

Appendix B:

Evaluation of the TrueNTH UK Supported Self-Management and Follow-Up Care Programme

Technical Report Number 2
HEALTH ECONOMIC EVALUATION
October 2017



UNIVERSITY OF
Southampton

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SURREY

The work reported here is part of the TrueNTH global initiative, led by the Movember Foundation, to tackle critical areas of prostate cancer care. TrueNTH is an international network of representatives which includes clinicians, academics, patients and organisations from across the UK, Canada, Australia and other countries. Through this initiative we are working together to identify and demonstrate the best and most cost-effective models for improving prostate cancer survivorship care and support. In the UK, the TrueNTH partnership of healthcare professionals, academics and volunteers is managed by Prostate Cancer UK

Funding

This work was funded by the Movember Foundation, in partnership with Prostate Cancer UK, as part of the TrueNTH Programme, grant number 250-30.

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Citing this report

This report should be referenced as: Jordan J, Gage H (2017) *Evaluation of the TrueNTH Supported Self-Management and Follow up Care Programme. Technical report 2: health economic evaluation*. Surrey: University of Surrey.

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INTRODUCTION

The economic analysis of the Supported Self-Management Care programme (henceforth referred to as the Programme) comprises an assessment of the direct costs associated with the intervention and the indirect costs driven by other health services use related to the patient's prostate cancer. Alongside the costs is an assessment of the patient's quality of life. This was assessed using the EQ5D5L and integrated over time to estimate the attributable Quality Adjusted Life Years (QALYs) gained, associated with the intervention. Combining the costs and health outcomes allows assessment of the cost-effectiveness of the Programme compared to a comparator group receiving 'usual care' at the site before the Programme was implemented, with respect to a willingness to pay threshold per quality adjusted life year.

METHODS

The economic evaluation comprises multiple elements. For both the programme group and the comparator group receiving usual care, costs and health outcomes are considered. Although data were collected for the comparator group and programme group sequentially (before and after the introduction of the programme), the samples recruited in both arms were not expected to be dissimilar, as indicated in the statistical comparison of the participant demographics [Technical Report 1). These data will therefore be analysed pragmatically as two parallel groups for comparison. In the estimation of health outcomes using EQ-5D data, differences in health related quality of life at baseline will be controlled for.

Health Outcomes:

Health related quality of life is the primary outcome measure for the economic evaluation. All participants were asked to complete EQ-5D-5L questionnaire [Rabin R 2001] at baseline, four months and eight months. This health related quality of life questionnaire covers five dimensions (Mobility, Self-Care, Usual activities, Pain/Discomfort, Anxiety/Depression), with five levels in each (No problems, slight problems, moderate problems, severe problems, Unable to perform/extreme). The five dimension, five level set up provides for 3,125 possible unique health states, ranging from 11111 signifying perfect health, to 55555 signifying the worst possible health state. Each unique health state can be used to assign a utility index score based on the participant's responses. The index ranges from 1 indicating perfect health, to 0 indicating a health state equivalent to death, and a lower limit of -0.59 for health states worse than death. The utility index scores were assigned based on the mapping of the long standing three level, UK validated tariff to the 5L instrument. [van Hout 2012]. The utility scores this approach provides, at baseline, four months and 8 months are a health state at that point in time only. In order to analyse the participant's health related quality of life over the duration of the study, we integrate these utility scores into a single measure. The time integrated measure of health utility is the quality adjusted life year (QALY). One year in perfect health is equal to one QALY. QALYs for each participant over the eight month trial period were calculated using the area under the curve (AUC) method. Average QALY difference between the care programme and usual care group was estimated using ordinary least squares (OLS) regression, controlling for differences in baseline utility. White adjusted standard errors were used to account for unobserved heterogeneity.

Care-pathway:

The total costs for each trial arm comprise different resource items, and are therefore estimated separately at an individual patient level. All costs for the analysis are calculated from an NHS perspective.

The care-pathway in both groups is considered from the point that the patient has completed treatment for their prostate cancer. From here forward, under routine usual care the patient would undergo regular Prostate Specific Antigen (PSA blood tests). They would have regular in person outpatient clinic visit where their PSA result would be reviewed and discussed. The patient will either be referred for additional testing and/or treatment, or they continue with the routine follow up tests and clinics visits at three monthly, six monthly or 12 monthly intervals.

Under the programme the process is different. The patient will be screened for suitability of supported self-management (SSM). At a routine clinic appointment, if eligible, they will be invited to join the SSM programme and at this point are introduced to a support worker. The patient can register to use an Online Service (if they want to use this service) and they are configured on a PSA Tracking System for management of their PSA results. Shortly thereafter they will be invited to a self-management workshop. If they attend the workshop, they receive a follow up call post workshop from a support worker as standard. The patient will still go to the GP or clinic for their regular PSA blood tests. However, there is no need for routine in person outpatient clinic appointments to discuss results. They will receive a PSA result letter which piggybacks the test reminder letter. If results are elevated they may be called/contacted to arrange for an appointment/referral. The process continues with routine PSA tests. The online service allows the patient to report symptoms and message clinicians directly, and also receive electronic messages in return.

The individual elements which attract a cost, associated with the two pathways are broken down below.

DIRECT COST OF THE PROGRAMME

The intervention has a direct cost associated with identifying and screening the patient for SSM suitability, introduction and enrolment and administering the Programme workshop. Estimates of these costs were obtained through questionnaires completed by the four clinical teams involved in the study. Each team was asked to observe and record average times to undertake the various activities involved in the delivery of the Programme..

The workshop combined with the PSA Tracker and online service, replaces outpatient clinic appointments for patients in the usual care group. The specific actions at the workshop are not practical to collect at an individual patient level as these workshop are typically delivered to groups of 8 to 12 men. Therefore the costs associated with identifying, inviting the patient to SSM and administering the workshop have been estimated from the top down, and then apportioned appropriately to calculate a cost per patient. This cost is added to the patient total cost for those in the care programme who required that activity.

Screening and enrolment: *Performed by a band 4 support worker. Durations are on average, across the four study sites.*

- Screening: 8.4 minutes per man enrolled
- Introduction of patient to support worker: 12.5 minutes per man enrolled
- PSA tracker system set up: 10 minutes per man enrolled
- Online Service set up: 10 minutes, only applies to men who sign up to use the IT portal.

Workshop: *Activity performed by a combination of band 4 support worker and a band 7 CNS. Durations are based on a 'per workshop attendee time', and are only applied to those who attend the workshop.*

- Workshop preparation: 10.4 minutes. One B4 SW
- Workshop set up: 4.4 minutes. One B4 SW, One B7 CNS
- Workshop delivery: 27 minutes. One B4 SW, One B7 CNS
- Workshop clean up: 3.75 minutes. One B4 SW, One B7 CNS
- Workshop room hire: £4.63 per attendee, on average
- Post workshop follow up call: 12.5 minutes. B4 SW
- Patient materials (information): £1 per attendee

Parking costs vary by site, venue and are negligible so were not included in this analysis.

