Ulster Med J 2013;**82(3):**146-149

Paper

The PSA tracker: A computerised health care system initiative in Northern Ireland

Derek B Hennessey, Caoibhe Lynn, Hazel Templeton, Kerry Chambers, Colin Mulholland

Accepted 17 July 2013

ABSTRACT

Introduction: The follow-up of men with prostate cancer forms a large part of many urologists workload. However, a rising PSA usually announces disease progression long before any clinically apparent symptom. Thus, many men can be safely monitored with PSA measurement alone. To facilitate this process, PSA tracking software was introduced to remotely monitor PSA results, minimising the work required for follow-up.

Methods: Stable prostate cancer patients were into the PSA tracker. When each PSA test was performed, the result was reviewed. The program automatically generated patient reminder letters, summary reports for clinic use and all correspondence to patients and primary care physicians.

Results: Since 2006, 65 patients have been entered into the PSA tracker. Median age was 81 (57-94) years. 274 outpatient appointments have been saved, indicating a potential saving of £32,000. More importantly it increased the capacity of the department to assess new patients. For the individual patient, the system has saved them, a median of 3 appointments each.

Conclusion: Remote follow-up of prostate cancer is associated with significant savings for both healthcare organisations and individual patients. This example, further demonstrates the benefits of implanting healthcare software for patients and hospitals.

Keywords: PSA tracker, prostate cancer, computerised follow up, electronic health record, outpatient clinic

INTRODUCTION

Over the past 20 years there has been worldwide increase in the incidence of prostate cancer[1]. This increase is due to improved awareness, increased prostate specific antigen (PSA) testing and increased availability of trans-rectal ultrasound guided biopsies (TRUS). Once treated, and the patients PSA remains stable or suppressed for two years, they are considered to have stable prostate cancer. Most stable prostate cancer patients are followed-up routinely in an outpatient department (OPD) for many years, often with little change in their disease status. Thus, the increasing numbers of stable prostate cancer patients is placing a burden on many urology departments' resources.

In response, PSA Tracking System (PTS) software has been developed to facilitate the remote surveillance of these stable prostate cancer patients, without the patient having to attend the hospital OPD. The system has been introduced as new model of patient care that would reduce the burden of long-term management, by facilitating follow-up by a specialist nurse, rather than by a consultant urologist. Stable prostate cancer patients are particularly suited to this form of follow up: because, once treated, a change in PSA will announce disease progression long before any clinical symptom or sign[2,3,4].

PTS software and nurse led prostate cancer follow-up was introduced into our institution in 2006. The goal of this study was to assess the provision of services in relation to these patients and assess local service development. A secondary goal was to assess if this automated computerised system reduced the burden of long-term follow-up and if there are any benefits for the patients on the PTS.

METHODS

In 2005, the department of Urology obtained a PTS system for free from Mr J Mcfarlane, consultant urologist, Royal United Hospital, Bath, to automate the process of prostate cancer follow-up. Since 2006, 65 stable prostate cancer patients were entered onto PTS system for remote surveillance of their PSA. All patients on the database were specifically chosen by a consultant urologist and all patients had stable prostate cancer that had been stable for at least two years.

Once selected for the PTS, a nurse specialist entered all patient data into the PTS to generate an electronic patient record (EPR). Letters and correspondence are generated

Department of Urology, Craigavon Area Hospital, 68 Lurgan Rd, Portadown, BT63 5QQ. Telephone:07926973150

Email:derek.hennessey@gmail.com

Correspondence to Mr Derek Hennessey

automatically and sent to the patient and general practitioner (GP) explaining the PTS and the process of PSA monitoring. When indicated, the PTS generates a letter informing the patient when their next PSA test is due. The patient attends their own health centre for the PSA test and the GP forwards the result to the nurse specialist. The result is then added and the system generates graphs and determines what temporal changes in PSA are concerning. Regular correspondence is sent to the patient and GP detailing these results and management.

Data gathered and analysed in this study included: patient age, stage, and grade of prostate cancer. Year entered onto the tracker; including number of years on the tracker. Previous prostate cancer treatments, current treatments and most recent PSA were also noted. Number of appointments saved, patient travelling time saved and distance saved not travelling was also determined.

Unless otherwise stated, data is represented as median (interquartile range: IQR) and N represents the number of patients included in the analysis. Data analysis was carried out with Prism version 5.01 (GraphPad Software, Inc. 2236 Avenida de la Playa La Jolla, CA 92037 USA).

