Acta Oncologica, 2005; 44: 628–632

Taylor & Francis
Taylor & Francis

ORIGINAL ARTICLE

PROQUR: A tool for quality control, epidemiological surveillance, patient follow-up and clinical research activities related to prostate cancer

MAGNUS GRABE[1], ANDERS BJARTELL[1] & BJÖRN WULLT[2]

[1]*Department of Urology, Malmö University Hospital, Malmö, Sweden,* [2]*Department of Urology, Lund University Hospital, University of Lund, Lund, Sweden*

Abstract
Prostate cancer is a leading cancer in Western Europe and epidemiological surveillance is essential to better understand the disease and its treatment. A database for quality control starting with the diagnostic procedure transrectal ultrasound guided core biopsy of the prostate was designed with the aim of monitoring side-events to the procedure, direct printing of reports and forms related to the diagnostic procedure, the National Cancer Registry and the National Prostate Cancer Quality Registry. The programme is flexible, and new folders related to specific research activities can be attached. The programme is easy to handle and aimed at facilitating the daily work of the urologist, epidemiological surveillance and disease progression. We suggest the programme should become a common tool and platform for a standardised approach in diagnostic, therapeutic, administrative reporting to the National Cancer Registry and National Prostate Cancer Quality Registry, and research on prostate diseases in the urologic community in Sweden and eventually abroad.

Prostate cancer is a leading male cancer in Western Europe and the most common in the Nordic population [1,2]. Through increased awareness and non-systematic screening activities, an estimate of 8 000 new annual cases is expected to be diagnosed in Sweden. Cancer epidemiology is an important tool for understanding and controlling cancer disease. In Sweden, all diagnosed cancers are reported to the Swedish Cancer Registry, enabling annual national epidemiological reports. During the last decade, through efforts made by the medical society and supported by the Swedish National Board of Health and Welfare [3], Quality Registries have been introduced for some urologic cancer diseases such as prostate cancer, bladder cancer and renal cell carcinoma, that include basic information on the history, the TNM classification and the initial treatment options [4,5]. Although the reports resulting from theses registries have been an important step forward in cancer epidemiology, the information provided is still limited both in terms of amount of information and in time, covering usually only the first six months after diagnosis. This is, among others, due to the lack of a simple and handy data reporting systems that work smoothly in daily clinical practice.

In order to gather as complete data as possible on basic epidemiology, associated with prostate cancer and other prostate diseases, we found it reasonable to start collecting data as early as possible during the investigational procedures. Performing a transrectal ultrasound (TRUS) guided core biopsy of the prostate is the entry gate to the diagnostic investigation and management of a patient with a suspected prostate cancer, we have found this key event ideal for starting recording patient data into a Prostate biopsy Quality Registry data-base (*PROQUR*), that, moreover, can be a tool for monitoring side-events and complications to the procedure.

Method

A first version of the prostate biopsy registry was installed in May 2003 in the departments of Urology of the two University Hospitals in Lund and Malmö as a tool for registering side-events related to core biopsy of the prostate while conducting a study on antibiotic prophylaxis in conjunction with the

Correspondence: Magnus Grabe, Department of Urology, Malmö University Hospital, SE 205 02 Malmö, Sweden. E-mail: magnus.grabe@skane.se

(Received 21 September 2004; accepted 21 April 2005)

ISSN 0284-186X print/ISSN 1651-226X online
DOI: 10.1080/02841860510029932

procedure. The two departments manage the large majority of all diagnostic and therapeutic procedures within a catchment area of some 750 000 people, and perform together more than 1 300 prostate biopsy annually. A similar standardized sextant technique as originally described by Hodge [6] is used, sampling six biopsies from the base, middle and apex of the prostate in the mid lobar parasagittal planes bilaterally. In case of re-biopsy, the number of biopsies is usually increased comprising eight to twelve samples involving also the lateral sectors of the gland and the transitional zone [7]. Almost all biopsies are performed on an out patient basis.

