Transforming Care After Treatment

Measurable Outcomes from TCAT: A Briefing Paper

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1. Introduction

Transforming Care After Treatment (TCAT) is a five-year programme funded by Macmillan Cancer Support. Focused on the care and support of people after treatment for cancer, TCAT is a partnership between the Scottish Government, Macmillan Cancer Support, NHS Scotland, local authorities and third sector organisations that aims to:

- enable people affected by cancer to play a more active role in managing their own care;
- provide services which are more tailored to the needs and preferences of people affected by cancer;
- give people affected by cancer more support in dealing with the physical, emotional and financial consequences of cancer treatment;
- improve integration between different service providers and provide more care locally.

Edinburgh Napier University was commissioned by Macmillan Cancer Support in May 2014 to conduct a national evaluation of the TCAT programme. The findings from this work are being disseminated through a rolling programme of Evidence and Learning Bulletins on specific topics. This is the 3rd in a planned series.

2017:

- Holistic Needs Assessment: Implications for Practice
- TCAT and the Patient Voice: From Involvement to Influence

2018:

- Community Based Projects: Evidence and Learning
- Mechanisms of HNA and Care Planning – A Realistic Evaluation
- Impact of TCAT on service integration and co-ordination
- Impact of TCAT on influencing attitudes, behaviours and priorities related to after care
- Final 'wrap up' report on the national evaluation

The views expressed in this report are those of Edinburgh Napier University TCAT Evaluation Team and do not necessarily represent those of Macmillan Cancer Support and their partners.

Sources

A number of evaluation methods have been deployed within the evaluation of TCAT since June 2014. These are presented in detail in the Baseline and Interim reports and accompanying Technical Appendix. (On request from TCAT@napier.ac.uk).

2. Background

The original purpose of this bulletin was to answer one specific national evaluation question:

> *To what extent does the programme provide more cost effective solutions and a more appropriate use of resources than current practice?*

Each project's (25 in total) original expression of interest application, was reviewed using a standardised proforma. This identified the potential of nine projects to contribute to the economic work strand of the evaluation. Edinburgh Napier University were not involved in the design of the interventions or their implementation.

Implementation processes at a local level meant that the expected data was not available or sufficient for the application of the proposed health economic techniques. The limitations of the available data severely reduced the prospects for robust findings and therefore subsequent generalisability. Specifically, this work strand was limited by:

- Lack of data on control or comparison groups
- Insufficient numbers on which to perform statistical analysis with acceptable confidence
- The choice of 'outcome measures' used by some local projects could not be used in cost benefit or cost effectiveness analysis
- Limited information on the intervention design, criteria for inclusion and critically the outcome of the intervention

As a result of the data weaknesses, Edinburgh Napier University revised the original scope of the bulletin.

3. Purpose of the briefing paper

This briefing paper presents what has been learned from the health economic work strand and places it in the wider context of the overall measures of impact and outcomes for TCAT. It does not report 'findings' or conclusions of the evaluation activity either locally or nationally. The purpose of the paper is to:

1. Provide an overview of the outcome measures that have been employed locally across the TCAT programme in relation to:
    - Patients
    - Services

2. Provide the opportunity to reflect on the extent of their transferability to another area[i] and broader generalisability.

3. Contribute to the debate on subsequent roll out and evidenced based sustainability of TCAT by *"aligning the project self-evaluations with the commissioned national programme evaluation."*[ii]

As the national evaluation has a key role in synthesising, interpreting and disseminating the learning from TCAT this paper makes a valuable and timely contribution to those looking to build on the work to date and roll out its successes to other areas.

Standalone health economic briefing papers for 6 projects are presented at the end of this Briefing Paper.

4. The meaning of measures in a programme of transformational change

Three important aspects of TCAT have to be considered when ascribing meaning to the outcomes of this programme: (i) duration, (ii) the programme's bottom up model and (iii) local evaluation methods.

Macmillan Cancer Support acknowledge that "large-scale transformative programmes of work take longer to deliver and even longer to see the full results"[iii]. Many of the anticipated TCAT outcomes and longer-term impact will not be observable for many years. Evaluation effort during the life time of a programme therefore naturally focuses on the measurement of progress or *distance travelled* towards these longer term goals [iv,v] by identifying and evaluating 'intermediate 'outcomes"[vi] and short term impact.

TCAT is not one model of 'care after treatment' set up in different locations, but 25 different projects linked only by the programme's overarching aims and principles. As TCAT is not straightforwardly 'a sum of its 25 parts', it would be erroneous to aggregate 'savings' or patient benefits across the whole programme or to assume that the same project will work elsewhere without due regard to context, variability in implementation and participant characteristics.

The outcome measures used across the different TCAT projects and the conclusions that can be drawn at a local and a national level have been affected by five main issues.

Scale of evaluation activity: Much of the data available from the local projects reflected the small numbers of participants, which affects the possibility of the samples being sufficiently powered to show an effect. Significance in statistical terms was not possible to determine and the risk of presenting false positive or false negative statements was therefore high. Moreover, the scale of qualitative evaluation undertaken by local projects was limited to small numbers in focus groups or one to one interviews. Furthermore the methodology and analysis of the qualitative data is unclear from the local reports, which makes generalisability of the presented project findings problematic.

Focus only on participants: Future services cannot be effectively informed if the evidence base only includes people who have received the service being tested. Local projects focused on the participants and therefore brings a risk of misleading the direction of future service development.[vii]

For example, in some projects, patients could opt in or opt out of the 'service' and within many, significant numbers declined or did not attend the new service. The number or characteristics of people who 'declined' or opted out were not universally recorded or analysed.

To better inform future services it is important to understand the extent to which services have been taken up and investigate further the characteristics of and reasons why people do not use a service.

Short termism: Local projects only had the capacity and time available to focus on snap shot, self-reported measures. This focus on short term outcomes limits understanding of the time required for the intervention to have an effect and the risk of 'premature' evaluation is high[viii]. There is no data on the long-term impact of projects.

Limited evidence of impact: Much of the evidence emerging locally from TCAT is qualitative in nature. Quantitative baseline or comparator group measures (a control group) were attempted only within a few projects. Where they were, they lacked scale and/or sophistication to assure accurate comparisons.

Ability to take credit for any impact: Scale, sample selection and duration of local evaluations all combine to reduce the likelihood of a local project being able to attribute any measured or observable change accurately or solely to their new service. This issue of understanding and ultimately 'proving' cause and effect is compounded by the multi component aspect of many of the TCAT projects[ix]. In addition, none of the projects were able to account for any relevant counterfactuals such as understanding what would have happened to the patient had they not received the TCAT service.

5. Patient measures

Overall TCAT aims to “improve experiences and outcomes for people affected by cancer.” Local evaluations by projects utilised the following patient measures:

- Increased self-reported quality of life
- Improved self-reported health and wellbeing
- Increased self-management
- Reduced self-reported unmet concerns.

5.1 Quality of life

Three projects used validated quality of life measures within their local evaluation. Ayrshire and Arran Phase 1 and Lothian Phase 2 used the EQ-5D and Lanarkshire Phase 1 used the FACT-L.

The EQ-5D instrument can be used to calculate quality of life years gained (QALY). The quality-adjusted life year or quality-adjusted life-year is a generic measure of disease burden, including both the quality and the quantity of life lived. It is used in economic evaluation to assess the value for money of medical interventions. One QALY equates to one year in perfect health.

The FACT-L instrument (Functional Assessment of Cancer Therapy) is a self-administered quality of life tool, which measures quality of life in patients with lung cancer or lung disease.

5.2 Health and wellbeing

Three Phase 2 projects (Midlothian, North and South Lanarkshire and Renfrewshire) measured changes in wellbeing using the validated tool the shortened version of the Warwick-Edinburgh Mental Well-Being Scale (SWEMWEBS). The original WEMWEBS was developed for the monitoring of mental wellbeing of the general population and to aid evaluation of interventions aimed at improving this.

5.3 Increasing self-management

Enabling and supporting self-management was found within the specific aims or planned outcomes of all TCAT projects.[x] However, neither local nor national evaluation activity can demonstrate the longer-term outcomes and effect on self-management. What is known among many projects is the short-term, self-reported impact of the piloted intervention and from this there is a positive indication of the distance travelled towards increased self-management.

However, to measure self-management' and the required 'patient activation' that is needed to sustain it, is more complex than a one-off measure. There is insufficient robust evidence from local test sites to assume that each approach is as equally successful as the local findings would suggest. Across TCAT for example, holistic needs assessment of people affected by cancer are undertaken in different health and social care settings, by different professions, and at a variety of points on the patient's journey. There is therefore limited evidence on, or understanding of, any effect these variables may have on patient experiences and outcomes, and resource use.

5.4 Reducing unmet need

Only three projects collected data that could quantify changes in the number of concerns reported by patients. All projects did however collect and report the number and type of concerns participants in the first six completed TCAT projects.

Data is also available for three additional projects who piloted a service for *all* cancer types. Two tested HNAs in the community (Midlothian and and Fife Phase 2) and one by Practice Nurses in a Primary Care setting (NHS Lanarkshire Phase 2).

A more detailed picture of the needs of patient living with a cancer diagnosis at end of treatment is being developed by the work of the TCAT programme. In addition to helping practitioners to "tailor" care and support to address identified needs locally, it "also gives a valuable source of information for research purposes and local service planning and commissioning"[xi]. The aggregated data gathered from TCAT to date relates to in excess of 1,000 people living with cancer. Analysis of this is ongoing and will be reported in 2018.

6. Service measures

Local evaluations by projects utilised the following service measures.

- Reduction in routine follow up
- Resource utilisation

6.1 Reduction in number of follow up appointments

Three of the selected 9 local TCAT projects tested a new care pathway after treatment that *aimed* to reduce the number of consultant led follow up appointments. Within these projects, consultant appointments were removed or reduced and replaced by a holistic needs assessment by a different professional. In addition, one project implemented a new model of care that *resulted* in the reduction of hospital-based follow up for people at the end of life.

It should be noted that for some TCAT projects piloting approaches to HNA after treatment, an 'additional' follow up appointment was introduced with the aim of improving care after treatment.

6.2 Resource utilisation

As data to compare the outcomes of new or alternate follow up arrangements was not available, it has only been s possible for the national evaluators to calculate cost savings (or the resulting cost minimisation) within four projects.

7. Wider Programme Measures

The national evaluation of TCAT was tasked to consider the extent to which a five-year programme can provide more cost-effective solutions and a more appropriate use of resources than current practice. Consideration of this over the last four years has always been through the commissioned evaluation approaches of appreciative inquiry and realist evaluation.[xii] [xiii] As a result, measurable changes in patient and service outcomes are continuously being assessed and understood within their local implementation context and overall positive or negative drivers of transformational change (wider programme measures).

For TCAT, critical indicators of wider programme success are to be found within the extent to which it has:

- Enhanced service integration and care coordination;
- Influenced attitudes, behaviours and attitudes to follow up and care after treatment.

Findings relating to these two key principles of TCAT will be reported in 2018.

NHS Ayrshire and Arran Phase 1

TCAT HEALTH ECONOMIC EVALUATION: Breast Cancer

Final Report

Edinburgh Napier University TCAT National Evaluation Team

20 November 2017

1. Purpose of report

As part of the national evaluation of the Transforming Care After Treatment (TCAT) Programme, Edinburgh Napier University have implemented a strand of activity dedicated to evaluating to what extent interventions implemented by local projects within the programme provide more cost-effective solutions and/or a more appropriate use of resources than current practice.