Surveillance costs in the intervention and control group:

In the Programme group, surveillance is administered remotely through the use of a PSA Tracking System, providing alerts to nursing staff as to when patients are due for PSA testing. The testing schedule is the same as for traditional follow-up (usual care comparator). The PSA review, rather than taking place in an outpatient clinic, is performed by the nurse and this is then communicated to the patient by letter. This activity is estimated to take 4.25 minutes and is typically performed by a band 7 CNS.

In the comparator group, surveillance (ordering and reviewing tests) is administered during the scheduled outpatient clinic sessions. The testing schedule is the same as for the Programme group.

Costs of Tests: (assumed the same for both groups)

PSA testing follows the same interval and activity for both groups as they follow the same protocol. However, as mentioned above, the action of reviewing the PSA result is explicitly handled by a band 7 CNS and takes approximately 4.25 minutes for the care programme group. In the usual care group, the action of reviewing the PSA result is absorbed within the outpatient clinic visit.

Other intervention specific activity

The Online Service gives the patient the opportunity to complete an electronic health needs assessment (HNA). This is estimated to require 12.5 minutes of a band four support worker to review, applicable only to participants who completed an HNA.

The Online Service also allows for electronic messaging and communication with a nurse. These were recorded and have been costed at a patient level the same as other service use.

The ongoing cost of the Online Service and support is estimated at £6 per patient enrolled to use the system.

Other health and social care resource use (only prostate related)

Data on other prostate-related health and social service use over the eight month trial period was collected by patient self-report using a customised questionnaire, retrospectively, by recall at four and eight months post intervention. As well as by self-report, urological secondary care activity is also captured direct from hospital records.

It was ensured that there was no double counting through patients self-reporting and data accessed direct from hospital records, by checking data at an individual level.

Unit costs were sourced from national available tariffs [Curtis L 2016, (PSSRU) : NHS Reference costs 2015/16] or finance managers. These were multiplied by the frequency of resource use to obtain a cost per patient. Costs for software and systems were provided centrally top down, averaged per patient, and applied bottom up for each participant in the Programme group.

Missing data

Primary analysis will be based essentially on complete case data with minimal account for missing data. i.e. only respondents with returned data on health outcomes and service use at all time points will be included. However, minor adjustment will be made for missing data for service use variables, where they are individual service items missing within a time point. Simple mean imputation stratified by group and site will be used. This means, that for an individual observation, where positive results have been provided for some service use items in the self-reported data within a time-point, if data is found to be missing for another item (i.e. it is blank), then mean imputation will be applied to this item and the observation will be preserved in the analysis. No imputation of health outcome data will be performed.

ANALYSIS

Data handling and cleaning:

All analysis has been conducted using STATA14 [Statacorp 2015] and Microsoft Excel 2013.

There are three blocks of data for the economic analysis. Firstly, as described earlier, data on some intervention related activity was provided top down and used to estimate costs and activity per patient. Clinical teams determined the length of time associated with various activities by undertaking prospective observations in clinic. Average times were provided to the research team via a questionnaire completed by each of the four study sites. Prospective records detailing telephone activity were kept and other frequency data was captured from various hospital systems including the appointment system and PSA Tracking Systems. The second and third forms of data related to patient level activity in regards to the Programme and other prostate related healthcare service use. These two data were anonymised with only a unique study ID to distinguish each participant. They included an SPSS 22 dataset containing all patient self-reported data, broken down by time point (baseline, four months, eight months), with service use reported retrospectively at four months and eight months and EQ5D5L reported at all three time points. The service use data included all self-reported primary care contacts (GP, Nurse) home visits, telephone calls, visits to GP surgery, allied health professionals and community based care (Physiotherapists, dieticians, counsellors, psychiatrists, complementary therapists), patient contact with helplines, attendance to support groups, workshops and secondary based care (outpatient/inpatient/emergency). Lastly, data on health service use taken direct from the hospital records was provided as a .csv file. These data were provided as aggregated over the full eight month period. The .csv file included data on the number and duration of all contacts with a support worker, CNS, registrar or consultant by both telephone and in person. It included the number of PSA reviews the patient had during the period, whether they signed up to the Online Service (Programme group only), if they completed a health needs assessment (HNA) and if the patient had sent or received any electronic messaging.

The two patient level datasets (SPSS & .csv), described above, were combined in STATA14 using a merge function linked by unique study ID. Each health service use variable from the patient self-report data had multiple elements. Firstly a dichotomous indicator of whether the participant used the service type in the period (yes/no) and secondly the frequency of use (integer value). For some items there was additional information such as whether it was an NHS or private health use. Three principles were used when handling data cleaning and missing data:

- If a respondent had a valid response for the frequency of use of an item, where the dichotomous indicator (did you use this service yes/no) was missing, it would be treated as positive value.
- If a respondent had a valid positive response for the dichotomous indicator, but the frequency of contact was missing, this would be replaced with a stratified mean imputed value. Stratification was by group and study site. If this stratified mean was found to be zero, the value to impute was assumed to be one. Likewise a valid negative response on the dichotomous variable would have a zero value entered for the frequency variable, if missing.
- If a respondent had valid positive responses for some health service use for a time period, but blanks for other service use variables, these blanks were assumed zero value, rather than missing, to avoid losing the entire observation based on a pairwise deletion across the high number of service use variables.

There were a number of service use items which were included in the questionnaire that were also collected directly from the Programme team: attendance at urology appointments, telephone contacts with a urology nurse specialist, emails with a urology nurse specialist. In these cases, the hospital data was used, as it was assumed to be more reliable, since self-reported data may include recall errors. However, where comparison between the two sources of data showed anomalies, these were double checked with the sites.

Men were asked to self-report attendance at support groups. However, open ended responses to this question suggested that men were reporting attendance of the Programme workshop. To avoid this double counting in the programme group, this support group variable was omitted from the analysis. Although this approach has the potential to result in under-reporting of some service use, to ensure equivalency and avoid bias it was omitted for both groups.

Details on consumable items such as pads and sexual aids was rare and difficult to consolidate due to its free format nature. For pragmatic reasons it was not included in the analysis. Costs associated with this appeared to be negligible within these data.

Calculation of costs:

Each patient in the Programme group has a cost applied for screening and enrolment. They have a cost applied if they sign up for the Online service, and they have a cost applied if they attend the workshop. Added to this is the cost of the time for the PSA review. In addition, each participant

has a variable cost component related to electronic messaging, phone calls with health professionals, HNAs and all other prostate related health service use. The variable costs have the frequency of activity multiplied by the appropriate unit cost sourced from national tariffs [Curtis L 2016, (PSSRU) : NHS Reference costs 2015/16] [TABLE 4]. These costs are combined additively for each participant over the 8 month trial period providing an estimate of the direct cost of the Programme related activity, and all costs associated with service use. These collectively are the total cost, per participant in the programme group.

Each patient in the comparator group has the direct cost of care and PSA monitoring (PSA test, and outpatient appointment for review), and the variable costs of all other prostate related service use. This is costed and aggregated in the same way as the programme group.

This approach allows for a comparable direct cost of monitoring and follow up for comparison and programme groups, and also a comparable cost of all other service use.

