% of bone scans, and 82.1% of PSA measurements (Table 2). These very high levels of preoperative testing probably represent underreporting. It is possible that among many of the remaining patients these essential studies were performed but not documented. The much lower levels of preoperative sonograms (55.3%), pelvic magnetic resonance imaging (10.8%), and pelvic CT scan (58.0%) may not only reflect underreporting of studies performed but also acceptable variations in practice patterns between providers.

Although preoperative staging was documented in 59.1% of cases, the diversity of systems used renders the information of greatly reduced value. In the majority of cases in which staging was documented, systems other than the Jewett and TNM were employed. This finding points out the need for urologists to agree upon and use a standard staging system. Although attempts have been made over the years to achieve this objective, as the findings of this study show, urologists are currently using a multiplicity of staging systems. Preoperative clinical staging often understates the pathologic extent of disease in as many as 50% of cases. Thus radical prostatectomy might not achieve cure in half those undergoing the procedure. However, these patients who would derive no therapeutic benefit might suffer from the consequences of surgery.

The majority of patients (75.0%) received intraoperative blood transfusions, the mean volume being 2.5 units. The blood given during prostatectomy was autologous in 61.4% of these patients. Yet among 24.6% patients who received postoperative transfusions, autologous blood was used in only 38.7%. The significant difference between intraoperative (61.4%) and postoperative (38.7%) autologous blood use probably reflects foreseen use in the case of the former and unforeseen need in the latter instance. In addition, the average of 3 days required to process autologous donations may be reflected in its diminished use postoperatively.

In calculating postoperative complications, we employed the same ICD-9-CM codes as did Lu-Yao et al. (3). However, we added four more complications (wound infection, wound separation, hemorrhage, and return to the operating room) to that of surgical repairs used by them. Our complications were computed during the hospitalization after surgery. Theirs were recorded during the first 30 days postoperatively.

We found that postoperative complications occurred in 18.5% of the 452 patients. The largest number of these were cardiopulmonary complications, which occurred in 10.2% of patients and which comprised 55.4% of all complications (Table 3). Our figure of 10.2% is slightly higher than those of 7.39% (75–79 years) and 9.69% (>80 years) recorded by Lu-Yao et al. (3) These authors also found that the risk of morbidity increased

for men 75 years of age and older and that the lowest cardiopulmonary morbidity (4.05%) was found in the 65–69-year age group (3).

We documented surgical complications in 7.4% of patients. Of these, wound infection (2.9%), wound separation (1.6%), and hemorrhage (1.6%) were the most common. Vascular complications occurred in only 0.9% of cases, a figure slightly higher than those of 0.2 and 0.4% reported by Lu-Yao et al. for comparable age groups.

Although Lu-Yao et al. found that cardiopulmonary complications accounted for 90% of postoperative complications, we found that they represented 55.4%. The differences in proportions between our figures and theirs is largely accounted for by our inclusion of five surgical complications compared to their one (surgical repair) (3). When we exclude the four additional postoperative complications used by us, our rate of cardiopulmonary complications reaches 94.0%, a figure close to the 90.0% found by Lu-Yao et al. (3).

We found an overall mortality of 1.3% with a higher mortality rate (0.77%) for low volume providers compared to that (0.43%) for high volume providers. Mortality rates were highest (0.9%) in the 70–74-year age group and lowest (0.0%) in the 80 years and above group. The small overall number of patients in the latter age group greatly reduces the reliability of this figure. Lu-Yao et al. found 30-day mortality rates of 1.0% for those less than 75 years of age, 1.4% for those 75–80 years, and 4.6% for those 80 years and above. The overall mortality rate of 1.3% observed in our study is within the range of that observed in other series (3).

The mean length of stay (LOS) was 8.5 days and the median 7 days. Excessive LOS was not necessarily related to the complications of the surgical procedure but due, in a number of cases, to comorbidities.

CONCLUSIONS

The rate of radical prostatectomy dramatically rose in New York State among male Medicare beneficiaries between 1990 and 1992 and remained at a high plateau in 1993. Pattern analysis revealed that the rate of radical prostatectomy tripled among those 70–74 years of age and doubled among those 75 years of age and older between 1990 and 1992. Trend analysis by provider showed that a high proportion of radical prostatectomies in men 70 years of age and older are performed by relatively few hospitals.

Chart review demonstrated the absence of documentation of discussions with patients of alternative options (other than radical prostatectomy) in 39.8% of cases. Other documentation issues included the ab-

sence of preoperative biopsy results in 7.1% of cases, bone scans in 23.2%, and staging in 40.9%.

The overall immediate complication rate was 18.5% with cardiopulmonary complications comprising the majority (55.4%). The immediate postoperative mortality rate was 1.3%.