To address the economic impact related questions of the overall evaluation each project's expression of interest application was reviewed using a standardised proforma. This proforma identified the potential of each local TCAT project to contribute to the economic work strand of the evaluation, by focussing upon for example opportunities for control groups/comparisons and relevant outcome measures such as quality of life measures using validated tools (e.g. EQ-5D or SF-36).

Edinburgh Napier University were not involved in the design of the interventions nor their implementation. In addition, for many projects the 'advised' data or expected data was not subsequently available / sufficient for the robust application of the proposed health economic techniques.

The purpose of this report is to present the findings of this work as it relates to the Phase 1 Project with Breast Cancer Patients in NHS Ayrshire and Arran.

2. Intervention

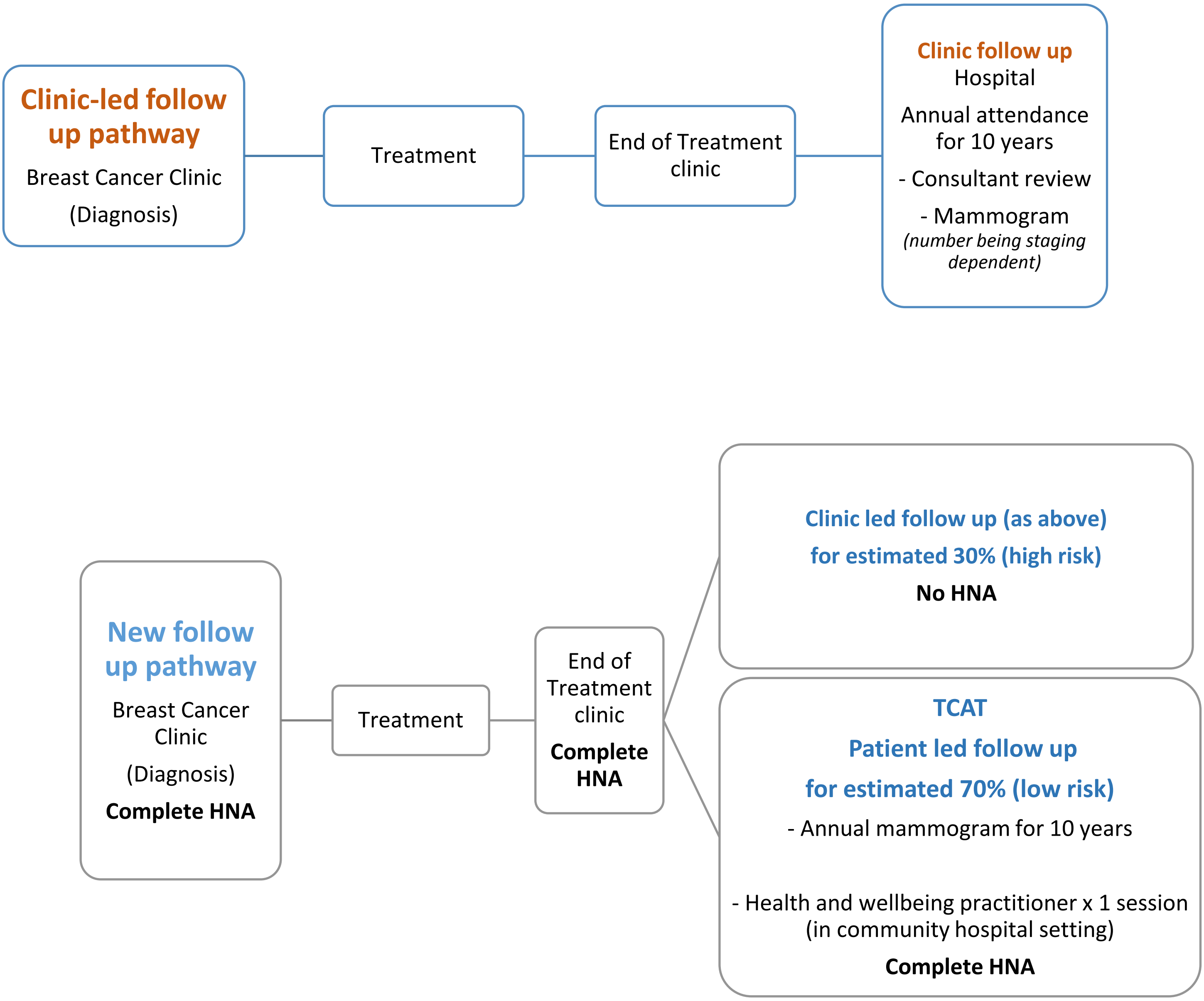
The intervention under investigation is the development of a new patient-led pathway for women with breast cancer.

NHS Ayrshire and Arran's Breast Cancer Team changed their model of follow-up to incorporate risk stratified care. Instead of continuing to follow-up every breast cancer patient at an annual surgical clinic over a 10-year period, the team reviewed each patient at a Multi-Disciplinary Team (MDT) to determine high or low risk stratification. Women stratified as high risk were to continue to be reviewed by the clinic-led pathway and the low risk women were entered into a new "patient-led pathway" (TCAT) see Diagram 1.

The low risk stratification women were considered able to self-manage and to report back to services as and when required.

Women on the patient led pathway were invited to attend one post-treatment session at a community Health and Well-being Clinic (HWBC) where a Holistic Needs Assessment (HNA) was offered, approximately eight weeks after end of treatment. Both pathway groups continue to receive mammograms. The number of mammograms was dependent on the stage of cancer diagnosed and other clinical indicators.

Diagram 1: A schematic of the pathways under consideration.



3. Methods and their limitations

The aim of the economic analyses was to:

- assess whether the TCAT patient-led pathway improved patients' quality of life in comparison to the previous clinic-led pathway and
- compare the cost of the new pathway**,** which includes clinic-led (30% of patients) and patient-led (70% of patients) with the previous clinic-led pathway (100%)

3.1 Quality adjusted life years

The quality-adjusted life year or quality-adjusted life-year (**QALY**) is a generic measure of disease burden, including both the quality and the quantity of life lived. It is used in economic evaluation to assess the value for money of medical interventions. One QALY equates to one year in perfect health.

Quality of life was measured using the EQ-5D instrument (EuroQol Group 1990). The EQ-5D is a validated questionnaire for quality of life and asks questions regarding mobility, self-care, anxiety, pain and usual activities. It is a useful measure as it can be used to calculate QALYs (Quality of life years gained). Patients are also asked to evaluate their current health state from one to 100, which is shown on a Visual Analogue Scale (VAS).

The ratings for each health state were converted using the EQ-5D Value Sets Crosswalk Index Calculator and the Visual Analogue Scale (VAS) scores were calculated.

Women on the TCAT patient-led pathway were compared to a historical control. The historical control was populated through a self-completion postal questionnaire being issued to all patients who had completed treatment for breast cancer provided by NHS Ayrshire & Arran in 2013 and 2014 (n=512). Patients who had died and those with metastatic disease were excluded. In total, 274 valid responses were received, giving a response rate of 53.5%.

In terms of calculating QALY gains, there is evidence in the literature that health state valuations following breast cancer treatment change with time and plateau at around 6 months post treatment (Connor-Spady et al 2005). As a result, it was methodologically sound to compare EQ-5D valuations from the 6 month time point for both TCAT and historical control groups for this project.

Therefore only data from the 6 month time point onwards was considered. No adjustments were made from month 12 onwards, and patients are assumed to be in the same health state from month 12 onwards regardless of when they completed the EQ-5D instrument.

Utility values for health states were sought from patients undergoing the patient led pathway (TCAT) and those who underwent the previous clinical pathway to act as control. Available data for each group is shown in Table 1.

EQ-5D data were provided for analysis from 325 patients however, a number were incomplete or had missing data and were therefore excluded.

Table 1: Number of completed EQ-5D's TCAT and Control Group

Pathway	Incomplete data	Total number analysed
Control	7	267
TCAT	6	45
Total	13	312

In utilising the data available there were a number of limitations:

- The EQ-5D Instrument does not capture everything that this intervention aimed to do such as making patients feel more supported and the benefits of having a holistic needs assessment. The local evaluation findings add weight to the hypothesis that the new pathway has a positive impact on patients.
- The data available on which to perform health economic analysis does not allow for, for example regression analysis or the accounting for confounding factors - therefore any observed changes in the measures may not be attributed wholly to the intervention. In addition, Quality of Life Questionnaires can be affected by many other factors that the intervention cannot affect, such as other co-morbid conditions.
- The control group are historical, meaning that they are a cohort of patients from before the current TCAT patient led pathway. Available data does not provide assurance that this historical control are comparable to the current cohort of patients. In addition, case matching was not possible. Factors which would be of interest are performance status, deprivation (SIMD), stage of cancer, treatment, living situation as these factors are all known to influence Quality of Life scores regardless of the intervention.
- Overall there were fewer responses from TCAT patients than control patients. The key effect of small numbers is that it increases variability, for example, if one patient recorded a negative value, this could have a large effect on the group averages. In a larger group, outliers do not influence the data as greatly.

3.2 Costs

To inform costs, assumptions about the previous and the new pathway were made. These are detailed below in Table 2. The following assumptions were made, based on advice from colleagues in NHS Ayrshire and Arran.

Table 2: Pathway assumptions made

Previous pathway (over 10 years)	New pathway (over 10 years)
Annual attendance at clinic for consultant review (100% of patients)	Annual attendance at clinic for consultant review (estimated at 30% of patients)
Mammogram For women having received a wide local excision (WLE) x7 mammograms (estimated at 70% of all patients) For women having received a mastectomy x 5 mammograms (estimated at 30% of all patients)	Annual mammogram (100%)
No HWBC offered (not part of the clinical –led pathway)	HWBC x 1 session offered to (70% of patients)

Costs of the intervention only were considered and included:

- Cost of consultant outpatient appointment, clinical oncology
- Cost of Health and Well Being Practitioner
- Cost of radiography (costs per examination for Radiology "Other Ayrshire and Arran" used and includes staff directly involved in providing the service, supplies used directly in the provision of the service and allocated costs)

Information Services Division (ISD) Costs (ISD 2015a, b) were used from the 2014/15 financial year to coincide with the dates of the project. As only short-term costs were evaluated, no discounting was applied. Scottish average costs were used, as data were not available for specialist nurse led clinics specific to Ayrshire and Arran (Table 3).

Table 3: Costs utilised

Item	Cost per examination/appointment
Consultant outpatient appointment, Clinical Oncology	£187
Mammogram	£54.11
TCAT Practitioner (assumed same cost as a specialist nurse oncology)	£123

4 Findings

4.1 EQ5D Index rating and VAS values

The EQ-5D index ratings and VAS values of the TCAT and Control Group were compared (Table 4). The closer to 1 the EQ-5D Index rating and VAS values are, the higher the patient rated their quality of life.

Table 4: EQ5D Index rating and VAS values

Group	Mean EQ5D Index rating	Mean EQ5D VAS values
TCAT	0.751	0.74
CONTROL	0.739	0.751

The difference between the control group and TCAT group was not statistically significant for either the Index Rating (p=0.755) or VAS values (p=0.775).

4.2 QALYs

As seen in Table 5 the patient led pathway can result in minimal gain or a loss of QALY compared to the control. It has not been possible to demonstrate a measurable effect on QALYs of the introduction of the patient led pathway. Consequently, the planned cost utility analysis was unviable.