Health outcomes:

As described previously, QALYs are the primary outcome for the economic analysis. These are the time integrated utility scores elicited using the EQ5D5L, over the eight month trial period. Differences in average QALYs were estimated using OLS regression, controlling for baseline utility and robust, white adjusted standard errors.

Cost – effectiveness:

To provide an estimate of the cost-effectiveness of the programme compared to comparator group, the difference in average costs and average QALYs between the two groups must be combined. The measure of interest is the Incremental Cost Effectiveness Ratio (ICER). In the case of a new treatment which is more expensive and better performing than a usual care comparator, the ICER can be thought of as the incremental (extra) cost for each additional QALY gained. More simply, the ICER is the cost per QALY gained. The National Institute for Health and Care Excellence (NICE) set a willingness to pay (WTP) threshold of £20,000-£30,000 per QALY gained in order to deem a new treatment cost-effective, when compared to the next best alternative [Appleby et al. (2007)].

As the difference in costs and QALYs must be assessed simultaneously across the sample, and to allow for the non-normality of distribution of cost and QALY data, uncertainty was handled non-parametrically using repeated bootstrap sampling with replacement. 10,000 resampled sets were pulled from the complete case data. For each of these 10,000 realisations, the incremental cost and incremental QALYs gained between the two groups was plotted on a cost-effectiveness plane

(CEP). The CEP shows the difference in costs on the vertical axis, and the difference in QALYs on the horizontal axis. A realisation residing on the origin would indicate no difference in costs or QALYs between the two treatment groups. Realisations in the upper right quadrant are associated with more costly and better health outcomes for the treatment group, in the bottom right are less costly with better outcomes (dominant). The upper left signifies more costly and worse outcomes for the treatment group (dominated), and the bottom left is less costly, but with worse health outcomes. This graph gives a visual spread of the uncertainty of the result. Probabilistically, if a majority of realisations cluster in the bottom right quadrant it suggests the new treatment is likely to be cost-effective.

The next step is to take the results from the bootstrap analysis above, and compare them to a willingness to pay threshold. As stated, NICE use £20,000-£30,000 per QALY. At this stage, for each realisation, the estimated ICER for that sample is converted to a net monetary benefit (NMB) using the willingness to pay threshold. To do this, the health outcomes are monetised. This means the difference in QALYs, is multiplied by the WTP threshold. The NMB is equal to the monetised incremental QALYs, minus the cost of achieving those QALYs (the incremental cost). An NMB greater than zero indicates the treatment is cost-effective, on average using that willingness to pay threshold.

This process is repeated for a range of WTP thresholds, and for each threshold the proportion of the 10,000 realisations which would be deemed cost-effective ($NMB > 0$) is calculated. This proportion is plotted on a cost effectiveness acceptability curve (CEAC) which indicates the probability that the intervention will be cost-effective, at a given willingness to pay threshold.

RESULTS

The dataset provided nominally 265 observations for the programme group at time point one (4 months) and 300 for the comparator group; 260 for the programme at time point two (8 months) and 285 for the comparator group. When dropping observations with missing service use data for a complete time point, whilst allowing for mean imputation (as described earlier) for those with mostly complete service use data, reduced the sample to 230 in the programme group and 280 in the comparator group. Further, when combining time point one and time point two and restricting based on eligibility at all time points, the sample was reduced to 216 in the programme group and 274 in the comparator group. Finally, when restricting to those observations that also had complete EQ5D data at baseline, time point one and time point two, the complete case sample was restricted to 206 in the programme group and 265 in the comparator group. This sample of (I-206 : C-265), formed the complete case sample used for the analysis which follows.

The direct costs of the care programme amounted to approx. £102 per patient based on the complete case analysis [Table 2]. This was made up of about £63 for the workshop itself including all related activity, and £33 for screening patients, setting them up on the online portal conducting the PSA review and the electronic online activity such as HNA and electronic messages. Unplanned clinical call costs amounted to approximately £6.50

The comparator group incurred approximately £59 per person in direct costs. This was made up mostly of face to face clinical consults (£53). On average patients had one outpatient consult over the course of the study [Table 1]. The level of clinician involved in this contact and the duration of these contacts meant the cost was relatively low. Additionally there was approx. £3.80 for planned telephone clinics on average per person and £1.60 attributable to unplanned clinical calls.

NB: These averages are across all patients. Some patients will have had no contacts, some may have had more than one contact. Hence the low average cost per patient.

Other prostate-related service use, which comprised GP practice visits, home visits, calls with GP, calls with practice nurse and a variety of secondary care contacts and admissions made up all other healthcare costs.

Here an appreciable difference was found between the programme and comparator groups. The average service use cost (SD) was £186 (411) per patient in the programme group and £268 (1020) in the comparator group. However as can be seen from the standard deviation there was

wide variation. This difference is partly explained by a small number of expensive inpatient events in the usual care arm. Primary care usage was similar between groups.

Taking all cost of the intervention and service use combined, over the eight month period the programme group had lower overall average costs of £289 per patient compared to £327 in the comparator group. A function of the lower apparent service use costs in the programme group, offsetting the higher initial cost of the intervention.

Health outcomes measured for the same sample as QALYs accrued over the eight month trial period equated to on average, 0.57 QALYs for the programme group and 0.54 QALYs for the comparator group [Table 3]. This provides a raw mean difference of 0.026 QALYs. However, caution must be taken as this does not account for baseline differences in reported quality of life. OLS regression, to compare the QALYs between groups, controlling for baseline EQ5D score yields a mean difference of 0.0037 QALYs between groups.

Given a mean difference in all costs cumulatively of £39, in favour of the programme group, and a mean difference in QALYs, controlling for baseline quality of life of 0.0037, these point estimates suggest the programme is the dominant strategy.

Taking only the direct costs of the intervention and ignoring all other prostate related health service use, the difference in cost of the two pathways is £43 with the Programme being more expensive. Combined with the mean QALY difference of 0.0037, these point estimates lead to an ICER of £11,622. This result does not, however, account for uncertainty.

Uncertainty:

Non parametric bootstrap resampling with replacement was conducted to allow for sampling uncertainty. The results of 10,000 resamples, using the differences in total costs between groups are presented on the Cost Effectiveness Planes [Figure 1: Figure 2]. As can be seen in figure 1, the cluster of simulations reside mostly below the origin on the Y axis showing the lower average cost for the programme group, and large proportion of realisations reside to the right of the origin on the X axis, indicating most realisations achieved better QALY outcomes in the programme group on average. The diagonal line, bisecting the graph through the origin, indicates the £20,000 per QALY threshold. Realisations in the upper right quadrant, but below this diagonal line are cost-effective at the £20,000 level.

Figure 2, is the same CEP, however, this resampling was only using the direct costs of the intervention and excluding the service use costs. This is analogous to assuming the differences in other prostate related service use between the two groups is zero. Or, that any observed

differences in service use are attributable to chance. Here the programme group was more expensive, and the distribution of health outcomes was naturally unchanged from figure 1.

