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Analysis of the financial impact and efficiency of the One Stop Prostate Clinic: A same day prostate cancer diagnostic clinic in the Australian public health system

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Abstract

Background: Access to prostate cancer diagnostic clinics are challenging for rural men in Western Australia due to remoteness and long travel distances. The One Stop Prostate Clinic (OSPC) provided same day assessment and diagnosis for prostate cancer in a public tertiary hospital to reduce access barriers for rural men. The objective of this study was to determine the financial and resource utilisation impact of the OSPC compared to a usual care pathway (UCP).

Design and methods: Study design: Cost minimisation analysis of the OSPC model (assuming 100% new referrals) compared with a UCP, including impact on the Patient Assisted Transport Scheme (PATS) for rural men. An estimate of total cost comparison of OSPC and UCP pathways of outpatient and diagnostic costs was calculated based on journey mapping of attendance and follow up.

Methods: Prospective data collection between August 2011 and November 2017 of referral, attendance and follow up outcomes. Journey mapping to identify time from referral to diagnosis, number of outpatient appointment (OPA) and travel savings.

Results: A total of 1000 men attended – 466 (47%) rural and 534 (53%) metro. Mean time from referral to diagnosis was 57 days (rural) versus 63 (metro; $p = 0.034$)). The OSPC saved 543 travel episodes (distance of 1.5M km) and 658 OPA's. Total episode of care costs for the OSPC (100% new) pathway estimated as $2237.34, compared to $2847.00 for a UCP, generating savings of $609.66 per attendance ($609,658.22 overall).

Conclusion: The OSPC was more cost effective and efficient in comparison to a UCP.

Keywords

Prostate cancer, public health, One Stop Prostate Clinic, urology, cost minimisation

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Introduction

Cancer was the highest burden of disease in Australia in 2015.[1] with prostate cancer the most common cancer overall and third highest cause of mortality after lung and colorectal cancer in Australia in 2019.[2] The economic burden of prostate cancer in Australia is also significant. Between 1993 and 1994 prostate cancer management was estimated to cost AU$ 101.1 million.[3] More recent studies have estimated the cost of treating prostate cancer in Australia to be US$270.9 million in 2016 with expectations to rise to US$384.3 million in 2025.[4]

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The cancer referral, diagnosis and treatment pathway is time sensitive with the goal of minimising delays in diagnosis in order to maximise survival benefits.[5] Timely access to cancer diagnostic services is especially relevant for people who live in rural and remote parts of Australia as they experience increased morbidity and cancer related mortality compared to people who live in metropolitan areas of the country.[1,2] Rapid access/fast track/one-stop cancer diagnostic pathways are now common in many tumour groups and there is much international data published comparing the clinical outcomes against a usual care pathway.[6–16] One-stop urological cancer pathways have been usual practice at our institution since 2008 with the introduction of the One Stop Haematuria Clinic.[17,18] The OSPC was established in 2011 initially to address health inequities and access barriers rural and remote men experience,[19] but later expanded to include all referrals to our service.[20,21] The purpose of the OSPC was to provide a streamlined assessment and diagnostic service for investigation of prostate cancer for rural men of Western Australia (WA). The OSPC model was designed to reduce the travel burden for rural men and so remove access barriers for men living far away from cancer diagnostic services. This was a Consultant led clinic supported by the OSPC Clinical Nurse (OSPC CN). Men were referred to the OSPC for investigation of concerns for prostate cancer using referral criteria of two abnormal prostate specific antigent tests (PSA) or abnormal digital rectal examination (DRE), irrespective of PSA level. Men were not referred to or assessed at the OSPC using any specific prostate cancer risk assessment tool. They attended for same day assessment and if clinically appropriate, underwent trans-rectal ultrasound guided (TRUS) prostate biopsies under local anaesthetic with antibiotic prophylaxis. Eligible (excluding prisoners or non English speaking) men who provided their verbal consent were informed of their biopsy results by telephone by the OSPC CN. This feature allowed men with benign pathology and no further urological issues to be discharged back to the care of their General Practitioner (GP) for PSA surveillance. The OSPC model was especially helpful for rural men who were able to be assessed and diagnosed with prostate cancer (or not) and contacted or then discharged all in one 'in person' visit', thus saving many kilometers of unnecessary travel.