Table 5: Comparison of TCAT vs Control group

	Control group, QALYs	TCAT group QALYs	QALY gains/losses (TCAT pathway vs Control)
Mean (QALY adjusted)	0.748	0.673	- 0.075
Mean (No adjustment)	0.739	0.751	+ 0.012

4.3 Costs

The cost of the TCAT patient led pathway was compared to the previous clinic led pathway over the 10-year follow up period (Table 6).

4.3.1 Cost per patient

Table 6: Cost per patient on previous clinic led pathway

Item	Cost per exam/visit	Total for 10 years
Basic pathway assuming annual consultant appointments and mammogram		
Consultant outpatient appointment, Clinical Oncology	£187	£1870
Mammogram	£54.11	£378.77 (for WLE x7 mammograms) £270.55 (post mastectomy x5 mammograms)
Total cost per patient (post wide local excision)		**£2248.77**
Total cost per patient (post mastectomy)		**£2140.55**

Table 7: Cost per patient on TCAT patient led pathway

Item	Cost per exam/visit	Total for 10 years
TCAT Practitioner (assumed same cost as a specialist nurse oncology)	£123	£123
Mammogram	£54.11	£541.10 (10 mammograms)
Total		**£664.10**

4.3.2 Cost per 100 Patients

To enable a cost comparison of the new pathway as a whole (30% clinic led and 70% of patients on patient led pathways), costs were considered for a hypothetical cohort of 100 patients.

The total cost of the old pathway has been used, as we are unable to say how many patients would be post wide local excision and post mastectomy in the hypothetical cohort. The total cost of the old pathway was divided by 100 to give an average cost per patient on the old pathway, which was then multiplied by 30, to represent a hypothetical cohort of 30 patients who would still be following this pathway.

Old pathway*= 100 patients, 70 would be post wide local excision (WLE) and 30 would be post mastectomy (M)*

70 patients x post WLE (per patient 2248.77) = £157,413.90

30 patients x post M (per patient 2140.55) = £64,216.50

Total = £ 221,630.40

New pathway*= 100 patient, 30 patients follow old pathway, 70 are on new pathway*

Cost of 30 following old pathway = £221,630.40/100 x 30= £66,489.12

Cost of 70 on new pathway = £664.10 x 70=£46,487.00

Total = £112,976.12

Cost saving via TCAT*= £221,630.40 - £112,976.12 = £108,654.28*

Average cost saving per person on the new pathway compared to the previous pathway. £1086.54

5.0 Conclusion

The TCAT patient led pathway has been considered in comparison to the previous clinic led pathway following treatment for breast cancer in NHS Ayrshire and Arran.

In relation only to cost, the new intervention was cheaper than the previous pathway and resulted in an average cost saving of £1086.54 per patient over 10 years.

There were several limitations to the data used as outlined previously. Caution is therefore advised with regards to drawing any conclusions from the results of the EQ-5D instrument presented.

The EQ5D instrument does not capture everything that this intervention aimed to do such as making patients feel more supported and the benefits of having a holistic needs assessment. The local evaluation report states that “the following objectives are already being met or positive progress has been made:

- Patients attend health and wellbeing clinic(s) and rate highly the support provided
- Patients on patient-led follow-up rate highly the follow-up process
- Patients are aware of relevant information and support services and rate highly the information provided about these services
- Patients access support services they have been signposted to and rate highly the support provided
- Patients adhere to their Care Plans
- Patients do not feel abandoned by the health service
- Patients feel their needs, identified by their HNA, are being met”.

6.0 References

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NHS Ayrshire and Arran Phase 1: Colorectal Cancer

TCAT HEALTH ECONOMIC EVALUATION

Final Report

Edinburgh Napier University TCAT National Evaluation Team

31 July 2017

1. Purpose of report

As part of the national evaluation of the Transforming Care After Treatment (TCAT) Programme, Edinburgh Napier University have implemented a strand of activity dedicated to evaluating to what extent the programme provides more cost effective solutions and a more appropriate use of resources than current practice.

The purpose of this report is to present the findings of this work as it relates to the Phase 1 Project with Colorectal Cancer Patients in NHS Ayrshire and Arran.

Health economic analysis was not planned nor commissioned for this patient group within this local project. However NHS Ayrshire and Arran collected data from people with colorectal and Edinburgh Napier University undertook to analyse it. The aim of this exploratory analysis was to assess whether the addition of a Health and Well-being Clinic (HWBC) to the pathway for colorectal patients improved quality of life.

2. Intervention & context

TCAT Phase 1 Project, implemented by NHS Ayrshire and Arran, involved a number of initiatives to support holistic care throughout the extended cancer pathway. The intervention under consideration is the provision of a service whereby patients with colorectal cancer at the end of treatment, were referred by their Clinical Nurse Specialist (opt-out system) to attend a post-treatment community Health and Well-being Clinic (HWBC) where a holistic needs assessment is offered.

3. Methods

Utility values for health states were sought from patients on the new TCAT pathway and those who underwent the previous clinical pathway (in 2013 and 2014) to act as control. Quality of life was measured using the EQ-5D instrument (EuroQol Group 1990). The EQ-5D is a validated questionnaire for Quality of life and asks questions regarding mobility, self-care, anxiety, pain and usual activities. It is a useful measure as it can be used to calculate QALYs (Quality of life years gained). Patients are also asked to evaluate their current health state from one to 100, which is shown on a Visual Analogue Scale (VAS).

A total of 101 completed EQ-5D were provided for analysis however a number were incomplete or had missing data and were therefore excluded (see Table 1).

Table 1: Number of completed EQ-5Ds: TCAT and Control Group

Pathway	Incomplete data	Total number analysed
Control group	8	79
TCAT group	2	12
Total	10	91

The ratings for each health state were converted using the EQ-5D-5L Value Sets Crosswalk Index Calculator and also calculated the Visual Analogue Scale (VAS) scores.

3.1 Limitations

The EQ-5D-5L Instrument did not capture everything that this intervention aimed to do, such as making patients feel more supported and with the benefits of having a holistic needs assessment. Quality of Life Questionnaires can be affected by many other factors which are unrelated to the intervention such as other co-morbid conditions, e.g. hip arthritis which would lead patients to score pain highly. This highlights that unless patients are randomised to groups within the same time period, there are remaining uncertainties which can never be fully resolved.

The numbers in the TCAT (n=12) were fewer than the control group (n=79), and a well-powered sample size in a future definitive evaluation would resolve limitations with this exploratory work presented in this report. The key effect of small numbers is that it increases variability, for example if one patient recorded a negative value, this could have a large effect on the group averages. In a larger group, outliers do not influence the data as greatly.

Resource constraints did now allow for consideration of wider economic costs.

Given the data available on the characteristics of the control group, it has been assumed that this historical cohort and similar to the TCAT patients - given the recruitment location and setting remained the same.

4. Findings

The EQ-5D index ratings and VAS values of the TCAT and Control Group were compared. The scores are shown in Table 2. The closer to 1 the EQ5D Index rating and VAS values are, the higher the patient rated their quality of life

For colorectal patients, there was a significant difference in EQ5D Index scores (p=0.031) and there was not a significant difference in VAS health scores (p=0.704).

Table 2: EQ-5D index ratings and VAS values

Group	Mean EQ5D Index rating	Mean EQ5D VAS values
TCAT	0.628	0.738
CONTROL	0.764	0.785

One patient in the TCAT group rated their health state as a negative value, which will have strongly influenced the overall mean calculation. As the TCAT group is only made up of 12 participants, caution must be used when interpreting the results.

If this person is removed from analysis then the there was a non-significant difference in EQ5D index rating or VAS values (p=0.228, p=0.751) as shown in Table 3.

Table 3: **EQ-5D index ratings and VAS values, with outlier removed**

Group	Mean EQ5D Index rating	Mean EQ5D VAS values
TCAT	0.692	0.777
CONTROL	0.764	0.785

Given the limited participants in the TCAT group for comparison. All available data were used in the QALY comparisons for the colorectal group QALY adjustments were made for data pertaining to months 11 or less (Table 4)

Table 4: Comparison of TCAT vs Control group, QALYs adjusted

	Control Group, QALY	TCAT, QALY	Difference
Mean (QALY adjusted)	0.633	0.483	- 0.15

5.0 Conclusion

The provision of a HWBC for colorectal patients at the end of treatment has been considered in comparison to the previous patient care pathway where no clinic was available.

This analysis reveals that participants rated their quality of life slightly lower when they completed the new TCAT pathway compared to the previous pathway. There were several limitations to the data used which have previously been outlined. Caution is therefore advised with regards to drawing firm conclusions from the results presented.

6.0 References

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NHS FIFE MELANOMA TCAT HEALTH ECONOMIC EVALUATION

Final Report

Edinburgh Napier University TCAT National Evaluation Team

31 July 2017

1. Purpose of report

As part of the national evaluation of the TCAT (Transforming Care After Treatment) Programme, Edinburgh Napier University have implemented a strand of activity dedicated to evaluating to what extent the programme provides more cost effective solutions and a more appropriate use of resources than current practice.

The purpose of this report is to present the findings of this work as it relates to the Phase 1 Project, NHS Fife Melanoma.

2. Intervention & context

The follow up pathway for patients diagnosed with a melanoma is determined by the Breslow Depth[1]: <1mm is 12 months follow up, over >1mm is 5 years follow up as per British Association of Dermatology Melanoma Guidelines.

The TCAT project did not change the number of hospital follow-up appointments required by each patient, but introduced a change in the workforce resource used to staff the pathways. Prior to TCAT all follow up patient appointments with patients both under <1mm and over >1mm were undertaken by a consultant. TCAT introduced follow-up appointments alternating between a dermatology consultant and dermatology Skin Cancer Link Nurse (SCLN)[2]. The old and new pathways are set out below visually