As the NICE threshold willingness to pay per QALY gained is £20-£30,000, if a treatment is less expensive than this threshold, when compared to the next best alternative, it should be adopted. As shown in figure 2, the direct cost of the programme group is higher than the comparator group in all realisations, but for most realisations achieves more QALYs on average. In order to determine the probability that the care programme would be cost-effective, the results of the simulations are plotted on a cost effectiveness acceptability curve [Figure 3]. For a variety of WTP thresholds, the proportion of realisations which achieve a cost-effective outcome are estimated.

This graph shows at a £20k WTP threshold, there is a greater than 62% chance the Programme would be deemed cost effective, at £30k this rises to approximately 68%.

When the CEAC is prepared based on the data including direct costs and other prostate related service use costs, the probability the Programme would be cost-effective is in excess of 80% (Figure 4). This is attributable to the better on average QALY outcomes (although a small difference) and lower overall costs, compared to the comparator group.

CONCLUSION

Based on the available data, over the eight month trial period, the programme group achieved marginally better health outcomes. Differences in costs between the two interventions was also relatively small, equating to the Programme attracting approximately £43 higher direct costs, but being £39 less expensive over all, due to higher other prostate related service use in the comparator group. Sensitivity analysis comprising non-parametric bootstrap analysis both with and without an assumption that differences in health service use costs were down to chance, yielded favourable results for the Programme. These results suggest on average, the Programme had a greater than 62% probability of being cost-effective at a willingness to pay per QALY of £20,000.

LIMITATIONS

Caution must be taken in interpreting these findings. Challenges with missing data and accuracy of self-reported patient data have been handled pragmatically, however there is the potential of under reporting of some service use data. This decision was to avoid the erroneous double counting and inflation of costs in both groups.

A simple comparison of the baseline EQ5D score for those participants included in the analysis, and those excluded due to missing data, but who did return a baseline EQ5D score, found no statistically significant differences. However, the average scores for those excluded were slightly lower, than those included, indicating the possibility of bias due to missing data.

Health service use data, especially over a short time horizon tends to be quite noisy with large variation and a large proportion of zero values. Some service use items, were reported in both hospital record data and also in the self-reported data. To avoid double counting, some self-reported service use items were omitted from the analysis. This has the potential to introduce some under-reporting of prostate related service use costs. However, the consistent approach of omitting these items for both groups, was preferred over potential inflation of costs, disproportionately, in one group due to double counting.

Care must be taken in inferring a causal difference in this service use, attributable to the intervention. As described above, to account for this, an assumption was made that differences in service use were attributable to chance. The results were still in favour of the intervention, however, the likelihood of the Programme being cost effective did reduce.

The data within this trial was collected sequentially, however has been treated here, for pragmatic reasons, as random selected parallel groups. For this reason care must be taken to not place too much weight on the statistical significance of mean differences between groups.

There is room for further speculative sensitivity analysis, exploring the results if lower grade members of staff were to perform some of the programme activity, or if the costs were accrued over a longer time horizon. However, in both these scenarios, using these data, it is not likely that the result would change other than favourably for the Programme. A longer time horizon will spread the upfront costs of the workshop over a longer period, which would typically result in a more favourable ICER. Likewise, using less expensive resources would also lead to more favourable ICER.

Some of the activity conducted in a hospital setting, relating specifically to the remote medicine portion of the intervention, does not have a specific reference cost. This poses challenges for appropriately apportioning costs. Pragmatic decisions were made to prorate urology consult costs based on duration of contact, using the NHS reference costs, or to prorate clinician activity based on the full time equivalent costs presented in the PSSRU 2016. This is a reasonable compromise, however it would be useful to establish a reference cost for this type of activity to ensure overheads and other indirect costs are always apportioned appropriately when used to evaluate this type of service.

There are no specific guidelines that outline the optimum frequency of PSA testing or the ideal duration of follow up. Furthermore, there is significant variation in the setting of follow up care (i.e. hospital urology/oncology department or primary care). A pragmatic approach was taken to represent real patients experience under 'usual care' and use this as a comparator for analysing the new service. However, care must be taken in generalising these results as there may be variation in the experiences of men around the country in terms of post treatment monitoring and care

Table 1. Frequency of service use

	Care Programme					Usual care					
	N	mean	sd	min	max	N	mean	sd	min	max	
Unplanned_Clinical calls Number	206	0.82	1.51	0	11	265	0.14	0.49	0	6	SUB TOTALS
Unplanned_Clinical calls Duration	206	8.30	15.39	0	80	265	1.82	6.94	0	70	
Telephone_clinics number	206	0.00	0.00	0	0	265	0.25	0.62	0	3	
Telephone_clinics Duration	206	0.00	0.00	0	0	265	3.68	9.22	0	45	
Face2Face_clinics number	206	0.00	0.00	0	0	265	0.99	1.13	0	9	
Face2Face_clinics Duration	206	0.00	0.00	0	0	265	13.74	17.68	0	135	
Telephone Contact, Support worker Number	206	0.66	1.43	0	10	265	0.01	0.09	0	1	Unplanned clinical calls
Telephone Contact, Support worker Duration (mins)	206	6.80	14.51	0	73	265	0.08	0.87	0	10	
Telephone Contact, CNS Band6 Number	206	0.01	0.10	0	1	265	0.00	0.00	0	0	
Telephone Contact, CNS Band6 Duration	206	0.10	0.98	0	10	265	0.00	0.00	0	0	
Telephone Contact, CNS Band7 Number	206	0.09	0.35	0	3	265	0.12	0.47	0	6	
Telephone Contact, CNS Band7 Duration	206	1.09	4.15	0	30	265	1.63	6.70	0	70	
Telephone Contact, CNS Band8A Number	206	0.00	0.00	0	0	265	0.01	0.11	0	1	
Telephone Contact, CNS Band8A Duration	206	0.00	0.00	0	0	265	0.11	1.15	0	15	
Telephone Contact, Registrar Urology Number	206	0.03	0.21	0	2	265	0.00	0.00	0	0	
Telephone Contact, Registrar Urology Duration	206	0.17	1.03	0	10	265	0.00	0.00	0	0	
Telephone Contact, Consultant Urology Number	206	0.00	0.07	0	1	265	0.00	0.00	0	0	
Telephone Contact, Consultant Urology Duration	206	0.02	0.35	0	5	265	0.00	0.00	0	0	
Telephone Contact, Consultant Oncology Number	206	0.02	0.14	0	1	265	0.00	0.00	0	0	Telephone Clinics
Telephone Contact, Consultant Oncology Duration	206	0.12	0.92	0	10	265	0.00	0.00	0	0	
Telephone CLINIC, CNS Band6 Number	206	0.00	0.00	0	0	265	0.00	0.00	0	0	
Telephone CLINIC, CNS Band6 Duration	206	0.00	0.00	0	0	265	0.00	0.00	0	0	
Telephone CLINIC, CNS Band7 Number	206	0.00	0.00	0	0	265	0.23	0.61	0	3	
Telephone CLINIC, CNS Band7 Duration	206	0.00	0.00	0	0	265	3.51	9.14	0	45	
Telephone CLINIC, CNS Band8A Number	206	0.00	0.00	0	0	265	0.01	0.12	0	2	
Telephone CLINIC, CNS Band8A Duration	206	0.00	0.00	0	0	265	0.08	1.23	0	20	
Telephone CLINIC, Consultant Oncology Number	206	0.00	0.00	0	0	265	0.01	0.09	0	1	
Telephone CLINIC, Consultant Oncology Duration	206	0.00	0.00	0	0	265	0.09	1.11	0	15	