Public health hospital funding of inpatient/outpatient and day-case services in Australia is a complex mix of taxpayer funded Commonwealth and State based responsibilities[22] and the responsibility for financial accountability in spending of public health dollars rests with the management of each individual public hospital. With the complexity and number of episodes of care delivered each year, it can be difficult to establish detailed granularity of the costs associated with individual diagnostic services. There is little published data that considers the cost effectiveness of a fast-track or rapid access cancer diagnostic service in comparison to a usual care pathway (UCP).[14,23] Cancer diagnostic services utilising a UCP will involve three visits (at a minimum) to arrive at a diagnosis of cancer or discharge. Upon referral, a person will attend 'in person' for the initial assessment with the Specialist. If the decision is made to undergo a diagnostic procedure, a second 'in person' visit will be required. A third 'in person' attendance will then be required to be informed of the diagnostic result.

The aim of this study was to identify the costs of, resource utilisation/financial impact and the effectiveness of the OSPC in comparison to a UCP. The effectiveness of the OSPC in comparison to a UCP was measured by a cost analysis of both pathways as well as the reduction in travel episodes for rural men and the overall number of outpatient clinic appointments required. It is hypothesised that the OSPC would be more cost effective and financially less burdensome to the Australian taxpayer than a UCP, as well as reducing diagnostic delay by providing an efficient 'referral to diagnosis' mechanism for men being investigated for suspected prostate cancer.

Design and methods

Study design

Quantitative cost minimisation analysis incorporating principles of the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist.[24] This analysis compared three different diagnostic pathways:

1. The OSPC – combination of new referrals and previous urological contact.
2. OSPC (100% new) – theoretical model of 100% new referrals.
3. UCP – theoretical model of 100% new referrals.

The OSPC provided baseline data whilst the OSPC (100% new) and UCP enabled comparative analysis of the different pathways.

Outcomes

The primary outcome of this study was a comparison of the cost effectiveness of all episode of care costs for three different prostate cancer diagnostic pathways – OSPC, OSPC (100% new) and UCP, including the impact on the cost of the State funded Patient Assisted Transport Scheme (PATS). All costs are reported in Australian dollars.

A secondary outcome of this study was to explore the effectiveness of the actual OSPC through clinic and travel savings and analysis of time from referral to diagnosis data.

Approvals

Human Research Ethics approval was obtained from the University of WA (RA/4/20/5088) along with institutional Governance approval.