A second version – PROQUR-was developed during 2004 as a tool to facilitate the handling of information related to prostate cancer epidemiology and other research activities. A third version is presently under evaluation and aims at facilitating the follow-up in terms of disease progression of and treatment action in patients with prostate cancer.

Software

The software version 1.0 and 2.0 were developed in cooperation with Majeda Information Malmö, Sweden (www.majeda.se). It is powered by MQR (www.mqr.se), a generic relational database based framework for bioinformatics, including data collection, analysis and statistics. Special attention has been given to make this tool easy to handle and useful in daily clinical practice. A statistical function is integrated to offer the possibility to monitor standard information on a regular basis. The present programme is built up in such a way that additional research folders can easily be linked to the original database. The third version is presently in progress.

Data recorded

In the first version, patient identification, date of biopsy, prostate volume measured at TRUS, finding at digital rectal examination (DRE), results of serum levels of prostate-specific-antigen (PSA, ng/ml) including free/total ratio, urine dip-stick test and urine culture, and antibiotic prophylaxis regiment were entered at the time of biopsy (Table I). Space for free text allowed further clinical data to be included in the referral report to the pathologist. Written consent for ongoing study was integrated in the database. A questionnaire was given to the patients to be returned after two weeks in order to collect all side-events and complications to the procedure.

In the second version, the same data are entered. However, new information are added and include the clinical evaluation of the patient in terms of TNM classification, result of the pathological examination (pT-stage, WHO Grade, Gleason score, prostatic intraepithelial neoplasia – PIN), treatment options within six months and informed consent of ongoing studies including consent to the newly introduced law in Sweden of storage of blood and tissue samples [8]. A third version is in progress and includes data on patient follow-up, PSA-values, disease progression and treatment options over time.

Linked reports

Selected standardised data and the free text are printed directly as report to the pathologist at the time of biopsy. The information required to complete the forms of the National Cancer Registry and the National Prostate Cancer Quality Registry, is automatically collected from the database and printed on the ad hoc form.

Results

During the period 1 May 2003 and 31 July 2004, 1 641 sets of core prostate biopsies (TRUS) were undertaken in 1 379 patients, giving an average of 1.19 sets of biopsies per patient (II). The technique was similar in both settings and an average of six biopsies (range 1 – 13) was taken per set. In case of re-biopsy, the number of biopsies was increased. This first period of registration was mainly aimed at quality control of prostate biopsy by recording side events. The questionnaire was returned by 97% of all patients. It was found in 1 302 patients from this period receiving a single dose of antibiotic prophylaxis that 15% had pain or dysuria, 45% had haematuria and that 1.3% developed a genitourinary infection after biopsy [personal communication, 9].

The mean and median age and age distribution were very similar in the two settings although a larger number of patients over the age of 80 were subjected to biopsy in Lund, 65 (6.8% of the population) compared with 38 (5.4%) in Malmö.

The mean PSA values were 28 ng/ml in Lund and 62 ng/ml in Malmö, while the median were 7 and 8 ng/ml, respectively. The discrepancy of the average was caused by a few cases in Malmö presenting with marked higher PSA level, the highest level being 10 040 ng/ml (3 over 5 000) as compared with 2 460 ng/ml in Lund. In a series of patients including 646 patients in Lund and 203 in Malmö, cancer of the prostate was detected in 199 (31%) and 73 (36%), respectively (Table III). PIN was described in 16% in Lund and 6% in Malmö, respectively.

All referral reports to the pathologist were printed directly from the database with preprogrammed information including clinical stage (DRE), PSA value, free/total PSA ratio, prostate volume and a

Table I. Data registered at the time of biopsy of the prostate, the post-biopsy follow-up and after reception of the pathology report.

Time of biopsy	First follow-up	Pathology
Consent to collect data for the biobank and future research	Questionnaire returned Symptoms after biopsy (pain, haematuria)	Result: Cancer, PIN or benign
Biobank storage number	Fever after biopsy	In case of cancer:
Reason for biopsy (elevated PSA, health control, symptoms)	Any contact with a doctor for complications	pT-stage
	Extra antibiotics	Gleason score
		WHO grade
Current PSA		
Current free/total PSA ratio		Treatment option within six first months
Prostate volume		
Clinical T-stage (DRE)		
Number of biopsies		
Urine dip-stick test		
Type of antibiotic prophylaxis		
Free text to the referral report		
Name of the urologist		

patient related free text. Presently, all data requested for the National Cancer registry and the National Quality Registry are printed directly from the database on ad hoc forms.