Face to Face CLINIC, CNS Band6 Number	206	0.00	0.00	0	0	265	0.08	0.30	0	2	Face to Face Clinics
Face to Face CLINIC, CNS Band6 Duration	206	0.00	0.00	0	0	265	2.17	8.38	0	60	
Face to Face CLINIC, CNS Band7 Number	206	0.00	0.00	0	0	265	0.22	0.51	0	3	
Face to Face CLINIC, CNS Band7 Duration	206	0.00	0.00	0	0	265	4.15	10.42	0	60	
Face to Face CLINIC, CNS Band8A Number	206	0.00	0.00	0	0	265	0.02	0.12	0	1	
Face to Face CLINIC, CNS Band8A Duration	206	0.00	0.00	0	0	265	0.13	1.10	0	10	
Face to Face CLINIC, Registrar Urology Number	206	0.00	0.00	0	0	265	0.21	0.50	0	2	
Face to Face CLINIC, Registrar Urology Duration	206	0.00	0.00	0	0	265	1.19	2.98	0	20	
Face to Face CLINIC, Consultant Urology Number	206	0.00	0.00	0	0	265	0.13	0.41	0	2	
Face to Face CLINIC, Consultant Urology Duration	206	0.00	0.00	0	0	265	1.62	5.26	0	30	
Face to Face CLINIC, Registrar Oncology Number	206	0.00	0.00	0	0	265	0.00	0.06	0	1	
Face to Face CLINIC, Registrar Oncology Duration	206	0.00	0.00	0	0	265	0.02	0.31	0	5	
Face to Face CLINIC, Consultant Oncology Number	206	0.00	0.00	0	0	265	0.32	0.84	0	6	
Face to Face CLINIC, Consultant Oncology Duration	206	0.00	0.00	0	0	265	4.45	12.22	0	90	
PSA Reviews Number	206	1.71	0.80	0	4	265	0.00	0.00	0	0	Supporting activity for Care Programme
Signed up to Online Portal	206	0.69	0.46	0	1	265	0.00	0.00	0	0	
Conducted Electronic Health Needs Assessment (HNA) Number	206	0.45	0.81	0	4	265	0.00	0.00	0	0	
Conducted Paper Health Needs Assessment (HNA) Number	206	0.39	0.25	0	0.55	265	0.00	0.00	0	0	
Staff Member electronic Messages Number	206	0.68	1.63	0	11	265	0.00	0.00	0	0	Other prostate related service use
Patient electronic Messages Number	206	0.55	1.63	0	14	265	0.00	0.00	0	0	
GP Visit Number	206	1.34	1.75	0	11	265	1.48	2.02	0	11	
GP Tel Advice Number	206	0.23	0.75	0	4	265	0.26	0.72	0	5	
GP Home Visit Number	206	0.02	0.14	0	1	265	0.02	0.12	0	1	
GP Nurse Visit Number	206	1.51	1.63	0	10	265	1.40	1.65	0	8	
GP Nurse Tel advice Number	206	0.18	0.57	0	4	265	0.14	0.49	0	3	
GP Nurse home visit Number	206	0.09	1.12	0	16	265	0.06	0.45	0	5	
Social worker visit Number	206	0.01	0.10	0	1	265	0.02	0.17	0	2	
Physiotherapist visit, NHS, Number	206	0.09	0.52	0	6	265	0.18	1.32	0	16	
Dietician visit, NHS, Number	206	0.04	0.25	0	2	265	0.06	0.69	0	11	Counsellor Visit, NHS, Number
Counsellor Visit, NHS, Number	206	0.01	0.12	0	1	265	0.10	1.07	0	16	
Psychiatrist/psychologist Visit, NHS, Number	206	0.01	0.10	0	1	265	0.00	0.06	0	1	

Complementary Therapist, NHS, Visit Number	206	0.07	0.53	0	5	265	0.01	0.09	0	1	
Services Helpline call Number	206	0.01	0.10	0	1	265	0.04	0.26	0	3	
Attended Urology Clinic Number	206	0.41	0.94	0	5.08	265	0.00	0.00	0	0	
Other Clinic Attendance (Entry 1) Number	206	0.14	0.45	0	3	265	0.20	0.84	0	10	
Other Clinic Attendance (Entry 2) Number	206	0.01	0.12	0	1	265	0.01	0.12	0	2	
Attended A&E Number	206	0.01	0.14	0	2	265	0.03	0.20	0	2	
Attended Hospital Day Case Number	206	0.04	0.23	0	2	265	0.09	0.48	0	4	
Attended Hospital Inpatient Number	206	0.01	0.16	0	2	265	0.03	0.20	0	2	
Attended Hospital Inpatient Number of days	206	0.01	0.16	0	2	265	0.12	1.42	0	22	
Number of ambulance uses	206	0.00	0.00	0	0	265	0.01	0.09	0	1	

Table 2. Costs of intervention and service use

	Care Programme					Usual care					
	N	mean	sd	min	max	N	mean	sd	min	max	
Total Cost	206	288.73	413.54	33.74	4185.02	265	327.31	1037.21	0.00	12632.82	
Direct cost of Intervention	206	102.39	21.07	18.87	200.90	265	58.64	90.56	0.00	639.00	Sub total
Total cost of Service use	206	186.34	411.45	0.00	4069.30	265	268.67	1020.75	0.00	12499.48	
Screening Cost	206	4.19	0.00	4.19	4.19	265	0.00	0.00	0.00	0.00	
Introduction to support worker	206	6.25	0.00	6.25	6.25	265	0.00	0.00	0.00	0.00	
Set up on PSA tracker system	206	5.00	0.00	5.00	5.00	265	0.00	0.00	0.00	0.00	Supporting activity for Care Programme
PSA Reviews Number	206	6.29	2.96	0.00	14.73	265	0.00	0.00	0.00	0.00	
Signed up to Online Portal	206	4.17	2.77	0.00	6.00	265	0.00	0.00	0.00	0.00	
Conducted Electronic Health Needs Assessment (HNA) Number	206	2.82	5.03	0.00	25.00	265	0.00	0.00	0.00	0.00	
Conducted Paper Health Needs Assessment (HNA) Number	206	2.43	1.56	0.00	3.43	265	0.00	0.00	0.00	0.00	Sub total
Staff Member electronic Messages Number	206	1.02	2.44	0.00	16.50	265	0.00	0.00	0.00	0.00	
Patient electronic Messages Number	206	0.82	2.45	0.00	21.00	265	0.00	0.00	0.00	0.00	
Cost of delivering workshop (per patient)	206	62.95	11.83	0.00	65.16	265	0.00	0.00	0.00	0.00	
Workshop preparation costs	206	5.01	0.94	0.00	5.19	265	0.00	0.00	0.00	0.00	Workshop activities
Workshop set up costs	206	5.86	1.10	0.00	6.07	265	0.00	0.00	0.00	0.00	
Workshop delivery cost	206	35.65	6.70	0.00	36.90	265	0.00	0.00	0.00	0.00	
Workshop post-clean up cost	206	4.95	0.93	0.00	5.13	265	0.00	0.00	0.00	0.00	
Workshop venue hire	206	4.47	0.84	0.00	4.63	265	0.00	0.00	0.00	0.00	
Workshop - post workshop follow up calls to patient	206	6.04	1.14	0.00	6.25	265	0.00	0.00	0.00	0.00	
Workshop - Patient information handling costs	206	0.97	0.18	0.00	1.00	265	0.00	0.00	0.00	0.00	Sub total
Unplanned_Clinical calls cost	206	6.45	12.97	0.00	99.00	265	1.57	5.97	0.00	60.67	
Telephone Contact, Support worker	206	3.40	7.25	0.00	36.50	265	0.04	0.43	0.00	5.00	
Telephone Contact, CNS Band6	206	0.07	0.69	0.00	7.00	265	0.00	0.00	0.00	0.00	
Telephone Contact, CNS Band7	206	0.95	3.60	0.00	26.00	265	1.41	5.81	0.00	60.67	Unplanned clinical calls