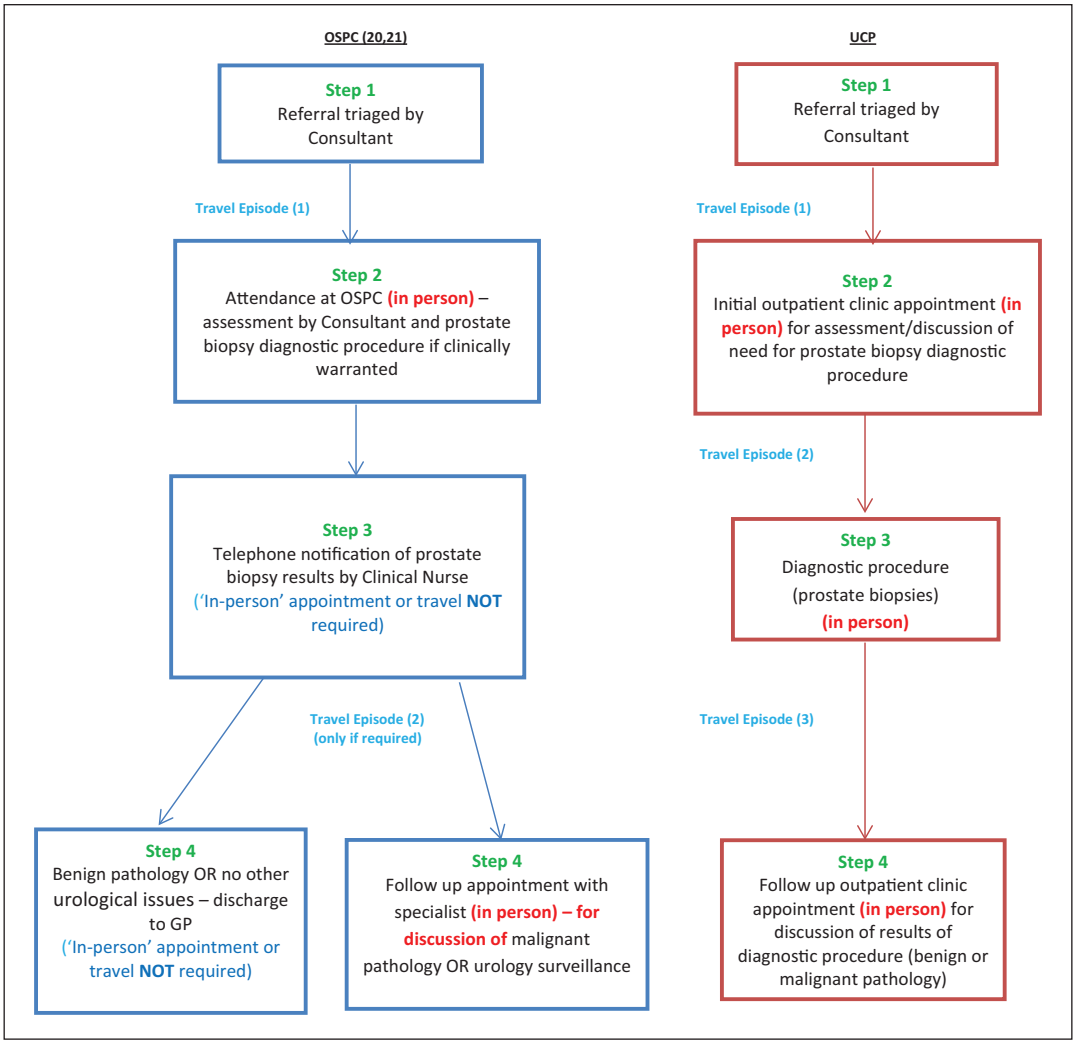

Figure 1. The clinical process of the OSPC and UCP pathways.

Diagnostic pathways

The clinical process of the OSPC and UCP pathways are described in (Figure 1).

Participants

An electronic database was established at the inception of the OSPC to prospectively record demographic, referral and clinical (histopathology and treatment outcomes) data and for those men requiring a follow up appointment (location and method of appointment (in person or via telehealth)). The rural and metropolitan (metro) allocation was based on WA postcodes as per place of residence and correlates with the Australian Bureau of Statistics Remoteness Area (RA) classifications; Rural (RA 1–5 (Inner Regional, Outer Regional, Remote and Very Remote) and metro (RA 0 Metropolitan).[25] Maintenance of the database ensured that no man who attended the OSPC was lost to follow up. Attendance of all men was captured and follow up outcomes recorded (i.e. follow up appointment booked for discussion of cancer diagnosis or other urological issue or discharge to GP). Men who were ineligible for telephone notification of prostate biopsy results (with either benign or cancer diagnosis) had a follow up appointment organised. Some men who were unable to be contacted by telephone or did not want to be advised of their results by telephone also had a follow up appointment organised post their OSPC attendance.

Inclusion/exclusion criteria

All men who attended the OSPC between August 2011 and November 2017 were included in this analysis. There were no exclusions from the data analysis.

Data collection methods

Episodes of care cost data. Direct and indirect costs included in the calculation of total cost for each pathway – a proportion of Consultant salary (including on costs) for

time taken to triage a referral, institution outpatient clinic costs (per clinic session as determined by the Activity Based Funding (ABF) model), per person prostate biopsy diagnostic costs (as determined by the ABF model), nursing salary costs of the OSPC CN (including on costs) and a cost per trip of travel reimbursement costs via the State funded PATS. A summary of the per unit cost of these variables and assumptions is provided in (Appendix).

