

Model to assess the Economic Impact of integrating CRHT and Inpatient Services

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SUMMARY

Background. Recent years have seen the introduction of Crisis Resolution and Home Treatment (CRHT) teams into the acute mental health care pathway in most areas of England. However, to date there has been limited evidence as to the economic benefits and resource implications of offering CRHT services alongside inpatient treatment. This paper aims to assess the economic implications of properly integrating CRHT services within the acute care pathway, so that they offer home treatment as an alternative to inpatient admission in appropriate cases.

Methods. A decision model was developed to compare the costs where Home Treatment (HT) is considered as an alternative and supporting service alongside inpatient services with the costs where it is not. To enable a cost analysis comparing the pathways through these two models, a probability value must be attached to each branch in the model, and for each route taken through the model a cost must be estimated. Probability and cost values for the model were obtained from a National Audit Office (NAO) audit of CRHT teams and published figures. Sensitivity analyses were carried out to assess the robustness of the model.

Results. The expected health costs when HT was considered were approximately £2,200 over a 28-day period, compared to approximately £2,900 when HT was not considered. Sensitivity analyses revealed that the model was robust to changing most

of the values used; where a change in values would alter the results importantly, that threshold was unlikely to occur, according to expert opinion and evidence. Two exceptions were: the probability of being admitted after a referral was considered for both inpatient and HT services and rejected for HT, and the probability of being admitted when the acute care pathway did not include consideration of whether HT might provide an alternative or supporting service alongside inpatient services.

Implications. Around £600 can be saved per patient if home treatment is considered in addition to inpatient treatment. If the proportion of patients considered for both options is increased to 90% (from the current level of 50%), the total savings to the NHS could be around £53 million. If those HT services that currently gatekeep below average numbers of patients are brought up to the current average, the potential cost savings are around £12 million.

BACKGROUND

1. Crisis Resolution and Home Treatment (CRHT) teams have been in existence since the 1980s, and are currently a key component of mental health services in the UK.¹ The introduction of CRHT services modified the traditional acute mental health pathway by reducing the demand for and utilisation of inpatient services. This has the potential to positively influence the quality of inpatient services, for instance by reducing overcrowding. However, to achieve such gains it is critical that the inpatient and community elements of the mental health service operate in an integrated and coherent way.
2. Department of Health guidance² states that:

“Only by the local crisis team assessing all people who potentially require admission, can three key objectives for crisis services be achieved:

 - i) Patients should be treated in the least restrictive environment which is consistent with their clinical and safety needs;*
 - ii) In-patient admissions and pressure on beds should be reduced;*
 - iii) Equity of access to an alternative to admission for patients and families must be ensured.”*
3. Given resource scarcity, it is essential to assess the costs and cost-effectiveness of such interventions, and a number of health economic evaluations have been conducted.³ Two studies, one naturalistic comparison (1999-2001) and one randomised controlled trial (2002-2005), have been recently completed in Islington and results indicate that these CRHT services are effective.⁴

¹ See: Care Services Improvement Partnership (2006). *10 High-Impact Changes for Mental Health Services*; Department of Health (1999) *National Service Framework for Mental Health: Modern Standards and Service Models*; Department of Health (2001) *Mental Health Policy Implementation Guide*; Para 14.31 in *The NHS Plan Cm 4818-1* (July 2000).

² Department of Health (2007) *Guidance Statement on Fidelity and Best Practice for Crisis Services*. Department of Health (2002) *Mental Health Policy Implementation Guide: Adult Acute Inpatient Care Provision*.

³ Joy CB, Adams CE, Rice K (2006) *Crisis Intervention for people with severe mental illnesses*. Cochrane Database of Systematic Reviews. See also: Hoult J, Reynolds I, Charbonneau Powis M (1983) ‘Psychiatric hospital versus community treatment: the results of a randomised trial’. *Australian and New Zealand Journal of Psychiatry*, 17, 160-167 and Muijen M, Marks I, Connolly J (1992) ‘Home based care and standard hospital care for patients with severe mental illness: a randomised controlled trial’. *British Medical Journal*, 304, 749-754. See also Minghella E, Ford R, Freeman T, et al (1998) *Open All Hours- 24-hr Response for People with Mental Health Emergencies*. London, Sainsbury Centre for Mental Health.

⁴ Johnson S, Nolan F, Pilling S, et al. (2005) ‘Randomised controlled trial of acute mental health care by a crisis resolution team: The north Islington crisis study’. *British Medical Journal*, 331, 559. Johnson S, Nolan F, Hoult

Unpublished data also suggests that providing CRHT services alongside inpatient services delivers cost savings. Whilst these two studies certainly add to the evidence base regarding CRHT teams, they are focused on services in an inner-London borough, and as such their generalisability may be limited.