Telephone Contact, CNS Band8A	206	0.00	0.00	0.00	0.00	0.00	265	0.12	1.18	0.00	15.50	
Telephone Contact, Registrar Urology	206	1.06	6.48	0.00	0.00	62.67	265	0.00	0.00	0.00	0.00	
Telephone Contact, Consultant Urology	206	0.16	2.32	0.00	0.00	33.33	265	0.00	0.00	0.00	0.00	
Telephone Contact, Consultant Oncology	206	0.81	6.11	0.00	0.00	66.67	265	0.00	0.00	0.00	0.00	
Telephone_clinics cost	206	0.00	0.00	0.00	0.00	0.00	265	3.75	10.69	0.00	100.00	Sub total
Telephone CLINIC, CNS Band6	206	0.00	0.00	0.00	0.00	0.00	265	0.00	0.00	0.00	0.00	
Telephone CLINIC, CNS Band7	206	0.00	0.00	0.00	0.00	0.00	265	3.04	7.92	0.00	39.00	
Telephone CLINIC, CNS Band8A	206	0.00	0.00	0.00	0.00	0.00	265	0.08	1.27	0.00	20.67	
Telephone CLINIC, Consultant Oncology	206	0.00	0.00	0.00	0.00	0.00	265	0.63	7.37	0.00	100.00	
Face2Face_clinics cost	206	0.00	0.00	0.00	0.00	0.00	265	53.32	88.42	0.00	639.00	Sub total
Face to Face CLINIC, CNS Band6	206	0.00	0.00	0.00	0.00	0.00	265	1.52	5.86	0.00	42.00	
Face to Face CLINIC, CNS Band7	206	0.00	0.00	0.00	0.00	0.00	265	3.60	9.03	0.00	52.00	
Face to Face CLINIC, CNS Band8A	206	0.00	0.00	0.00	0.00	0.00	265	0.14	1.14	0.00	10.33	
Face to Face CLINIC, Registrar Urology	206	0.00	0.00	0.00	0.00	0.00	265	7.45	18.70	0.00	125.33	
Face to Face CLINIC, Consultant Urology	206	0.00	0.00	0.00	0.00	0.00	265	10.82	35.06	0.00	200.00	
Face to Face CLINIC, Registrar Oncology	206	0.00	0.00	0.00	0.00	0.00	265	0.12	1.92	0.00	31.33	
Face to Face CLINIC, Consultant Oncology	206	0.00	0.00	0.00	0.00	0.00	265	29.69	81.44	0.00	600.00	
Total cost of Service use	206	186.34	411.45	0.00	0.00	4069.30	265	268.67	1020.75	0.00	12499.48	Sub total
GP Visit	206	48.21	63.17	0.00	0.00	396.00	265	53.14	72.58	0.00	396.00	
GP Tel Advice	206	1.08	3.45	0.00	0.00	18.40	265	1.20	3.29	0.00	23.00	
GP Home Visit	206	1.79	12.73	0.00	0.00	92.00	265	1.39	11.24	0.00	92.00	
GP Nurse Visit	206	16.78	18.16	0.00	0.00	111.40	265	15.56	18.34	0.00	89.12	
GP Nurse Tel advice	206	1.42	4.49	0.00	0.00	31.60	265	1.13	3.85	0.00	23.70	
GP Nurse home visit	206	1.82	22.11	0.00	0.00	315.84	265	1.27	8.92	0.00	98.70	
Social worker visit	206	0.77	7.77	0.00	0.00	79.00	265	1.79	13.63	0.00	158.00	
Physiotherapist visit, NHS,	206	2.80	16.79	0.00	0.00	192.00	265	5.68	42.18	0.00	512.00	
Dietician visit, NHS,	206	1.40	7.94	0.00	0.00	64.00	265	1.81	21.94	0.00	352.00	
Counsellor Visit, NHS,	206	0.61	5.04	0.00	0.00	42.00	265	3.49	43.27	0.00	672.00	
Psychiatrist/psychologist Visit, NHS,	206	0.41	4.13	0.00	0.00	42.00	265	0.16	2.58	0.00	42.00	
Complementary Therapist, NHS, Visit	206	1.15	8.47	0.00	0.00	80.00	265	0.12	1.39	0.00	16.00	
Services Helpline call	206	0.10	1.03	0.00	0.00	10.50	265	0.40	2.71	0.00	31.50	
Attended Urology Clinic	206	37.86	86.02	0.00	0.00	464.97	265	0.00	0.00	0.00	0.00	

Other prostate
related service
use

Telephone Nurse, Urology Clinic	206	0.00	0.00	0.00	0.00	265	0.00	0.00	0.00	0.00	
Electronic Comms, Nurse Urology clinic	206	0.00	0.00	0.00	0.00	265	0.00	0.00	0.00	0.00	
Other Clinic Cost	206	20.45	70.16	0.00	468.00	265	30.76	130.51	0.00	1560.00	
A&E	206	9.59	137.67	0.00	1976.00	265	26.10	199.97	0.00	1976.00	
Hospital Day Case	206	31.15	162.18	0.00	1426.00	265	64.57	340.83	0.00	2852.00	
Hospital Inpatient Cost	206	8.97	95.78	0.00	1232.00	265	59.37	534.83	0.00	5800.00	
Ambulance use	206	0.00	0.00	0.00	0.00	265	0.74	8.50	0.00	98.00	

Table 3- Health related quality of life QALYs

	Care programme			Usual care		
	n	mean	SD	n	mean	SD
Raw difference	206	0.568715	0.104572	265	0.5432	0.1174
Difference, based on OLS controlling for baseline EQ5D score						
						0.0037