Patient Assisted Travel Scheme (PATS). The actual cost of PATS reimbursement for men attending the OSPC was unable to be provided by the Western Australian Country Health Service (WACHS) for this analysis. Therefore, an estimate of these costs were calculated based on a summary provided by the WACHS of Urology travel reimbursement per WA region (cost per return trip/cost per patient) from the 2016/2017 financial year. An assumption of 75% utilisation of eligible PATS financial support was incorporated into the calculations of PATS costs.

PATS costs for rural men were estimated as cost per return trip x number of appointments attended in person at the institution:

- *OSPC*: Calculation based on the source of initial referral, number of, location (metro or regional) and type (in person or Telehealth) of outpatient appointment/s.
- *OSPC (100% new)*: Calculation based on the same proportion of follow up appointments (initial appointment not required) as the OSPC rural men attendances (number and regional area).
- *UCP*: Calculation based on same proportion of rural attendees for initial appointment and the same proportion (number, location and type) for follow up appointments as the OSPC.

Time from referral to attendance/diagnosis. The date of initial referral and OSPC attendance was recorded. Date of referral was not recorded for staged OSPC appointments (men who were on Active Surveillance (AS) or where there was a planned re-attendance at the OSPC.

Outpatient clinic and travel savings. The journey footprint of men attending the OSPC was mapped from referral, attendance and follow up to identify actual usage of outpatient clinic appointments (location and type (in-person or Telehealth)) and travel savings.

Average distances between the metropolitan centre and regional areas vary between 400 – 500 km (Great Southern and Wheatbelt), 600 km (Goldfields), 1000–1500 km (Midwest), 1600 km (Pilbara) and 2000–3000 km (Kimberley region). The Christmas/Cocos Keeling Islands lie approximately 2600 km north east of Perth in the Indian Ocean.

Other assumption. The attendance, diagnostic rate and number of follow up appointments required for the OSPC (100% new) and UCP were assumed to be the same as the baseline OSPC to enable like for like comparison.

Data analysis of OSPC and UCP costs. Actual cost calculations for the three models (OSPC, OSPC (100% new) and UCP were calculated as an aggregate cost per patient, utilising the costs recorded in Data collection and methods – episodes of care cost data (Appendix) and based on historical numbers of men attending the OSPC. An average cost per episode of care was calculated using the following costs – Consultant time for referral triage, outpatient appointment costs (including direct and indirect costs), diagnostic costs (including direct medical and nursing, supplies and indirect costs), additional costs for the OSPC CN (including salary and on costs of superannuation) and an estimate of PATS costs for rural men. The journey mapping analysis provided the number of episodes of referral, attendance and follow up data, along with the number of times men attended 'in person' via each model.

Statistical Analysis

SPSS Version 25 (IBM, Endicott, NY) was used to perform statistical analysis. Analysis of mean data was undertaken using parametric (Independent Samples *T*-Test) and non-parametric (Mann-Whitney *U* test) tests depending on normality of distribution. Categorical data was analysed using the Pearson Chi-Square test. The level of statistical significance was set at $p < 0.05$.

Results

Attendance and follow up at the OSPC

Between August 2011 and November 2017, 1000 men attended the OSPC. Based on residential postcode, 466 (47%) men were rural and 534 (53%) men were metro. A total of 568 men (306 rural (31%) and 262 (26%) metro) were new referrals to the OSPC and 432 men (160 (16%) rural and 272 (27%) metro) had received prior urological assessment before their OSPC attendance. A total of 876 men (420 rural (48%) and 456 metro (52%)) proceeded to TRUS guided prostate biopsies.

Public follow-up outpatient appointments were organised for 800 men (359 (36%) rural, 441 (44%) metro), 24 men (9 (0.9%) rural and 15 (1.5%) metro) were followed-up privately and 173 men (95 (9.5%) rural and 78 (8%) metro) were discharged to their General Practitioner (GP) for PSA surveillance. Three men with a new cancer diagnosis did not have follow up appointments booked (two men died post biopsy and one man moved interstate). All men with a new or existing cancer diagnosis had follow up organised by the OSPC CN with no loss to follow up.