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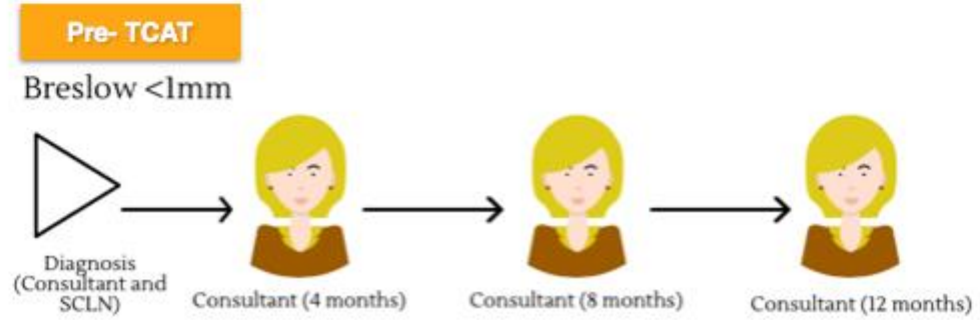
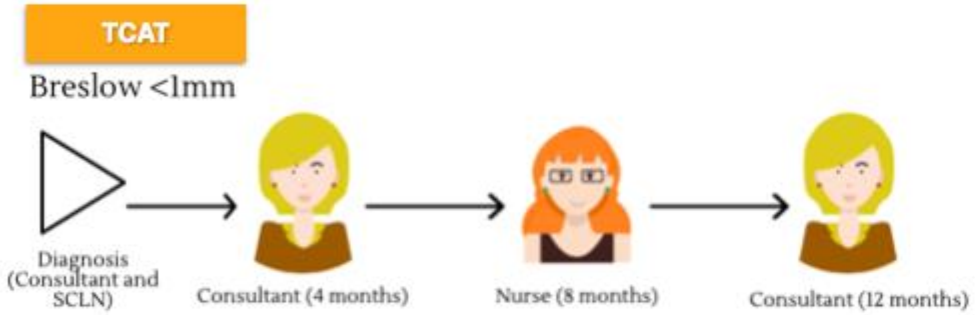
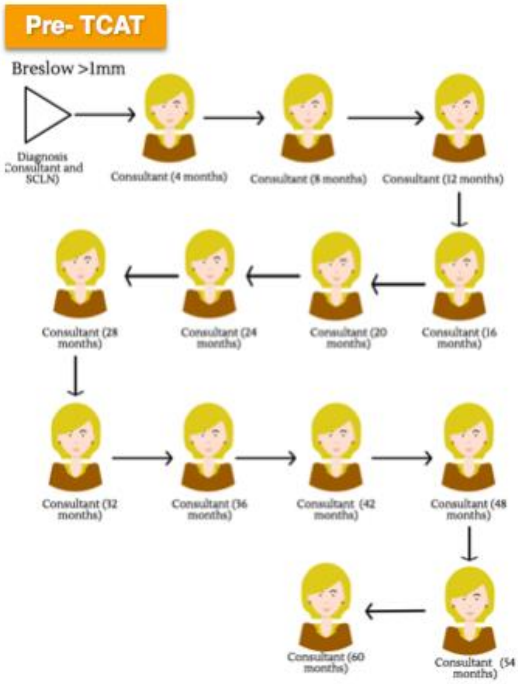
[1] Breslow's thickness measures in millimetres the distance between the upper layer of the epidermis and the deepest point of tumour penetration. The thinner the melanoma, the better the chance of a cure. Therefore, Breslow's thickness is considered one of the most significant factors in predicting the progression of the disease.
[2] The SCLN works as a dermatology nurse but has additional training in skin cancer.

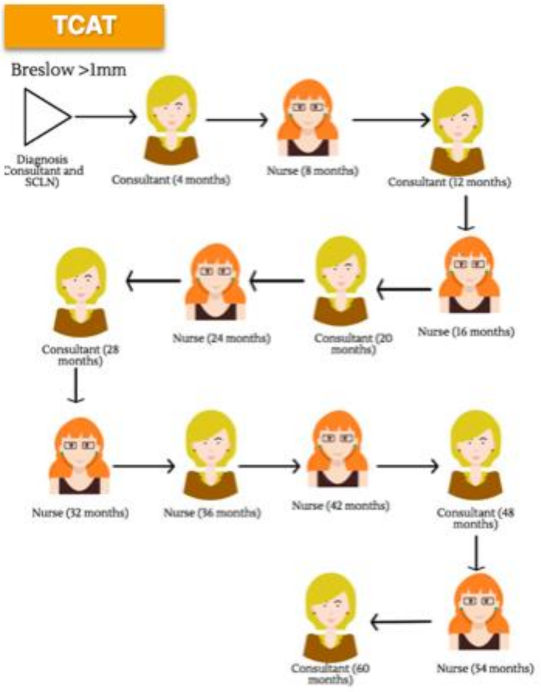
Patients with <1mm Breslow Depth





Patients with >1mm Breslow Depth





3. Methods

The aim of the economic analyses was to compare the cost of the new TCAT pathway with the previous pathway and set out visually the two pathways and identify service use.

A cost comparison analysis was conducted using activity data from the project as implemented. Between 18/05/2015 and 31/07/2016 134 consecutive patients attended a follow up appointment on the TCAT pathway.

Table 1a: Patients attending follow up appointment by Breslow Depth

Breslow	**Number of patients**
<1mm	64
>1mm	66
Not assessable	4
Total	**134**

Costs per outpatient clinic attendance were obtained from the Information Services Division Scotland (ISD) Costs book for Outpatient costs (ISD 2016). Consultant costs were for Consultant Outpatient Appointment Oncology cost per one attendance for NHS Fife. Costs for the SCLN were for Outpatient Nurse Led Clinics Oncology cost per one attendance for NHS Scotland, as no NHS Fife specific costs were available for these appointments.

Table 1b: Outpatient clinic attendance costs used

	Cost per one attendance
Consultant appointment	£194
SCLN appointment	£134

3.1 Limitations

- Patient outcome data was not available, therefore it is assumed that the outcome of the old and new pathways are the same (cost minimisation only).
- Limited detail on SCLN skillset, training, accreditation.
- Resource constraints did now allow for consideration of wider economic costs.

4. Findings: Cost

Patients with <1mm Breslow Depth

Table 2: Costs of Previous Pathway

Appointment type	Number of follow up appointments over 12 months	Cost of total follow up appointments per patient
Consultant	3	£582
SCLN	0	£0
Total	3	£582

Total number of patients x cost per patients = 64 x 582= £37,248

Table 3: Costs of TCAT Pathway

Appointment type	Number of follow up appointments over 12 months	Cost of total follow up appointments per patient
Consultant	2	£388
SCLN	1	£134
Total	3	£522

Total number of patients x cost per patients = 64 x 522= £33,408

Cost savings by implementing TCAT pathway with Breslow depth <1mm

£37,248 - £33,408= £3,840 (n=64)

For patients on the <1mm 12 month pathway there is a cost saving of £60 per patient.

Patients with >1mm Breslow Depth

Table 4: Cost of Previous Pathway

Appointment type	Number of follow up appointments- 5 years	Cost of total follow up appointments per patient
Consultant	13	£2522
SCLN	0	£0
Total	13	£2522

Total number of patients x cost per patients = 66 x 2522 =£166,452

Table 5: Cost of TCAT Pathway

Appointment type	Number of follow up appointments- 5 years	Cost of total follow up appointments per patient
Consultant	7	£1358
SCLN	6	£804
Total	13	£2162

Total number of patients x cost per patients = 66 x 2162= £142,692

Cost savings by implementing TCAT pathway with Breslow depth >1mm

£166,452 - £142, 692 = £23,760 (n=66).

For patients on the >1mm 5 year pathway there is a cost saving of £360 per patient.

5. Findings: Other observed benefits

Patient satisfaction with new pathway

Patient questionnaires carried out with those on the TCAT pathway (n = 114) showed that 87% of patients were satisfied with the way in which the follow up pathway was arranged, and 78% rated the pathway with the highest possible score of 10.

Introduction of a rapid access/ urgent (follow up or return) appointment slots

The introduction of the TCAT Pathway introduced capacity for the development of a 'rapid access/ urgent (follow up or return) appointment slot. Within the SCLN clinic template there now are 5 standard review slots and 1 urgent slot which are 30 minutes long. Pre-TCAT patients requiring to be seen urgently between review appointments or after discharge would be added to an already fully booked consultant clinic list, or given a 'new urgent tumour slot'. This did not allow time to fully explore a patient's needs and reduced the number of slots available for new 'urgent suspicious of cancer' referrals.

Clinic appointment allocation data from one SCLN during the TCAT project illustrates that 15% of all clinic appointments were 'rapid access'.

This allows a patient who develops a problem between follow up appointments to phone and be given a slot without having to see their GP or wait for the relevant dermatology consultant to be contacted. Moreover, if a melanoma patient develops a concern after discharge from the follow up pathway they are advised to see their GP who will refer urgently. At the point of triage this patient can be given a SCLN urgent clinic slot.

At discharge the patient knows how to access the department again if required. This is detailed within the footer of the ‘standard melanoma clinic letter’ that the patient is copied into.

Although it is not possible to ‘prove’, the provision of rapid access back to secondary care is perceived to:

- alleviate patient anxiety
- reduce waiting times
- assist consultant clinic to run to time
- free up new patient ‘tumour assessment clinic’ slots when compared with old pathway

Improved efficiency of clinic, that supports patient self-management

As a result of the new pathway there have also been improvements which cannot be captured by economic analysis . These include better and more efficient running of the clinic.

Previously patients were “squeezed” in whenever possible, now a set SCLN clinic with dedicated appointments has been set up. This has resulted in the charge nurse being able to allocate staff appropriately and ensure the department is run as efficiently as possible.

In addition, Consultant staff within the department also know the day and time on which the SCLN clinic takes place. All consultant dermatologists work on split sites and the majority work part time compared to the SCLNs who work on one site and are full time.

The clinic template, into which patients can be booked, enables all dermatology consultants to utilise this clinic from whichever site they are working without the need to locate and communicate with the SCLN as to an appropriate time for a patient. This contributes to an efficient running of the service and the utilisation of the SCLN clinic. At each SCLN appointment patients have the opportunity to participate in a holistic needs assessment. This assessment is carried out by the SCLN and allows for patient’s concerns to be discussed. Referrals and signposting can then occur to the most appropriate place. This is seen to provide supported patient self-management during and after follow up.

6. Conclusion

In terms of cost minimisation (i.e. where cost is the only outcome measure) (McFarland 2014), the TCAT service dominates. For the 130 TCAT patients, the new pathway, “costs” £27,600 less in total, for the entire pathway, than if these patients had continued on the old pathway.

- For patients on the <1mm 12 month pathway there is a cost saving of £60 per patient.
- For patients on the >1mm 5 year pathway there is a cost saving of £360 per patient.

The TCAT service has increased provision of rapid access back to secondary care during follow up and probable reduction in waiting times. Importantly, the service has also increased the efficiency of the melanoma clinics overall. The introduction of the holistic needs assessment, which promotes patient self-management, could also contribute to the efficiency of clinics by reducing medically unnecessary 'additional' appointments as patients are supported better to self manage.

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NHS Lanarkshire Phase 2

TCAT HEALTH ECONOMIC EVALUATION

Final Report

Edinburgh Napier University TCAT National Evaluation Team

20 November 2017

1. Purpose of report

As part of the national evaluation of the Transforming Care After Treatment (TCAT) Programme, Edinburgh Napier University have implemented a strand of activity dedicated to evaluating to what extent interventions implemented by local projects within the programme provide more cost-effective solutions and/or a more appropriate use of resources than current practice.

To address the economic impact related questions of the overall evaluation each project's expression of interest application was reviewed using a standardised proforma. This proforma identified the potential of each local TCAT project to contribute to the economic work strand of the evaluation, by focussing upon for example opportunities for control groups/comparisons and relevant outcome measures such as quality of life measures using validated tools (e.g. EQ-5D or SF-36).

Edinburgh Napier University were not involved in the design of the interventions nor their implementation. In addition, for many projects the 'advised' data or expected data was not subsequently available / sufficient for the robust application of the proposed health economic techniques.

The purpose of this report is to present the findings of this work as it relates to the Phase 2 project in NHS Lanarkshire.

2. Intervention

The project was set up to investigate the feasibility and acceptability of Practice Nurses carrying out holistic Cancer Care Reviews in General Practices using the Holistic Needs Assessment (HNA) tool the Concerns Checklist. The conducting of a Cancer Care Review (CCR) by Practice Nurses was a departure from 'traditional' usual care whereby a GP would carry out a CCR with patients within six months of their diagnosis. A specific objective of the work was to investigate the potential of Practice Nurse led CCRs to reduce unnecessary/inappropriate GP appointments.

Over an 18-month period, Practice Nurse led Cancer Care Reviews were implemented in nine medical centres within NHS Lanarkshire. When the medical centre received notification of a new cancer diagnosis an invitation (by letter and/or phone call) to attend a CCR with a Practice Nurse was made. Across the 9 practices 390 people were invited to have the CCR, and 248 people responded, with an overall 'take up rate' of 63%.