Discussion

Epidemiological surveillance of prostate cancer is essential. Cancer tumours are for many years reported to regional and national cancer registries. In recent years, National Quality Registries have been developed in Sweden, for among others prostate, bladder and kidney cancer [4,5]. They include basic standardised clinical and pathologic data and reflect the initial treatment option, i.e. usually within the first six months. The National Board of Health and Welfare has stimulated the development of National Quality Registries and underscored their value for transparency, internal control, comparison between geographic regions and centres, and for medical research [3].

The reporting is, however, time consuming, and the accuracy of the data depends on a retrospective review of the patient records done by an already overstretched urologist. There is a risk for incomplete and even inappropriate data output and subsequent interpretation of analysis. Moreover, the present registries do not mirror the management in the long term. Thus, a prospective continuous input of data in a database would enhance the accuracy and quality of the reporting. The time previously used for filling in old-fashioned forms should shift to database recording enabling fast and time saving reports to be automatically printed, or even electronically transferred. This requires a systematic report from the pathologist as well as from the clinician, with a minimum of predefined data that are eventually entered into the database by a trained staff member.

The incidence of prostate cancer is rising, due among other things to an increased awareness of the disease in the society in general and in the male population in particular, resulting in a higher

Table II. Patient age, sets of biopsies and PSA-value recorded in the two settings of Lund and Malmö.

Feature	Lund	Malmö
Number of patients	766	613
Age at biopsy – years		
Mean	66.3 (44–92)	65.7 (42–94)
Median	67	67
Biopsies		
Number of sets of biopsies	948	693
Number of biopsies/sets	6 (1–13)	6 (1–12)
Number of sets of biopsies per patient	1.24	1.13
PSA value – ng/ml		
Mean	28 (0.9–2 460)	62 (0.1–10 040)
Median	7	8
Prostate volume (mean)	39.1	45.5

Table III. Results of pathology in two consecutive series of patients from the two settings of Lund and Malmö.

Results of pathology	Lund	Malmö
Number of patients	646	203
Diagnosis		
Cancer	199 (31%)	73 (36%)
Prostatic intraepithelial neoplasia (PIN)	105 (16%)	13 (6%)
Benign tissue	342 (53%)	117 (58%)

frequency of diagnostic procedures. Even though screening is presently not recommended in Sweden, the increased awareness and request for health examination and check-up have been followed by a marked increase of detection of elevated PSA and consequently of demand for diagnostic prostate biopsy. Consequently, the amount of information becomes so large that it can only be handled accurately through a database.

In this series of patients 1 379 men with a similar age distribution between the two settings, the median PSA- values were 7 and 8, respectively, which is relatively high a figure to detect early prostate cancer. Nonetheless, the overall number of patients with prostate cancer was 32% considering a re-biopsy frequency of 1.2. PIN was described in 16% in Lund and 6% in Malmö, showing a difference among pathologists in the interpretation of core biopsy findings.

The Cancer related National and local Quality Registries have revealed local and regional variations of the diagnostic and therapeutic management of cancer diseases. They mirror differences in available health care resources, therapeutic traditions and attitudes in front of medical dilemmas. To monitor the discrepancies and measure the impact of different approaches, a common tool is of great importance. Interestingly, the basic data from this series illustrate differences in patient characteristics, intensity in diagnostic policy and logistics, supporting the need for easy handled instrument for quality control and surveillance.

Also, not only cancer of the prostate has to be subject to research. In our material, a majority of patients with elevated serum PSA had a benign finding. There is a lack of understanding of what causes the clinical condition, i.e. the possible role of inflammation of the gland. Further research in non-cancer issues would definitely improve our knowledge of prostate diseases.