Table 1. The summary of the cost per person.

Cost attribution	OSPC	OSPC (100% new)	UCP
Commonwealth (ABF)	2,013,180.75	1,874,940.75	2,219,260.75
State (PATS)	393,940.34	362,403.70	627,741.92
Total cost per pathway	2,407,121.09	2,237,344.45	2,847,002.67
Difference between OSPC (100% new) and UCP			609,658.22
Cost per person			
Commonwealth (ABF)	2013.18	1874.94	2219.26
State (PATS)	393.94	362.40	627.74
Total cost per person	2407.12	2237.34	2847.00
Difference between OSPC (100% new) and UCP			609.66

Cost comparison between diagnostic pathways. The OSPC (100% new) model resulted in estimated overall savings of $609,658.22 compared to the UCP, equivalent to a net savings of $609.66 per person. (Table 1) is a summary of the cost per person comparative analysis– based on attendance of 1000 men.

Time from referral to diagnosis

Of the 1000 men who attended the OSPC, time from referral to diagnosis was recorded for 922 men (418 (45%) rural and 504 (55%) metro). Data was missing from four new referrals and not recorded for 74 men with prior urological contact. Overall, the mean time from referral to attendance at the OSPC was 60 days [range 0–342] (57 (rural) and 63 (metro), $p = 0.034$). Mean time from referral to diagnosis was 60 days [range 0–342] (55 (rural) and 64 (metro), $p = 0.005$) for new referrals and 62 days [range 4–358] (61 (rural) and 62 (metro), $p = 0.924$) for men with previous urological contact.

Overall, 559/922 (61%) of men were diagnosed within 60 days from date of referral. A 185/922 (20%) men attended between 60 and 90 days of referral, 156/922 (17%) men attended between 90 and 180 days from referral and 22/922 (2%) men waited longer than 180 days from time of referral to attend the OSPC.

Clinic and travel savings

The OSPC generated 737 (365 (rural) and 312 (metro)) initial and follow up clinic appointment savings. The OSPC (100% new) would generate 1800 clinic attendances (1000 initial and 800 follow up), compared with 2876 for the UCP (1000 initial, 1000 diagnostic and 876 post biopsy follow up). This would result in overall savings of 1076 clinic appointments between the UCP and the OSPC (100% new) pathways. The OSPC avoided 543 trips for rural men which equated to a travel distance of 1.5 million kilometres saved.

Discussion

The streamlined OSPC pathway was designed to reduce unnecessary 'in person' contact and in particular, to help alleviate the challenges that rural men face in accessing cancer assessment and diagnostic clinics in a timely manner.[26] Our analysis of the OSPC demonstrated financial savings of over AUD $600,000 to the Australian taxpayer, institutional savings of 737 outpatient clinic appointment savings and 1.5 million kilometres of travel distance saved for rural men. Our results have shown similar efficiency savings as other international data describing the cost effectiveness of same day/rapid access cancer diagnostic clinics.[14,23] Delaloge et al.[23] concluded the one-stop breast clinic was feasible, accurate at an affordable cost, however did not compare costs between different diagnostic models. In comparison, and similar to our cost analysis, Liedberg et al.[14] did provide a comparison of a 'fast-track' approach in comparison to usual care and found the 'fast-track' haematuria clinic lest costly to the health service than the control group. However, single institution cohort can be regarded as a limitation with no comparison in cost minimisation between low to middle income countries and high-income countries.

Health care in Australia is funded by a combination of Commonwealth and State initiatives. In 2011 funding arrangements were changed with the introduction of an ABF model, whereby inpatient services are funded according to activity, including a weighting of complexity and block funding for some aspects (i.e. teaching and research).[27] State funded rural health initiatives have been introduced to facilitate improved health access for rural and remote residents. Visiting Specialists conduct clinics and some diagnostic procedures in regional areas and the Royalties for Regions Scheme funds PATS to help rural patients offset the costs of travel and accommodation whilst attending the metropolitan centre for health appointments.[28]

The financial savings generated by the OSPC benefit both the Commonwealth (ABF) and State funding arrangements. However, from an institutional point of view, the OSPC

savings only partly flow to the institution through the ABF arrangements. This anomaly highlights the complexities of Australia's differing Commonwealth and State health funding arrangements and disguises the very real financial benefits generated by a same day/rapid access cancer diagnostic service in the public sector. Adding to this complexity is the impact of Medicare (Commonwealth funded).[29] on the provision of outpatient services in the private and public sector. The multiple service rules in place with Medicare billing arrangements reduce significantly the amount of reimbursement that a service such as the OSPC would attract and act as a barrier to rapid access diagnostic services.