METHODS

Model structure

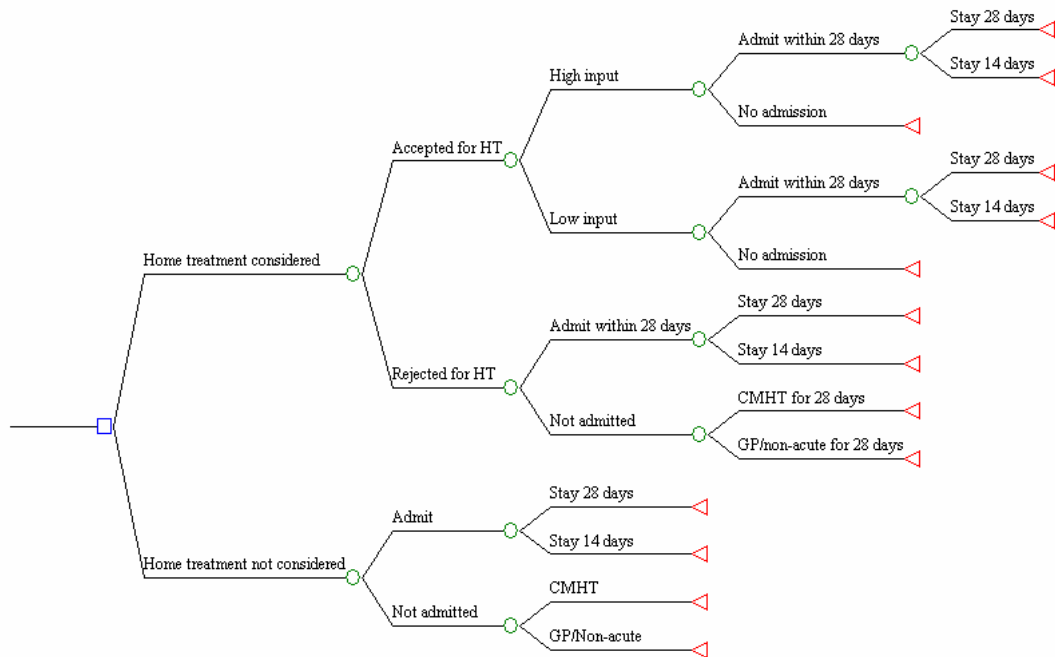
4. The model is made up 'branches' which illustrate a simplified care pathway, and of 'nodes', which indicate points where a care pathway may diverge. The cost analysis aims to compare two acute mental health service models. The first considers home and inpatient as alternative and supporting options for service users referred to it, while the second does not include the home treatment option. In both cases, a probability value is attached to each branch in the model, and a cost is estimated for each route taken through it.
5. The Department of Health's policy is that all people referred as experiencing a mental health crisis should be considered for treatment at home or in an inpatient unit, and flexibly access both across the period of their crisis until it is resolved. Therefore the populations that follow the 'home treatment considered' and the 'home treatment not considered' branches should be the same; services should provide a CRHT assessment for *all* referrals. However, as an NAO audit shows,⁵ many admissions are not being gatekept by CRHT teams; this shows that CRHT and inpatient services are currently not as integrated as they should be, which introduces the risk that CRHT and inpatient services are serving separate populations. Ideally there would not be such opportunity for potential patients to fall between the gaps of a disjointed acute care pathway. The model seeks to highlight how, by improving the proportion of referrals to acute mental health services that follow the 'home treatment considered' pathway, efficiencies/savings may be afforded to acute

(2005) 'Outcomes of crises before and after introduction of a crisis resolution team'. *British Journal of Psychiatry*, 187, 68-75.

⁵ See National Audit Office (2007), *Helping people through mental health crisis: The role of Crisis Resolution and Home Treatment services*, pp. 23f. (<http://www.nao.org.uk/pn/07-08/07085.htm>)

mental health services. The model illustrates how a pathway incorporating CRHT results in a different potential for different services to be delivered. It is by including more options that this pathway achieves potential savings, as will be shown.

The decision tree



6. The care pathways that might be experienced are described below:⁶

- In the model (shown above, and in more detail in appendices) patients are assumed to be referred to secondary care services following a referrer making an assessment that the patient may be experiencing a severe (acute) psychiatric crisis.
- Once referred, there is the possibility that the acute care pathway includes consideration of both acute inpatient and acute community services for each patient (as intended for all potential admissions according to Department of Health guidance). If on further assessment the referral is judged to be non-acute, the patient is re-directed to non-

⁶ Patients of an acute mental health service that includes the option of CRHT would follow the path in the model labelled 'Home Treatment considered'. Patients of an acute mental health service where CRHT services are not available or considered would follow the path in the model labelled 'Home treatment not considered'.

acute services. Alternatively HT services may not be available or considered, and a person referred as potentially experiencing a mental health crisis may only be considered for acute admission or non-acute services.