RESULTS

Patient demographics

At time of this study, there were 65 patients enrolled in the PTS. Data was obtained on all 65 patients. The median age of patients was 81 years, (IRQ 57-94). The median year of diagnosis of prostate cancer was 2007, (IRQ 1996-2011). The majority of patients were entered onto the PTS tracker after 2010, (Table 1). The median duration for a patient on the PTS was 12 months, (IRQ 9-30).

Clinical stage, grade and treatment

The median PSA at diagnosis was 17, (IRQ 3.1-2012) (Table 2). The local clinical stage as determined by digital rectal examination (DRE) varied. 34 (53%) patients had organ-confined disease; 3 patients gad pT1a, 14 patients were pT1c, 17 patients were pT2a and 1 patient was pT2b. 30 (47%) patients had locally advanced disease; 22 had pT3 disease and 8 had pT4 disease (Table 2).

Gleason grade varied less between patients. 33 (50.7%) patients had Gleason 6 disease, 10 (15.3%) had Gleason 7 (3+4), 4 (6.1%) had Gleason 7 (4+3), 2 (3%) had Gleason 4+5 and 1(1.5%) patient was Gleason 5+4. TRUS guided biopsies were not performed in 14 patients as PSA and DRE alone were used to diagnose the prostate cancer, (Table 2).

8 (12.3%) of patients had radical treatment (7 patients had radiotherapy, 1 patient had brachytherapy) for their prostate cancer, 21 (32.3%) of patients were on watchful waiting programme. 36 (55.4%) of patients on hormonal treatment for their prostate cancer, (Table 2). The current median PSA of the patient cohort is 2.2, (IRQ 0.1-336).

TABLE 1:

Patient demographics, year of diagnosis and year entered into PTS

Patient Demographics	
Total	**Total N %**
Age (years), (median IRQ)	81 (57-94)
Diagnosis year, (median IRQ)	2007(1996-2011)
Year entered into tracker	
2006	5 (7.6%)
2007	2 (3.1%)
2008	4 (6.2%)
2009	4 (6.2%)
2010	12 (18.5%)
2011	33 (50.8%)
2012	5 (7.6%)
Time on tracker(months), (median IRQ)	12 (9-30)

PTS, Prostate Tracking System; N indicates number of patients; IQR, interquartile range

Economic benefits

Since the introduction of the PTS, the tracking system saved 274 outpatients clinic appointments. For individual patients, a median of 3 appointments was saved, (IRQ 1-6). For the urology consultant, 4090 minutes of time was saved, amounting to 12 full outpatient clinics, (Table 3). By removing the need for the patient to attend the hospital for review, each patient avoided having travel a median of 126 miles, (IRQ 54- 444), and taking a median of 228 minutes, (IRQ 80-602). In total, 21700 patient miles and 30400 patient minutes were saved by not needing to travel for their hospital appointments (Table 3).

DISCUSSION

The aim of this paper was to highlight the emerging importance of healthcare software; and more specifically discuss the use of the PSA tracker in monitoring men with stable prostate cancer. We found the PTS reduced the clinical, administrative and personal burden required for the follow-up of these patients. In our hospital, we found that system saved 274 outpatient appointments. This represented a potential saving of £32,000 for our healthcare organisation. However, the real benefit was that the system increased the department's capacity to assess new patients; by removing the need to regularly review stable prostate cancer patients in the OPD. For individual patients, it meant that they did not have to travel to the hospital for review, saving them time and money.

Computerised systems are just one of the features illustrating

Table 2:

Clinical data: Prostate cancer stage and grade

Clinical Data	
	Total N %
PSA at diagnosis, (median IRQ)	17 (3.1-2012)
Clinical stage	
T1a	3 (4.5%)
T1c	14 (21.5%)
T2a	17 (26.1%
T2b	1 (1.5%)
T3	22 (33.8%)
T4	8 (12.4%)
Gleason	
3+3	33 (50.8%)
3+4	10 (15.4%)
4+3	4 (6.2%)
4+5	2 (3.1%)
5+4	1 (1.5%)
N/A	14 (21.5%)
Treatment	
Radical	8 (12.4%)
Active Surveillance	7 (10.7%)
Watchful waiting	14 (21.5%)
Hormones	36 (55.45)
Current PSA, (median IRQ)	2.2(0.1-336)

N indicates number of patients; IQR, interquartile range

innovation possible within health care organisations. Public opinion on electronic records for means of surveillance of long-term conditions is positive[5]. Therefore it is the belief of many that the next step of such a tracking the system would be the expansion of such a system into other healthcare organisations. Indeed, it is now the goal of the transforming cancer follow-up initiative of Northern Ireland Cancer Network (NICaN) prostate cancer subgroup to develop a PTS for all stable prostate cancer patients in Northern Ireland.