Table 4 – Unit cost of health services

Item	Cost (£)	Unit	Source	Comment
Band 4 community support worker	30	per hour	9. Scientific and professional staff. PSSRU 2016	
Band 6 CNS	42	per hour	9. Scientific and professional staff. PSSRU 2016	
Band 7 CNS	52	per hour	9. Scientific and professional staff. PSSRU 2016	
Band 8a CNS	62	per hour	9. Scientific and professional staff. PSSRU 2016	
Registrar	94	Per consult	NHS Reference costs 2016	NON-Consultant Led, follow up, face to face non admitted. Assumption on average 15 minute consult to apportion pro-rata.
Consultant, Medical	100	Per consult	NHS Reference costs 2016	Consultant Led, follow up, face to face non admitted. Assumption on average 15 minute consult to apportion pro-rata.
GP visit	36	per 9.22 minute consult	10.3b. PSSRU 2016.	
GP email or Phone	4.6	per 4 minute intervention	10.4 telephone triage. PSSRU	
GP home visit	92.2	per 11.44 minute consult + 12 minute travel time	10.3b. PSSRU 2016.	Used average consult length of 11.44 minutes plus 12 minute travel time as assumed in PSSRU 2015. 10.8a. GP hourly cost at £236 from PSSRU 2016

Nurse visit	11.14	per 15.5 minutes	10.2 Nurse (GP practice). PSSRU 2016	used the average consult length of 15.5 minutes in GP practice for 10.6 Nurse PSSRU 2015. PSSRU 2016 £43/h
Nurse email or Phone	7.9	per 6.56 minute intervention	10.4 telephone triage. PSSRU 2016	
Nurse home visit	19.74	per 15.5 minutes+12 minutes travel time	10.2 Nurse (GP practice). PSSRU 2016	used the average consult length of 15.5 minutes in GP practice for 10.6 Nurse PSSRU 2015. PSSRU 2016 £43/h. PSSRU 2015 noted travel time for GP home visits as 12 minutes. Added this to estimate consult cost
Social Worker visit	79	per hour	11.2 Social worker (adult services) PSSRU 2016	Assume 1 hour visit. No information available on average duration of a consult
Physio	32	per hour	9. Scientific and professional staff. PSSRU 2016	Assume 1 hour visit. Band 5
Dietician	32	per hour	9. Scientific and professional staff. PSSRU 2016	Assume 1 hour visit. Band 5
Counsellor	42	per hour	9. Scientific and professional staff. PSSRU 2016	Assume 1 hour visit. Band 6
Psychiatrist/psychologist	42	per hour	9. Scientific and professional staff. PSSRU 2016	Assume 1 hour visit. Band 6
Complementary medicine	16			Average cost per month 8-28 pounds, 2013. "Prevalence of use of complementary and alternative medicine (CAM) by patients/consumers in the UK: systematic review of surveys" Clinical Medicine 2013, Vol 13, No 2: 126-31
Helpline Service	10.5			Assume B6CNS 15 minute call
Cancer support group	91.47			//assume average outpatient urology clinic costs/ NHS Ref 2016, average of urology/oncology outpatient clinic cost
Urology/oncology clinic	91.47	per outpatient clinic	NHS REF costs 2016	
Urology/oncology advice PHONE	10.5			Assume B6CNS 15 minute call

Urology/oncology advice EMAIL	10.5			Assume B6CNS 15 activity
Hospital outpatient clinic, cancer	156	per outpatient visit	7.1 NHS reference costs for hospital services. PSSRU 2016	Overall average of all outpatient clinics. PSSRU 2016
A&E	988	per visit	8.2 PSSRU 2016	Average cost for all users A&E and outpatient. 2009 uprated to 2016 for inflation
Hospital Day Case	713	per case	7.1 NHS reference costs for hospital services. PSSRU 2016	
Hospital Inpatient Elective	3653	per case	7.1 NHS reference costs for hospital services. PSSRU 2016	
Hospital Inpatient Non-elective short	616	per case	7.1 NHS reference costs for hospital services. PSSRU 2016	
Hospital Inpatient Non-elective Long	2900	per case	7.1 NHS reference costs for hospital services. PSSRU 2016	
Ambulance transit	98	per use	7.1 NHS reference costs for hospital services. PSSRU 2016	Overall average for all ambulance services (see and treat, refer, and convey.

Figures

Figure 1 -Cost Effectiveness Plane – All costs included

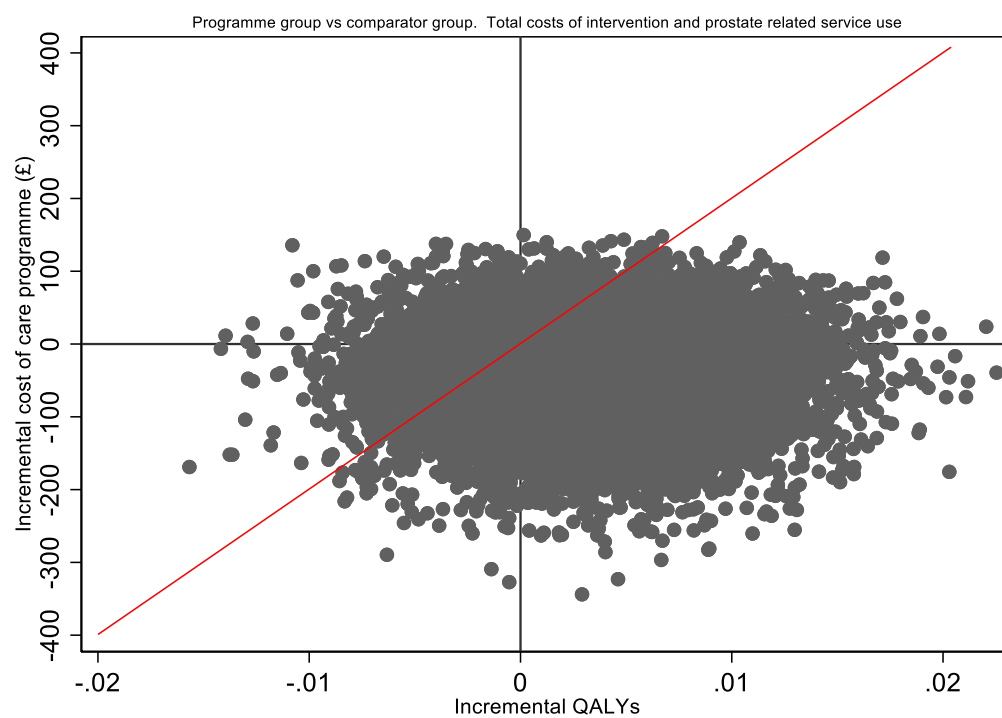


Figure 2 -Cost Effectiveness Plane – Direct cost of intervention only. Prostate related other service use excluded