3. Methods and their limitations

The aim of the work was to undertake a range of economic analyses using data from 3 of the 9 participating practices. It was anticipated that this work would include reporting on:

- Cost Comparison: Comparing the cost of a Practice Nurse Led CCR compared to 'usual' practice of a GP Led CCR.
- Resource Utilisation Analysis: Comparing the impact on resource utilisation of Practice Nurse (PN) led CCRs (including changes in demands on GPs appointments) of those attending a CCR and those who declined a CCR.
- Cost effectiveness analysis: This part of the planned analysis was not possible to complete as, against the advice of ENU, the project chose not to distribute a validated quality of life questionnaire such as the EQ-5D to attenders or those who declined.

There was an expectation that in one practice data would be collected to compare resource utilisation post PN led CCR with GP led CCR. However only eight patients had a GP led CCR during the project and it was not possible to undertake this analysis.

3.1 Comparing the new intervention to usual care - data available

3.1 Costs

The value per unit (i.e. per contact with patient) used in this analysis and their source are presented in Table 1.

Table 1: Costs used

Item	Value	Unit and	Source
Telephone consultation			
Nurse	£7.90	Unit costs for nurse led triage, per contact	Curtis and Burns 2016, Campbell et al 2015
Doctor	£14.60	Unit costs for General Practitioner led triage, per contact	Curtis and Burns 2016, Campbell et al 2015
Face to face consultation			
Nurse	£9	£36 per hour. Using the average appointment time of 15.5 minutes unit cost given is per contact (4 per hour)	Curtis and Burns 2016 Information Centre 2007
Doctor	£31	Unit costs (10.3b) Per patient contact lasting 9.22 minutes	Curtis and Burns 2016

3.2 Resource Utilisation

The data shown in Table 2 was extracted on site from patient records for:

- Patients who had completed a Practice Nurse led CCR (n=68) and
- Patients who had declined invitation and did not have a PN led CCR, (n = 24) (to act as a control).

Data for the resource utilisation analysis was only available from three of the nine participating practices. Data was therefore available for 68 patients who had attended and 24 who had declined the invitation. Data extraction covered an 8-week period after the CCR or 8 weeks after declining. This time frame coincided with the distribution of the project's patient feedback questionnaire.

Table 2: Data extracted from patient records for the 8 weeks post intervention or post declining the intervention

Resource used	Data extracted
Telephone consultation	
Nurse	*Number in 8 week period*
Doctor	*Number in 8 week period*
NHS 24	*Number in 8 week period*
Face to face consultation	
Nurse	*Number in 8 week period*
Doctor	*Number in 8 week period*
District nurse	*Number in 8 week period*
Unscheduled hospital admissions	Number in 8 week period

Information on use of NHS 24 and the number of unplanned hospital admissions was also gathered. However, as this related to only one or two patients it was excluded from the analysis.

The available data does not provide assurance that the control group (those who declined a CCR) are comparable to the new intervention cohort of patients (for example in terms of characteristics or disease trajectory). In addition, case matching and the identification of potential confounders from the data available was not possible.

4. Findings

4.1 Cost Comparison Analysis

The cost of a GP-led CCR was compared to the cost of a Practice Nurse led CCR. Information provided in the local projects evaluation report, informed the following assumptions:

- The average time a patient spent with the practice nurse was 30 minutes.
- A GP offers a 'double appointment' of around 20 minutes to a patient if they are conducting a GP led CCR.
- In the absence of patient outcome data for both cohorts the outcome of the old and new pathways are considered to be the same (cost minimisation only).

Table 3: Cost of CCR by practitioner

Cost of one GP led CCR	Cost of one Practice Nurse Led CCR
£62	£18

In relation only to cost, the new intervention was cheaper than the previous pathway and resulted in a cost saving per CCR of £44.

4.2 Resource Utilisation Analysis

Resource utilisation was analysed in two ways.

- Subsequent contacts with a GP and nurse for those patients who attended a cancer care review were compared to those who did not.
- The overall 'contact profile' of the available samples were compared. This was done to investigate whether the CCR resulted in changes in 'who' a patient subsequently contacted.

As all the analysis is based on small sample sizes and large differences in sample size, caution must be used when interpreting the findings. The large difference in the sample sizes available restricted the comparison of absolute numbers of contacts. The figures were therefore converted to average number of contacts per patient.

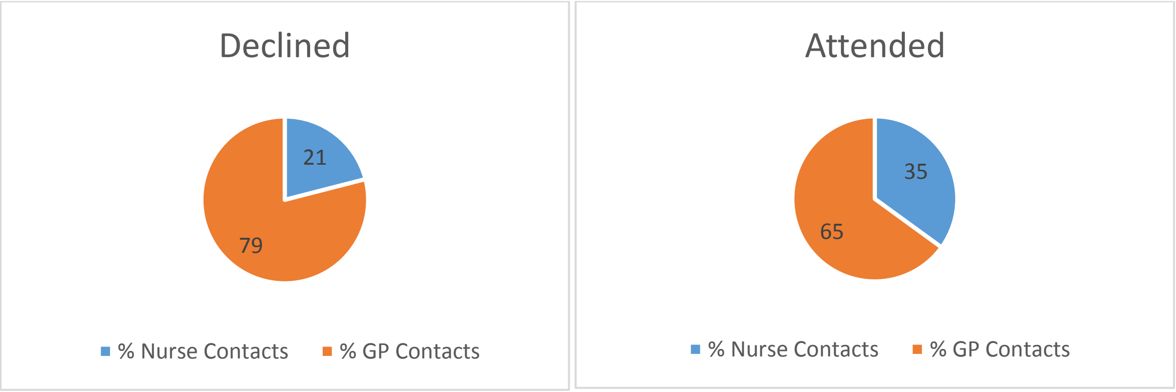
Table 4: Number of contacts with primary care (over 8 weeks)

	Total number of contacts – all patients who declined CCR	Average number of contacts per patient who decline CCR	Total number of contacts – all patients who attended CCR	Average number of contacts per patient who attended CCR
Telephone consultation				
Nurse	2	0.08	13	0.19
Doctor	13	0.54	31	0.45
Face to face consultation				
Nurse	6	0.25	30	0.44
Doctor	17	0.70	48	0.70
All consultations				
All nurse contacts	8	0.33	43	0.63
All GP contacts	30	1.25	79	1.16
Total Contacts	**38**	**1.58**	**122**	**1.79**
Total Patients in sample	**24**		**68**	

Analysis of this data could indicate that this new service model does not change the average number of contacts with the medical centre (1.58 average contacts for those who declined compared to 1.79 contacts for those who attended PN-led CCR).

Observable from the limited data is that as a proportion of all contacts with the medical centre, it appears that a PN-led CCR may be 'diverting' requests for consultations with the GP to the PN (see Figure 1).

Figure 1: Proportion of contacts with nurse and GP



Overall, those who attended for a Cancer Care Review appeared to have increased contact with Practice Nurses (whether by telephone or face to face) compared to patients who did not have a CCR. As a proportion of all consultations (both face to face and telephone) those with a GP appear to have been reduced.

5. Conclusion

The Practice led CCR has been compared to ‘usual care’ of a GP led CCR in NHS Lanarkshire. In relation only to cost, the new intervention was cheaper than the previous pathway and resulted in a cost saving per CCR of £44.

Resource utilisation following a CCR was compared to those who declined the review. It indicated that as a result of attending a PN led CCR, patient contacts with the PN increase.

6. References

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NHS Lothian Phase 2: Westerhaven TCAT project

TCAT HEALTH ECONOMIC EVALUATION

Final Report

Edinburgh Napier University TCAT National Evaluation Team

20 ovember 2017

1. Purpose of report

As part of the national evaluation of the Transforming Care After Treatment (TCAT) Programme, Edinburgh Napier University have implemented a strand of activity dedicated to evaluating to what extent interventions implemented by local projects within the programme provide more cost-effective solutions and/or a more appropriate use of resources than current practice.

To address the economic impact related questions of the overall evaluation each project's expression of interest application was reviewed using a standardised proforma. This proforma identified the potential of each local TCAT project to contribute to the economic work strand of the evaluation, by focussing upon for example opportunities for control groups/comparisons and relevant outcome measures such as quality of life measures using validated tools (e.g. EQ-5D or SF-36).

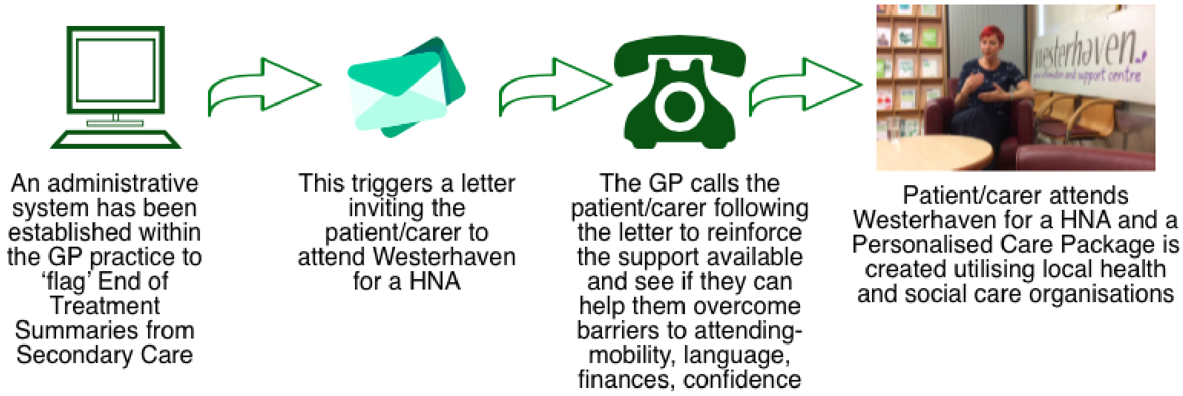
Edinburgh Napier University were not involved in the design of the interventions nor their implementation. In addition, for many projects the 'advised' data or expected data was not subsequently available / sufficient for the robust application of the proposed health economic techniques.

The purpose of this report is to present the findings of this work as it relates to the Phase 2 Project, Westerhaven in NHS Lothian

2. Intervention

The project under consideration in this report aimed to identify every patient completing their cancer treatment and consistently offer them and their families an in depth one to one holistic needs assessment (HNA) carried out by staff of the Westerhaven Macmillan Information and Support Service. An active inclusion protocol was developed whereby all patients at the end of cancer treatment received a letter and a follow up phone call from a General Practitioner (GP) inviting them to attend for a HNA and informing them the service was also available for their families. Patients chose whether to accept or decline the service. The aim of the project was to empower service users (patients and carers) to optimise their well-being.

Figure 1: Active Inclusion at Westerhaven



3. Methods

The aim of the economic analyses was to assess whether an HNA improved patients' quality of life. In addition resource utilisation analysis was undertaken to compare the impact on resource utilisation of primary care based resources of those attending for an HNA and those declining (referred to as non-attenders).

3.1 Quality adjusted life years

The quality-adjusted life year or quality-adjusted life-year (**QALY**) is a generic measure of disease burden, including both the quality and the quantity of life lived. It is used in economic evaluation to assess the value for money of medical interventions. One QALY equates to one year in perfect health.