The current PTS used in Altnagelvin Area Hospital is a stand-alone programme that is now seven years old. It will not be adopted by the NICaN prostate cancer subgroup for the surveillance of prostate cancer patients. Instead, it is likely that a new programme will be developed. A key feature of this future programme would be the incorporation of this system into an EPR. The amalgamation of computerised health care systems would allow a detailed overview of the patient to include their past medical history, diagnosis, treatment and subsequent management. A secondary benefit in this integration, would allow any patients past medical history be reviewed instantly, almost anywhere within the health care network[6,7].

One of the general concerns with any computerised health care system is that patients can be lost in the system or lost to follow-up. This was discussed by Singh *et al,* who studied the use of an integrated EPR in aiding with effective management of lung cancer. They found that the proportion of people 'slipping through the system': that is, not being followed up regarding their malignancy decreased with use of electronic systems compared to standard methods. Indicating that electronic follow up of certain patients was safe and efficient[8]. Similarly, our PTS generated reminders and correspondence automatically, in addition to flagging all patients that were due a PSA ensuring that it was very hard for a patient to be lost to follow up.

The initial starting cost of implementing a PTS has to be considered. Firstly, there is a considerable investment of time and money that is needed to develop such a system. Secondly, the task of transferring information from paper to EPR will be a considerable administrative process[9]. However, the improvement in efficiency, quality of care, public satisfaction and healthcare policy-making is likely to be significant.

CONCLUSION

The PSA tracker has clear advantages; it reduces the need to review stable patients in the OPD, this has associated cost savings for the health care organisation. This example, further demonstrates the benefits of implanting healthcare software for patients and hospitals.

The authors have no conflict of interest.

REFERENCES

1. Center MM, Jemal A, Lortet-Tieulent J, Ward E, Ferlay J, Brawley O, et al. International variation in prostate cancer incidence and mortality rates. *Eur Urol*. 2012; **61(6)**:1079-92.

Table 3:

Economic benefits of the PTS system

Economic Benefits		
	Median (IRQ)	**Total N**
Appointments Saved	3(1-6)	274
Consultant time		4090 Minutes
Distance not travelled	126(54- 444) Miles	21700 Miles
Time not travelling	228(80-602) Minutes	30400 Minutes

N indicates number of patients; IQR, interquartile range

2. Pound CR, Christens-Barry OW, Gurganus RT, Partin AW, Walsh PC. Digital rectal examination and imaging studies are unnecessary in men with undetectable prostate specific antigen following radical prostatectomy. *J Urol*. 1999; **162(4)**:1337-40.

3. Johnstone PA, McFarland JT, Riffenburgh RH, Amling CL. Efficacy of digital rectal examination after radiotherapy for prostate cancer. *J Urol.* 2001; **166(5)**:1684-7.

4. Lattouf JB, Saad F. Digital rectal exam following prostatectomy: is it still necessary with the use of PSA? *Eur Urol*. 2003; **43(4)**:333-6.

5. Luchenski S, Balasanthiran A, Marston C, Sasaki K, Majeed A, Bell D, et al. Survey of patient and public perceptions of electronic health records for healthcare, policy and research: study protocol. *BMC Med Inform Decis Mak*. 2012;**12**:40.

6. Kanas G, Morimoto L, Mowat F, O'Malley C, Fryzek J, Nordyke R. Use of electronic medical records in oncology outcomes research. *Clinicoecon Outcomes Res*. 2010;**2**:1-14.

7. Lau EC, Mowat FS, Kelsh MA, Legg JC, Engel-Nitz NM, Watson HN, et al. Use of electronic medical records (EMR) for oncology outcomes research: assessing the comparability of EMR information to patient registry and health claims data. *Clin Epidemiol*. 2011;**3**:259-72.

8. Singh H, Hirani K, Kadiyala H, Rudomiotov O, Davis T, Khan MM, et al. Characteristics and predictors of missed opportunities in lung cancer diagnosis: an electronic health record-based study. *J Clin Oncol*. 2010; **28(20)**:3307-15.

9. Hayrinen K, Saranto K, Nykanen P. Definition, structure, content, use and impacts of electronic health records: a review of the research literature. *Int J Med Inform*. 2008; **77(5)**:291-304.