As TRUS core prostate biopsy is presently the gate into the active diagnostic and therapeutic handling of the patient, we find this event ideal for starting data collecting. Although the first version of the prostate biopsy quality registry was initially introduced to register complications after the procedure, we soon found that the registry could serve other purposes and make possible administrative requirements. All information is collected prospectively in one database that facilitates both daily clinical practice and administration and research activities. The software is built up in a flexible way, and new folders can easily be added as required by different ongoing and future research activities.

Finally, this software programme is in further development to assist the clinician in the long-term follow-up of patients with prostate cancer. Data such as the PSA-value over time, changes in the disease and new treatment actions are being integrated in the database.

In conclusion, the PROQUR database allows tracking of all patients undergoing core biopsy of the prostate and its outcome in terms of diagnosis, whether malignant or not. Side effects secondary to the diagnostic procedure are easily monitored. The automatic printing and eventually the electronic transmission of reports to the department of Pathology and external databases, as the Swedish Cancer Registry and National Prostate Cancer Quality Reports, creates attractive rationalisation of the clinical administrative work. Furthermore, PROQUR can easily be expanded for longitudinal data registration enabling epidemiologic studies of the impact of screening, assessment of new diagnostic tools, of treatment decisions and their consequences in a defined population. Quality of life studies can easily be introduced. We suggest the programme to become a basic tool and a common platform for standardised approach in diagnostic, therapeutic, administrative reporting to the National Cancer Registry and National Prostate Cancer Quality Registry and research on prostate diseases in the urologic community in Sweden and eventually abroad.

Acknowledgements

We are thankful to registered nurses Ulla Lindström (Malmö) and Eva Ljunggren (Lund) for consistent and faithful data registration, pertinent criticism, and suggestions that were essential for the development of the second version PROQUR and for running ongoing studies. We are also grateful to Bayer Sweden AB for a generous research grant, which made it possible to launch and develop the first step of the project and to the Foundation for Urological research, Malmö University Hospital, Malmö, Sweden for financial support.

Commercial affiliations

PROQUR is the propriety of the Department of Urology, Malmö University Hospital and the three authors are responsible for the project and its development. The cost of the programme is sized only for expected development expenditures. No other commercial affiliations are linked to this project.

References

[1] World Cancer Report 2003. World Health Organisation (ISBN: 9283204115).

[2] Levi F, Lucchini F, Negri E, Boyle, La Vecchia C. Leveling of Prostate Cancer Mortality in Western Europe. The Prostate 2004;60:46–50.

[3] Användningen av och nyttan med nationella kvalitetsregister. Socialsyrelsen (The use and advantages of national quality registries), (The National Board of Health and Welfare) 2002 (Dnr 51 8028/2002).

[4] Nationellt kvalitetsregister för blåscancer (National Quality Registry for Bladder Cancer) 2002; Socialstyrelsen, Svensk Urologisk förening, Sveriges Onkologiska Centra. SE-221 85 Lund.

[5] Nationella prostatacancer registret (National Quality Registry for Prostate Cancer), Manual för Uppsala/Örebroregionen, Regional Onkologiskt Centrum, Akademiska Sjukhuset, SE-751 85 Uppsala.

[6] Hodge KK, McNeal JE, Terris MK, Stamey TA. Random systematic versus directed ultrasound guided transrectal core biopsies of the prostate. J Urol 1989;142:71–74; discussion 74–75.

[7] Matlaga BR, Eskew LA, McCullough DL. Prostate biopsy: indications and technique. J Urol 2003;169:12–9.

[8] Biobank lagen. SFS 2002:297.

[9] Lindsted S, Wullt B, Lindström U, Ljungren E, Grabe M. Endos antibiotikaprofylax vid prostatbiopsi: jämförande studie med cirpofloxacin 750 mg givet 2 tim före respektive i anslutning till biopsitillfället (UR-22) (Single dose antibiotic prophylaxis in prostate biopsy with oral ciprofloxacin 750 mg: impact of timing). Riksstämman 2004; Göteborg.