Quality of life was measured using the EQ-5D instrument (EuroQol Group 1990). The EQ-5D is a validated questionnaire for quality of life and asks questions regarding mobility, self-care, anxiety, pain and usual activities. It is a useful measure as it can be used to calculate QALYs (Quality of life years gained). Patients are also asked to evaluate their current health state on a scale from one to 100, which is shown on a Visual Analogue Scale (VAS).

The ratings for each health state were converted using the EQ-5D Value Sets Crosswalk Index Calculator and the Visual Analogue Scale (VAS) scores were calculated.

EQ-5D questionnaires were sent out 8 weeks post attendance at Westerhaven (n = 60) and to non-attenders, 8 weeks post invite (n = 20).

A total of 28 completed EQ-5D were provided for analysis. For attenders (n = 21; response rate of 35%) and for non-attenders (n = 7: response rate of 35%).

In relation to the data there were a number of limitations:

- The EQ-5D Instrument does not capture everything that this intervention aimed to do such as making patients feel more supported and the benefits of having a holistic needs assessment, which is looked at in the local evaluation.
- The data available on which to perform health economic analysis does not allow for, for example regression analysis or the accounting for confounding factors - therefore any observed changes in the measures may not be attributed wholly to the intervention. In addition, Quality of Life Questionnaires can be affected by many other factors that the intervention cannot affect, such as other co-morbid conditions.

3.2 Resource utilisation data

To allow comparisons between the groups (attenders and non-attenders) data was collected within 8 weeks of completing the HNA and for those that did not attend, 8 weeks after the invitation to attend Westerhaven was issued.

Data available on resource use was restricted to patients registered to Wester Hailes Health Centre, for which permissions were in place. This reduced the sample size available. Data was available for attenders (n =10) and non-attenders (n = 22).

Table 1: Data extracted from patient records for the 8 weeks post intervention or post declining the intervention

Resource used	Data extracted
Telephone consultation	
Nurse	*Number in 8 week period*
Doctor	*Number in 8 week period*
NHS 24	*Number in 8 week period*
Face to face consultation	
Nurse	*Number in 8 week period*
Doctor	*Number in 8 week period*
District nurse	*Number in 8 week period*
Unscheduled hospital admissions	Number in 8 week period
Contact with NHS 24	Number in 8 week period

Information on use of NHS 24 and the number of unplanned hospital admissions related to only one or two patients and was therefore excluded from the analysis.

The available data does not provide assurance that the control group (those who did not attend a HNA) are comparable to the new intervention cohort of patients (for example in terms of characteristics or disease trajectory). In addition, case matching and the identification of potential confounders from the data available was not possible.

4. Findings

4.1 Quality of life

The EQ-5D index ratings and VAS values of the attenders and non-attenders were compared (Table 3). The closer to 1 the EQ5D Index rating and VAS values are, the higher the patient rated their quality of life.

Table 3: EQ5D Index rating and VAS values

Group	Mean EQ5D Index rating	Mean EQ5D VAS values	Number in sample
Attenders	0.557	0.619	21
Non attenders	0.685	0.65	7

Overall, the data shows that the non-attenders, the patients who chose not to attend Westerhaven rated their quality of life higher than those who chose to attend. This finding holds with both parts of the EQ5D instrument (Index value and VAS).

However, the fact that nearly half (9 out of 21) the patients attending Westerhaven who returned a questionnaire, were in the palliative stages of their cancer provides one possible explanation for this finding. No data for non-attenders was available.

To explore this further the VAS scores of palliative and non-palliative attenders were compared, as it is known that despite interventions, palliative patients' self-reported health state declines over time (Homs, 2004). This showed that palliative attenders reported lower VAS scores on average than non-palliative attenders (p=0.06).

4.2 Resource Utilisation Analysis

Resource utilisation was analysed by exploring subsequent contacts with a GP and nurse for those patients who attended a HNA were compared to those who did not (Table 4).

As all the analysis is based on small sample sizes and large differences in sample size, caution must be used when interpreting the findings. The large difference in the sample sizes available restricted the comparison of absolute numbers of contacts. The figures were therefore converted to average number of contacts per patient.

Table 4: Average contacts with primary care (over 8 weeks)

Type of contact	Attenders (mean)	Non-attenders (mean)
Nurse telephone calls	0.9	0.55
Nurse consultation	0.9	0.69
Doctor telephone calls	2.1	2.59
Doctor Consultation	1.8	1.23
Total number of people in sample	10	22

When looking at mean contacts (Table 4) patients who attended the HNA at Westerhaven were more likely to have a telephone call with the nurse, have a consultation with the nurse and have a consultation with the doctor.

The data extraction illustrated that many nurse contacts were routine appointments for blood pressure checks and monitoring of chronic obstructive pulmonary disease (COPD) and therefore would be less likely to be impacted by this intervention.

5. Conclusion

The aim of the economic analyses was to assess whether an HNA improved patients' quality of life. In addition resource utilisation analysis was undertaken to compare the impact on resource utilisation of primary care based resources of those attending for an HNA and those declining (referred to as non-attenders).

There were however several limitations to the data used and the findings are therefore inconclusive.

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NHS Lanarkshire Phase 1

TCAT HEALTH ECONOMIC EVALUATION

Final Report

Edinburgh Napier University TCAT National Evaluation Team

20 November 2017

1. Purpose of report

As part of the national evaluation of the Transforming Care After Treatment (TCAT) Programme, Edinburgh Napier University have implemented a strand of activity dedicated to evaluating to what extent interventions implemented by local projects within the programme provide more cost-effective solutions and/or a more appropriate use of resources than current practice.

To address the economic impact related questions of the overall evaluation each project's expression of interest application was reviewed using a standardised proforma. This proforma identified the potential of each local TCAT project to contribute to the economic work strand of the evaluation, by focussing upon for example opportunities for control groups/comparisons and relevant outcome measures such as quality of life measures using validated tools (e.g. EQ-5D or SF-36).

Edinburgh Napier University were not involved in the design of the interventions nor their implementation. In addition, for many projects the 'advised' data or expected data was not subsequently available / sufficient for the robust application of the proposed health economic techniques.

The purpose of this report is to present the findings of this work as it relates to the Phase 1 Project in NHS Lanarkshire

2. Intervention

The aim of the TCAT project was to test the use of electronic patient reported outcomes measures (PROM), a form of holistic care needs assessment, to support patients during their follow up on completion of treatment. The PROM selected for the project was the Sheffield Profile of Assessment and Referral of Care (SPARC).

The SPARC contains 45 items which are scored by the patient as 0 - not at all, 1 - a little bit, 2 - quite a bit, and 3 - very much depending on level of need. This was developed onto an online platform, Docobo-WEB by telehealth providers Docobo, allowing patients' to access the assessment on any day between 6am and 11pm from a mobile phone, tablet, laptop or personal computer. Patients were eligible for participation if they had a lung cancer diagnosis, lived in South Lanarkshire and completed surgery, radical radiotherapy, palliative radiotherapy or chemotherapy. As the aim of the project was to test digital health technology and eligible patients had to be computer literate or be able to nominate a person on their behalf to complete the eSPARC online. For the purpose of the project we focused on active treatment pathways. Therefore patients receiving best supportive care were not eligible for participation. [3].Recruited patients were sent an electronic version of the SPARC

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[3] Local Evaluation Report, Executive Summary

questionnaire once a month for six months. Patients completed this, without a professional present and the details were available to be reviewed by the TCAT Lung Cancer Nurse Specialist (LCNS) who provided patients the option of a face-to-face or telephone consultation to discuss their concerns. A plan of care to manage each concern was then agreed between the patient and LCNS. This could include a combination of self-management information, signposting and onward referral. The care plan was shared with the patient and their GP.

3. Methods and their limitations

The aim of the health economic work for this project was to perform a cost benefit analysis of the intervention using data provided by the local project. Cost effectiveness was to have been calculated as cost benefit and expressed as the cost of gaining an additional unit of quality of life as measured by the Functional Assessment of Cancer Therapy - Lung (FACT-L) instrument. The limited number of patients recruited to the project (21% of the 275 eligible patients (n=58)) severely restricted the meaningful application of cost benefit analyses. Therefore, only the cost per patient has been calculated.

3.1 Quality of life

Quality of life data was gathered using the FACT-L questionnaire (Cella et al 1995). The FACT-L instrument is a self-administered quality of life tool which measures quality of life in patients with lung cancer or lung disease across 5 domains including physical, social/family, emotional and functional wellbeing combined with a lung cancer subscale (Butt et al 2005). Scores range from 0 to 136. A higher score indicates better quality of life. Data was gathered at three time points. These were before the first SPARC assessment (Time point 1), after the 3rd SPARC assessment (Time point 2) and after the 6th SPARC assessment (Time point 3).

Forty-two (42) patients had data available for the 1st and 2nd Time points. From these 42, data for only 26 patients was available for Time point 3.

3.2 Costs

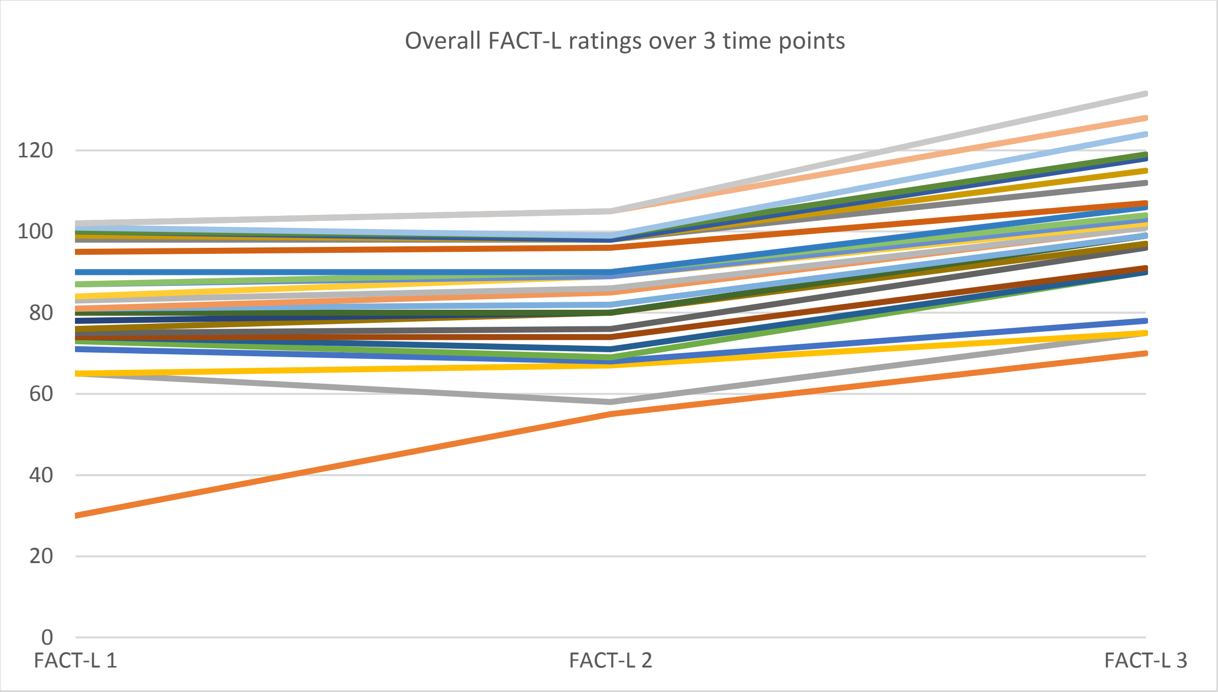
Cost data supplied by the NHS Lanarkshire team gave an overall project cost of £181,880 (Total funding of £237,404 minus £55,524 underspend). The two major costs were staff and operating system for the online assessments. Salaries for the two-year project accounted for £102,492.04 (56%) and the Docobo-WEB system for £40,848 (22%).