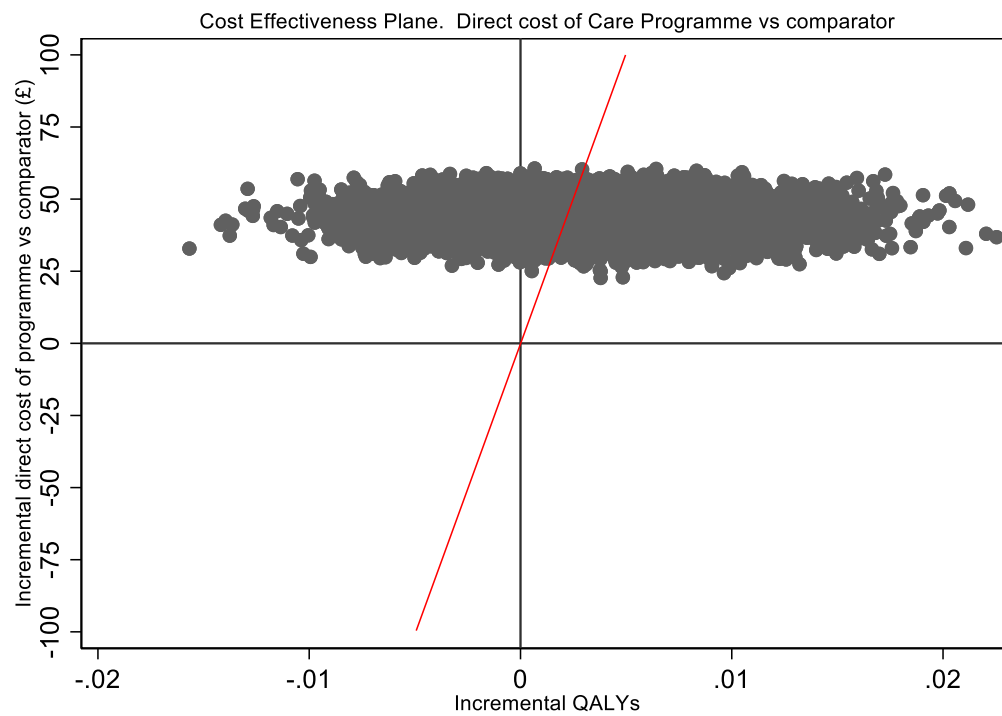


Figure 3 – Cost Effectiveness Acceptability Curve- Direct Intervention costs only

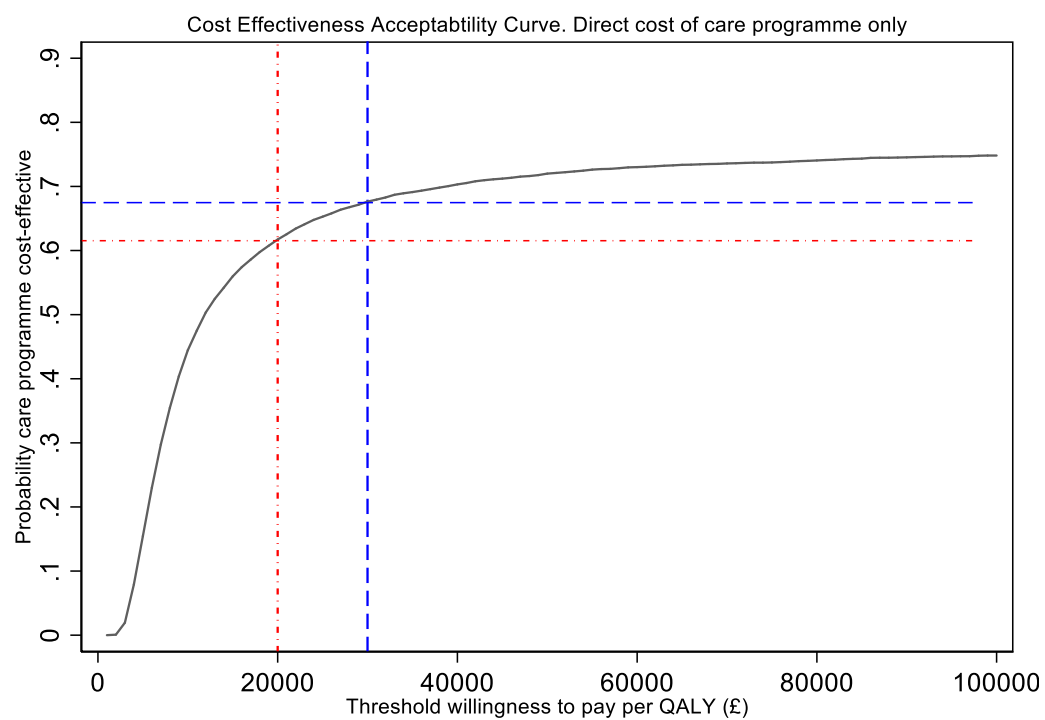
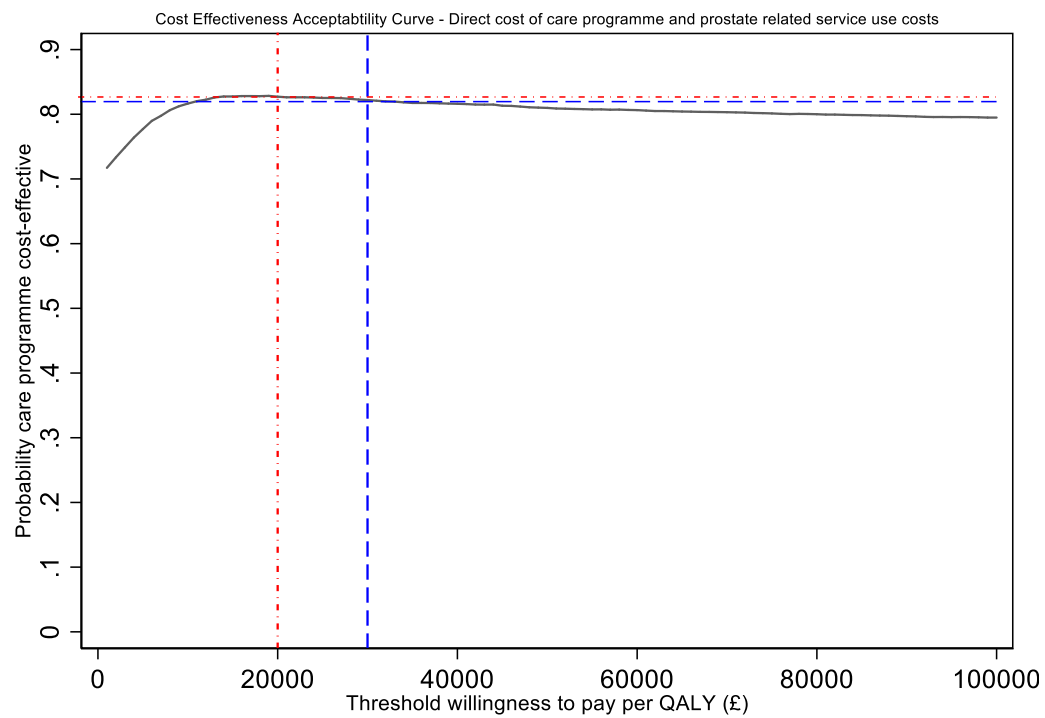


Figure 4 – Cost Effectiveness Acceptability Curve- Direct Intervention costs and service use costs



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