The value of rapid access/one-stop cancer diagnostic clinics is the streamlined process that improves the time from referral to diagnosis. The efficacy of the OSPC was demonstrated by the efficient processing of referrals from initial referral to diagnosis, the number of outpatient clinic appointments (both initial and follow up) saved and the travel distances saved for rural men. Out-patient clinic savings from the OSPC generates opportunity value allowing other people on the waiting list for an appointment. Even with the institution's resource constraints and ever-increasing demand for services, the majority of men were seen at the OSPC within the appropriate level of urgency. Taking time off work or usual duties to attend medical appointments can impose a time/financial burden as well as logistical challenges if caring for others. Such challenges become more acute for rural people with the long travel distances to the metropolitan area where the service is provided.[30]

Implications for future clinical practice

The impact of COVID-19 has changed the method of outpatient care at our institution. There has been widespread utilisation of telephone/video-call/telehealth modes of outpatient appointment delivery rather than 'in-person' which is likely to continue into the future. This change in practice does not however detract from the efficiencies of the OSPC diagnostic model. In addition, telephone notification of biopsy results has been used since the inception of the OSPC in 2011 and this method is well received by men.[31] The OSPC model (diagnostic pathway and telephone notification of biopsy results) could be incorporated into routine clinical practice in public health institutions for urological and other tumour groups.

Limitations

The OSPC had been the usual prostate cancer diagnostic pathway at our institution since 2011 and as a result there is a lack of actual historical comparative data of a UCP. The cost minimisation analysis only considered the impact on the institution and did not address the impact on men with respect to time taken and lost earnings in attending medical appointments. The impact of PATS costs on the different pathways was required to be estimated due to the lack of access to actual data. As a result of COVID-19 there has been a change in practice in delivering outpatient care. Many outpatient appointments are now routinely conducted by telephone with benefits of time/cost and travel savings for patients. This change of practice has not been incorporated into the estimated UCP PATS costs.

Conclusion

The OSPC was a cost effective and efficient model of referral, diagnosis and follow-up in comparison to a UCP. The OSPC was less expensive to the taxpayer funded health service compared to the UCP, providing a cost effective service in delivering the same outcomes as the UCP at a reduced cost. The OSPC was more efficient than the UCP with the reduced the number of 'in person' attendances and outpatient appointments required and generated travel savings for rural men.

Appendix

Cost item	$ Amount (per person)	Source	Funding provider	Assumptions
Consultant referral triage cost	50	AMA[32]	Commonwealth	Based on Consultant Level 9. Estimate of 15 min per referral
Clinic outpatient cost	320	ABF costing – institution Business Unit[27]	Commonwealth	Institution analysis of clinic appointments costs (includes direct and indirect costs)
TRUS prostate biopsy diagnostic cost	1477	ABF costing – institution Business Unit[27]	Commonwealth	Institution analysis of diagnostic procedure costs (includes direct and indirect costs)
OSPC CN salary and on costs	275	ANF[33]	Commonwealth	Based on 75% Full Time Equivalent (FTE) – Clinical Nurse Level 2
Travel costs (PATS)	Variable – dependent on region/distance travelled	2016/17 Cost per trip – Urology Service[28]	State	Estimate of 75% utilisation of PATS funding

ABF: activity based funding; AMA: Australian Medical Association; ANF: Australian Nursing Federation; PATS: Patient Assisted Transport Scheme; WACHS: Western Australian Country Health Service Estimate of PATS costs per pathway.

Declaration of conflicting interests

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