Prostate cancer in older men usually has a protracted course. Radical prostatectomy in such men is associated with operative risks and significant immediate and long-term complications. Among the latter are impotence and incontinence. These facts make for a strong case against the use of radical prostatectomy in older men. In addition, radical prostatectomy provides only marginal benefit of 10 years because of competing mortality in older men. Provider- and patient-focused educational efforts are required to reduce the numbers of radical prostatectomies in older men where the benefits are marginal compared to operative risks and significant immediate and long-term complications.

ACKNOWLEDGMENTS

We express our appreciation to the members of the Radical Prostatectomy Advisory Group who provided advice about the design and analysis of this study. Thanks are also extended to the following IPRO staff members who assisted in the data collection and analysis aspects of this study: Ann M. Eichorn, Kamran Nayyeri, Ph.D., Janice Norwood, Veronica Pryor, Carl R. Rosenberg, Ph.D., Harriet Starr, and Terri A. Straub. We also wish to thank Christine Regonini for her help in preparing the typescript and Lori DeRise for preparing Figure 1.

References

1. CDC. Trends in prostate cancer—United States, 1988–1990. *MMWR* 1992;41:401–404.
2. New York State Department of Health cancer registry data, 1993.
3. Lu-Yao GL, McLeran D, Wasson J, et al. An assessment of radical prostatectomy. Time trends, geographic variation, and outcomes. *JAMA* 1993;269:2633–2636.
4. Whitmore WF Jr. Management of clinically localized prostate cancer. An unresolved problem. *JAMA* 1993;269:2676–2677.
5. Moore MJ, O'Sullivan B, Tannock IF. How expert physicians would wish to be treated if they had genitourinary cancer. *J Clin Oncol* 1988;6:1736–1745.
6. Chodak GW, Thisted RA, Gerber GS, et al. Results of conservative management of clinically localized prostate cancer. *N Engl J Med* 1994;330:242–248.
7. Division of quality control management, American Hospital Association. *International Classification of Diseases, Ninth Revision, Clinical Modification*, Chicago, American Hospital Publishing, 1989.
8. Thompson IM. Carcinoma of the prostate: changing incidence associated with annual urologic screening. *South Med J* 1989;82:335–337.
9. Lu-Yao GL, Greenberg ER. Changes in prostate cancer incidence and treatment in USA. *Lancet* 1994;343:251–254.
10. Johansson J-E, Adami H-O, Andersson S, et al. High 10-year survival rate in patients with early, untreated prostatic cancer. *JAMA* 1992;267:2191–2196.
11. Stamey TA, Freika FS, McNeal JE, et al. Localized prostate cancer. *Cancer* 1993;71:933–938.
12. Catalona WJ. Management of cancer of the prostate. *N Engl J Med* 1994;331:996–1004.
13. Thompson IM. Observation alone in the management of localized prostate cancer: The natural history of untreated disease. *Urol Suppl* 1994;43:41–46.
14. Whitmore WF Jr, Warner JA, Thompson IM Jr. Expectant management of localized prostatic cancer. *Cancer* 1991;67:1091–1096.
15. Walsh PC. Editorial comments on survival of men with clinically localized prostate cancer detected in the eighth decade of life. *J Urol* 1994;151:1329.
16. Adolfsson J, Steineck G, Whitmore WF Jr. Recent results of management of palpable clinically localized prostate cancer. *Cancer* 1993;72:43–55.
17. Fowler FJ, Barry MJ, Lu-Yao G, et al. Patient-reported complications and follow-up treatment after radical prostatectomy. National Medicare experience: 1988–1990 (updated June 1993). *Urology* 1993;42:622–629.
18. Litwin MS, Hays RD, Fink A, et al. Quality-of-life outcomes in men treated for localized prostate cancer. *JAMA* 1995;273:129–135.
19. Fleming C, Wasson JH, Albertsen PC, et al. A decision analysis of alternative treatment strategies for clinically localized prostate cancer. *JAMA* 1993;269:2650–2658.
20. Beck JR, Kattan MW, Miles BJ. A critique of the decision analysis for clinically localized prostate cancer. *J Urol* 1994;152:1894–1899.
21. Catalona WJ. Editorial. Expectant management and the natural history of localized prostate cancer. *J Urol* 1994;152:1751–1752.
22. Schellhammer PF. Contemporary expectant therapy series: A viewpoint. *Urology* 1994;44:47–52.
23. Wilson IB, Cleary PD. Linking clinical variables with health-related quality of life. *JAMA* 1995;273:59–65.
24. Fleming C, Wasson JH, Albertsen PC, et al. for the Prostate Patient Outcome Research Team. A decision analysis of alternative treatment strategies for clinically localized prostate cancer. *JAMA* 1992;269:2650–2658.