4 Findings

4.1 Quality of Life as measured by FACT-L

Overall FACT-L ratings of patients with data available at all three time points was analysed. This is shown in Figure 1, on which each line represents one individual patient.

Figure 1: Participants' FACT-L rating across Time point 1, 2 and 3



(n = 26)

From this initial analysis, the trend in quality of life for this group appears to be relatively stable over Time points 1 and 2, with a general increase to Time point 3. However, this finding must be interpreted with caution as it is based on only 26 patients.

Using all available data, Table 1 shows the median and mean of all Fact-L ratings for each time point.

Table 1: Median and mean of all FACT-L ratings over three time points

	FACT-L rating			
	Time point 1 (n = 42)	Time point 2 (n = 42)	Time point 3 (n = 26)	Overall change (T1 to T3)
Median	**99.5**	**98**	**101**	**+1.5**
Mean	94.3	96.6	101.3	+7

This analysis further confirms the minimal change in quality of life reported across Time point 1 and 2 and noted in Figure 1. The validity of the findings is, however, compromised given the smaller sample size available at Time point 3.

Further analysis of the quality of life ratings was completed exploring the impact of the intervention on each of the five subscales of the Fact-L instrument. This is shown in Table 2. Following the recommendations of Dolan et al (2000), the median were used for calculating overall gains in quality of life.

Table 2: Median and percentage change in sub-scales of FACT-L (T1 and T3)

	Wellbeing				
	Physical	**Social**	**Emotional**	**Functional**	**Lung Cancer Sub Scale**
Median	2.5	- 0.5	0.5	2.5	1.5
% Change (median)	8.92	-1.78	2.08	8.92	4.16

The greatest increases were evident in the Physical and Functional wellbeing of the participants, with overall median gains of 2.5 units being reported for each subscale.

Given the recommendations of Ringash et al (2007) that a difference of 5% in the instrument range may be representative of a meaningful change in quality of life, this analysis suggests that the NHS Lanarkshire project has meaningfully positively impacted the lives of patients with lung cancer in relation to their Physical (8.9% improvement) and Functional (8.9% improvement) wellbeing.

4.2 Costs per patient

Given overall project costs of £181,880 (Total funding of £237,404 minus £55,524 underspend) and number of patients completing the new pathway (n = 58), the cost per patient is calculated as £3135.86.

Had all eligible patients participated (n = 275) the cost per patient completing the new pathway would have been £661.38.

5.0 Conclusion

The impact of the TCAT project has been considered in relation to quality of life (using FACT-L instrument) and the cost per patient. , This analysis suggests that the NHS Lanarkshire project has meaningfully positively impacted the lives of patients with lung cancer in relation to their Physical (8.9% improvement) and Functional (8.9% improvement) wellbeing at a cost of £661.38 per eligible patient.

There were several limitations to the data available as outlined previously. Caution is therefore advised with regards to drawing any conclusions using only the data presented here.

6.0 References

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NHS Fife, Best Supportive Care (Phase 1)

TCAT HEALTH ECONOMIC EVALUATION

Final Report

Edinburgh Napier University TCAT National Evaluation Team

October 2016

Introduction

The following is a report written as part of the TCAT Evaluation project undertaken by Edinburgh Napier University for Macmillan Cancer Support. This report details the economic analyses undertaken in collaboration with NHS Fife as part of the Phase 1 TCAT projects.

Overview

The Fife TCAT Lung Cancer Project aimed to develop and test a model of care which could be extended to all patients with advanced cancer. The new model incorporated a risk stratified pathway to provide more proactive and responsive palliative care through the development of a best supportive care clinical pathway. It was anticipated that the number of unplanned admissions and follow up in secondary care clinics would be reduced. This report outlines the final findings in relation to the economic outputs of the project. The report is structured according to the outcomes that were identified in the Interim Report.

A comparison of patient pathways for best supportive care, prior to and following the new model of care

This outcome was achieved using decision analytical modelling. Probability trees were built using TreeAge pro software to map the patient journey for both the new clinical pathway and a comparator pathway. The Fife project team ensured the final trees were clinically relevant and accurate.

The trees were populated with observational data supplied by the Fife team. The data were gathered over a 12 month period for both groups, with 102 participants' data being available for 2012 and 99 for the 2015 tree. Resultant probabilities were calculated. The pre and post 'new model of care' probability trees can be seen at the end of this appendix.

A comparison of resource use prior to and following the new model of care

Resource use was calculated using observational data supplied by the Fife team. Costs were sourced from Scottish Health Service Costs (ISD 2015). All costs were calculated using data specific to NHS Fife from the financial year 2014/15. For costs of laboratory testing, it was assumed that there was an equal amount of haematology and biochemistry testing completed. The costs allocated were therefore the average of these two tests (£5.74 for haematology, £5.27 biochemistry). Equally, for CT/MRI costs, an average of the two tests was used (£38.98 for CT, £111.40

MRI). Given the short duration of the project (12 months), no discounting was applied.

	Total Number of tests (Number of tests x n)	**Cost range**	**Total Number of tests (Number of tests x n)**	**Cost range**
Year	**2012**		**2015**	
Resource				
Laboratory testing (blood) Cost per test £5.50				
Once	27	£148.64	33	£181.67
2 – 5 times	86 – 215	£473.43 - £1183.58	84 - 210	£462.42 – £1156.05
6 – 10 times	66 - 110	£363.33 - £605.55	48 – 80	£264.24 - £440.40
11+ times	66	£363.33+	11	£60.56
Total	**£1348.73 - £2301.10**		**£968.89 - £1838.68**	
Difference	**Saving £379.84 - £462.42**			
Radiology (conventional x-ray) Cost per examination £48.76				
One	48	£2340.48	45	£2194.20
Two	20	£975.20	28	£1355.76
Three	6	£292.56	6	£292.56
Four	8	£390.08	4	£195.04
Five	10	£487.60	5	£243.80
Six	12	£585.12	0	0
Total	**£5071.04**		**£4277.36**	
Difference	**Saving £793.68**			
CT/MRI Cost per examination £75.19				
One	15	£1127.85	19	£1428.61
Two	8	£601.52	2	£150.38
Three	9	£676.71	0	0
Four	4	£300.76	0	0
Total	**£2706.84**		**£1578.99**	
Difference	**Saving £1127.85**			
Bed days Cost per bed day £912.00				
	1079	£984048.00	624	£569088.00
Total	**£984048.00**		**£569088.00**	
Difference	**Saving £414960.00**			
Overall Total	**£993174.61 - £994126.98**		**£575913.24 – £576783.03**	
Overall Difference	**Saving £417261.37 - £417343.95**			

A comparison of unplanned admissions prior to and following the new model

For this outcome, all admissions were considered unplanned. A comparison of the admission rates is given below. The data does not include patients who were diagnosed with lung cancer as acute hospital in-patients and subsequently died in hospital on that admission (n = 11 for 2012 and n = 7 for 2015).

	2012 (Total available cohort n = 91)	**2015 (Total available cohort n = 92)**	**Difference**
Admission to Hospital (Total)	56	57	**+ 1**
Admitted once	47	41	**- 6**
Admitted more than once	9	16	**+ 7**
Admission to Hospice (Total)	16	14	**- 2**
Admitted once	16	12	**- 4**
Admitted more than once	0	0	**0**

Discussion

Patient pathways

An overview of the probabilities of each terminal node are presented below. A comparison of the changes in probability is also presented. Given the sample sizes available (n = 102 for 2012 and n= 99 for 2015) and the 18 terminal nodes in the probability tree, some of the end points were calculated with very minimal data. Where probability is 0 on the figures, this indicates no data availability for that branch (i.e. this event was not observed in the patient population during the study period). Where the difference is negative, there has been a reduction in the probability of that event happening based on the observed data. Positive differences indicate an increase in that event.

Event	**2012**	**2015**	**Difference**
Assessment as in patient	0.325	0.162	- 0.163
Dies in hospital	0.099	0.07	- 0.029
Discharged from hospital to hospice and dies in hospice	0.02	0.02	0
Discharged home, no further admissions and dies at home	0.062	0.03	- 0.032
Discharged home, readmitted to hospice and dies in hospice	0.02	0	- 0.02
Discharged home, readmitted once to acute care and dies in acute care	0.074	0.02	- 0.054
Discharged home, readmitted once to acute care and dies in hospice	0	0	0
Discharged home, readmitted once to acute care and dies at home	0.028*	0.01*	- 0.018
Discharged home, readmitted more than once to acute care and dies in acute care	0.01*	0.003*	- 0.007
Discharged home, readmitted more than once to acute care and dies at home	0	0.003*	+ 0.003
Discharged home, readmitted more than once to acute care and dies in hospice	0.01	0.003*	- 0.007
Assessment as out patient	0.675	0.838	+ 0.163
Dies at home/in the community	0.127	0.182	+ 0.055
Admitted to a hospice and dies in in hospice	0.117	0.121	+0.004

Admitted to acute care once, and dies at home	0.127	0.131	+ 0.004
Admitted to acute care once and dies in acute care	0.186	0.161	- 0.025
Admitted to acute care once and dies in hospice	0.049	0.09	+ 0.041
Admitted to acute care more than once, and dies at home	0.029	0.05	+ 0.021
Admitted to acute care more than once and dies in acute care	0.039	0.08	+ 0.041
Admitted to acute care more than once and dies in hospice	0	0.02	+ 0.02

* indicates that terminal node data were calculated on n= 1

The introduction of the new model of care has increased the chance that patients will have best supportive care at diagnosis in the community. The probability of dying in hospital has been reduced, as has the chance of being readmitted before death. For those with multiple readmissions, the observational data again suggest that the overall probability of this happening has been reduced since the implementation of the new model of care, for all in the multiple readmission groups except those who die at home. For those assessed as outpatients, since the introduction of the new model, the probability of dying at home or in a hospice has been increased for all subgroups except those with multiple acute care admissions prior to death.

Resource use

Overall, healthcare resource use was less for the 2015 data set compared to 2012. Cost savings were generated across all resource use for which data was available. The greatest reduction was generated as a result of the reduction in bed days noted following the introduction of the new model. Overall, using the resource data collected by the Fife team, the new model of care represents a cost minimisation in the range of £417261.37 - £417343.95.

Comparison of unplanned admissions prior to and following the new model of care

The data show that overall, there has been a slight increase in hospital admissions (by n = 1) and a slight reduction (by n = 2) in admissions to hospice care.

A further simple model was built to compare the outcomes of unplanned admissions pre and post introduction of the new model. The model compares outcomes in terms of probability of events occurring and cost. Costs data were not available for hospice care specific to NHS Fife and were sourced from work based in NHS England (Georghiou and Bardsley 2014). Average length of stay for Hospice was calculated using inpatient data from ISD Scotland for Palliative Medicine (ISD Scotland 2016). As no TCAT specific data were available for average length of hospice stay, it was assumed that this would remain constant over the two time points compared. Average length of stay for hospital was calculated from the TCAT project evaluation.