- If HT is not considered together with inpatient services, then the referral will either be confirmed as an acute case and admitted to an inpatient unit or receive some form of community care (either from a community mental health team or from primary care services) as a non-acute case.
- If the patient is admitted, then this may be for 28 days or 14 days (this is a simplification of what happens in reality, where lengths of stay are variable).
- If the pathway includes considering whether the patient could be treated at home or on an inpatient unit, or potentially could use both services in sequence, then the patient will be accepted or rejected for HT. Patients may be rejected for HT on the grounds that their crisis requires them to be admitted to inpatient services, or they may be rejected on the grounds that non-acute services are better suited to their needs.
- If accepted for HT, the patient is assumed to receive this at a high or low level of intensity. During the period of the crisis a patient following this pathway may still be admitted to an inpatient unit for a period of time or an admission may have been avoided altogether. The usual period of a crisis is approximately 28 days. Also, a patient may be discharged from an inpatient unit to the care of a CRHT team whilst still experiencing an acute crisis: the model allows for this, as the pathway described here allows the crisis period to include both an inpatient stay and treatment at home.

Probability values used in decision model

7. The probabilities used as a base case for the model are shown in Table 3 in the appendices.⁷ The source for most of these was a recent audit conducted by the NAO,⁸ although some probabilities are based on estimated effects. The probabilities currently used are suggested for the base case and can be adjusted to reflect different circumstances and to investigate the impacts where the probabilities do differ. It is important to recognise that the base case probabilities used here need only reflect the average tendency and that in different localities the pathway will operate differently.
8. For instance where CRHT teams have different capacities to accept patients for home treatment, the value of P9 'Accepted for HT' may vary around the base case we have used (0.5). What the sensitivity analyses later show is that in order for 'home treatment considered' to remain the less expensive service model, this value should not fall below 0.07 (meaning for every hundred referrals, the CRHT team should be able to accept at least seven).
9. Similarly, where the typical populations of referrals to acute mental health services in one area differ from the types and spectrum of referrals made in another area, P6a (the probability of being admitted after the initial referral is assessed, when HT is not considered) will vary around the base case probability (0.5). Again, the sensitivity analyses show that if fewer than around four in ten referrals to inpatient wards do not warrant acute services, then a pathway offering CRHT alongside inpatient services does not afford cost-savings compared to a pathway which does not.
10. There will be local variations in the likely probabilities that apply to the different branches in the model, and local managers can examine the threshold values to see if any of these are likely to be crossed in their locality. This should help to identify where important service characteristics may result in more or fewer efficiencies and cost-savings occurring.

⁷ The probabilities for all branches from a single node must add up to one: the hash '#' sign indicates where $p = 1 -$ (the sum of the other probabilities).

⁸ For full details, see the report *Are Crisis Resolution & Home Treatment Services seeing the Patients they are supposed to see?* at http://www.nao.org.uk/publications/nao_reports/07-08/07085_report_of_interviews.pdf

11. Where the care pathway considers utilising home and inpatient treatments together (e.g. potential admissions are 'gatekept' by a CRHT team), the model simulates how the probabilities of receiving the different services available will be different from where CRHT is not available or considered. For instance, where CRHT and inpatient teams are offered together, it is more likely that the CRHT team is then involved in early discharge. The model allows for this by setting the base-case probability (p20) of having a 14-day rather than 28-day admission length when HT is received at a higher level than is otherwise the case. The probability (p21) of having an early discharge when home treatment is not considered was set at zero to reflect that it is highly unlikely to occur. A sensitivity analysis was run to vary this outcome probability (at p20 or at p21) when the 'rejected for HT' path is followed, as the probability of an early discharge may be the same for all patients considered for HT, whether rejected or accepted. Similarly, if rejected they may be equally unlikely to have a shorter stay.