Resource inputs		
Cost of hospital admission		
	Bed day, NHS Fife	£912.00 (ISD Scotland 2015)
	Average bed days per admission 2012	9.99 (TCAT data set)
	Average bed days per admission 2015	6.71 (TCAT data set)
Total 2012		***£9110.88***
Total 2015		***£6199.52***
Cost of hospice admission		
	Bed day, UK based hospice care	£400 (Georghiou and Bardsley 2014)
	Average bed days per admission	15.25 (ISD Scotland 2016)
Total		***£6100***

The analysis of unplanned admissions can be seen below in Figure 1.

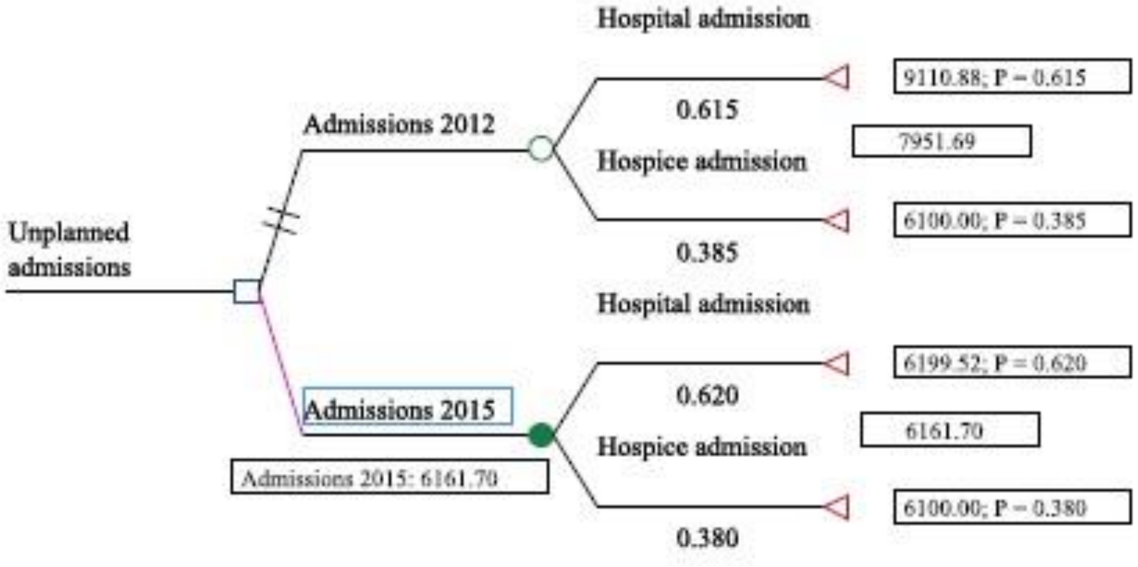

Figure 1: Unplanned admissions

This analysis shows that given the probabilities of unplanned admissions calculated from the observed data, the resource use of the average admission prior to the new model of care was £7951.69. This average was reduced to £6161.70 under the new model of care.

Conclusion

Overall, the available data show that the new model of care for patients with lung cancer has increased the probability of dying at home for most subgroups. This appears to be a more favourable patient pathway than before the introduction of the service. Resource use has been reduced over the resources for which data was available and potential cost minimisation has been achieved in the region of £417261.37. The main driver for this is the reduced average length of hospital stay. Although little difference was noted in the absolute number of overall admissions, the length of stay still represents an efficiency gain in terms of resource use. The average cost of unplanned admissions has also been reduced by £1789.99.

Subsequent work which incorporates quality of life ratings, a bigger sample size and more in depth resource use data could help inform any future cost benefit analyses of the service. The current work has given an insight into comparisons of observational data in relation to costs and resource use. A clear area for future study is how the quality of service has impacted on the patient experience. Combining this with the current models evaluating resource use would enable a comparison of cost effectiveness in addition to cost minimisation.

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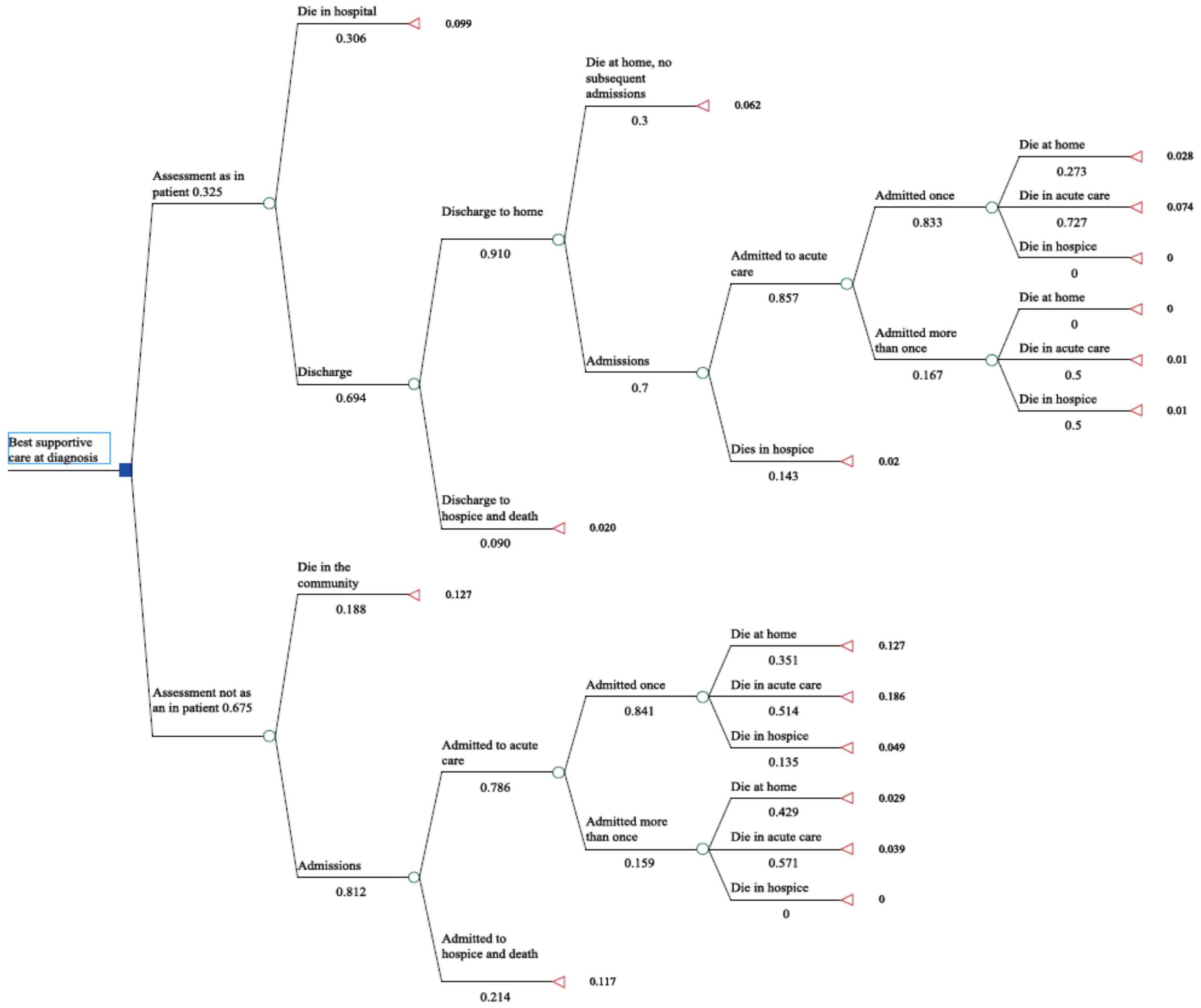
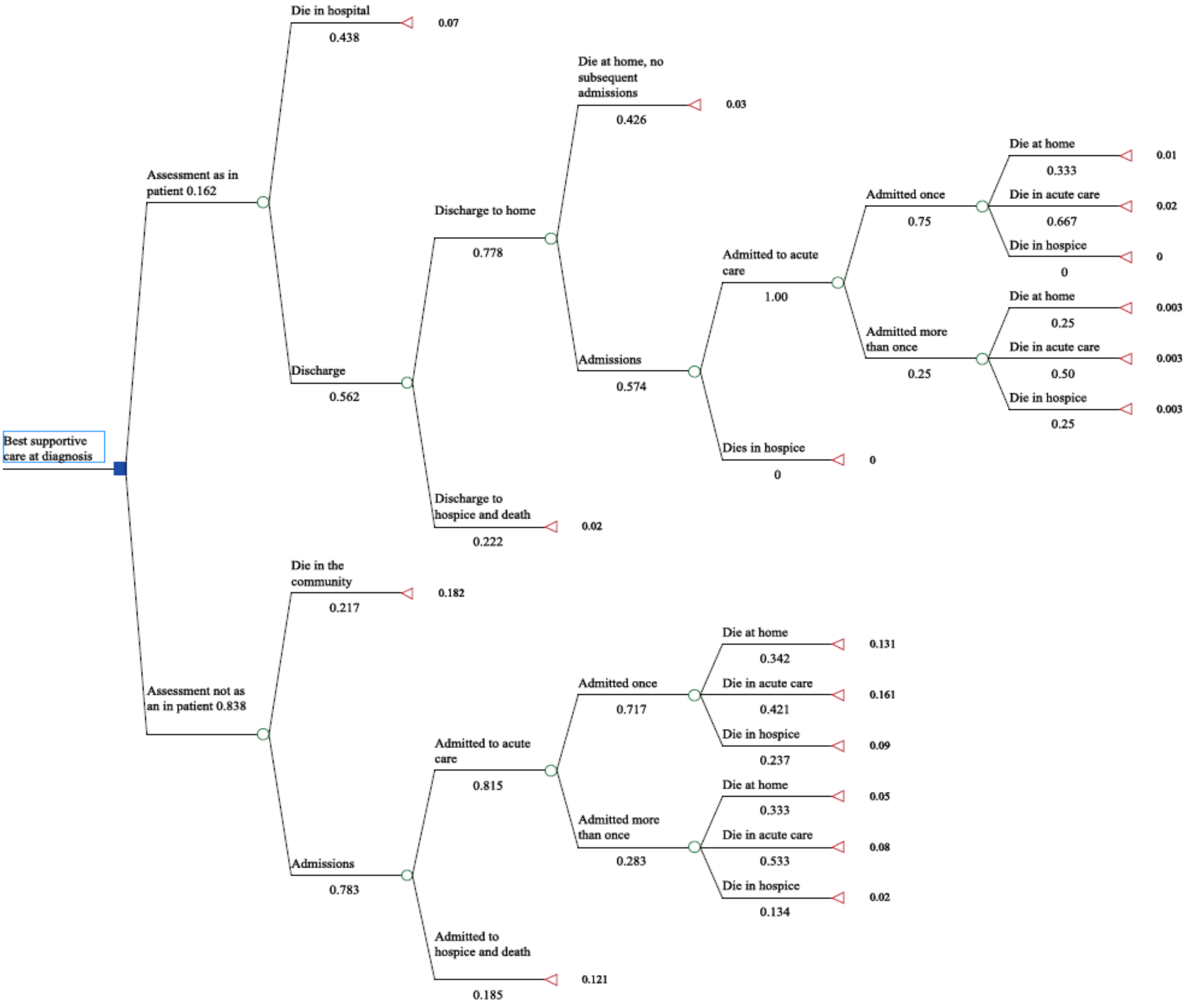
Probability tree with 2012 data (prior to the new model of care)



Probability tree with 2015 data (following the introduction of the new model of care)



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