Evidence for base-case probabilities

P6 (probability of a patient being admitted after HT is rejected):

12. The NAO audit found a probability of 0.27 (see Table 1 in appendices, taken from an NAO audit of 500 referrals across 25 CRHT teams⁹) for patients being admitted to inpatient wards after being rejected for HT. However, 54% of the referrals to CRHT teams that were refused were in fact re-directed to non-acute services, and a further 6% were assessed as not needing any further mental health service. This indicates that referrals to the CRHT teams included a significant number of non-acute or non-mental health referrals. Of course CRHT teams may also accept some referrals that are inappropriate.
13. However, the NAO audit of 500 admissions to inpatient wards showed that CRHT teams are gatekeeping on average half of the admissions, and that common reasons why those admissions were not gatekept included that they

⁹ For full details, see the report *Are Crisis Resolution & Home Treatment Services seeing the Patients they are supposed to see?* at http://www.nao.org.uk/publications/nao_reports/07-08/07085_report_of_interviews.pdf

were Mental Health Act assessments and transfers from other wards. The total population of referrals directly to inpatient units (this would include the 50% of admissions that CRHT teams are supposed to gatekeep but currently are not gatekeeping) should therefore be expected to include fewer non-acute cases than the current population of referrals that are made directly to CRHT teams. Therefore, we have suggested that the 0.27 value be increased to 0.5 for the base case probability of being admitted after HT is rejected as we know that if CRHT staff were involved in all admissions, this would include MHA assessments and transfers and other referrals that are bypassing the CRHT team. This assumes that on being assessed for the appropriateness of HT and/or admission, half of patients are rejected for HT on the grounds that they require an inpatient admission and the other half would be referred to the non-acute services of the CMHT or primary care.

P6a (probability of a patient being admitted when HT is not considered):

14. The same assumptions as for P6 were followed for this variable, since we assumed there that half of the referrals would be considered acute enough to warrant admission, and that the other half would be re-directed to non-acute services because they were not acute enough to warrant admission. However, it is recognised that, because services are not currently gatekeeping all referrals, differences in severity may apply for the population of referrals for whom HT is considered (which often excludes MHA assessments and transfers, as previously discussed) and those for whom it is not. This possibility was also explored in sensitivity analyses.

P9 (probability of a patient being accepted for HT after HT is considered):

15. The NAO audit found that 296 out of 500 referrals (59%) directly to the CRHT team were accepted for HT (Table 1). However, some HT patients would still not be potential recipients of inpatient care (the NAO audit found CRHT managers estimated that 88% of HT clients were 'very' or 'quite likely' to have been admitted if HT could not be provided as an alternative). Also as for the argument for P6, we know that CRHT teams are gatekeeping 50% of

admissions, so the total population of referrals may include more cases that require admission. Therefore we suggested reducing the observed 0.59 figure to a base case figure of 0.50 so that, after considering whether a referral would be appropriate for HT, we assume for the base case model there is an equal likelihood that the patient is accepted or rejected for HT.

P13 (probability that patient receives high input from HT team after being accepted for HT and after HT is considered):

16. Onyett et al. show the percentage of CRHT teams' caseloads where contacts are more than daily (20%) or daily (43%).¹⁰ These have been combined to derive a probability of 0.63 for this parameter.

P15 (probability that patient receives care from community mental health team after not being admitted, after being rejected for HT and after HT is considered):

17. With the lack of an evidence base, this was set at 0.50 in the base case scenario, so that we assume a patient is equally likely to be referred on to either a GP/Primary care or a CMHT.

P15a (probability that patient receives care from community mental health team after not being admitted and after HT is not considered):

18. As for P15.

P17 (probability that a patient is admitted to hospital after receiving high or low input from a HT team, after being accepted for HT and after HT is considered):

19. This parameter is based on figures reported by Onyett et al. Page 56 of that report sets out the frequency with which referrals are made to other agencies, and these have been weighted to produce the above probabilities. The data produced by Onyett et al. are shown in Table 2 in the appendices.
20. We assumed that (i) 2-3 referrals daily = 70 referrals in 28 days, (ii) daily referrals = 28 referrals in 28 days, (iii) referrals at least once a week = four

¹⁰ Onyett S, Linde K, Glover G, Floyd S, Bradley S, Middleton H (2006), *A National Survey of Crisis Resolution Teams in England*. London, Care Services Improvement Partnership.

referrals in 28 days and (iv) referrals less often = 2 referrals in 28 days. If we assume that there are 100 teams we can use the above percentages as actual numbers of teams. (This assumption does not affect the probabilities.) Multiplying each number by the assumed number of referrals in 28 days results in 5,225 referrals to the above agencies by 100 teams in 28 days.

21. The probability is calculated as follows:

$$\begin{aligned} P17 \text{ (admission, row B in table)} &= [(0.6 \times 70) + (7.9 \times 28) + (61.0 \times 4) + (30.5 \times 2)] / 5225 \\ &= 0.11 \end{aligned}$$

P20 (probability that patient stays in hospital for 28 days after being admitted, after receiving high input from HT team, after being accepted for HT and after HT is considered):

22. This probability reflects the likelihood that the CRHT will/not be involved in early discharge (hence the change in length of stay to 14 days). The probability used is 0.68, which is an average of a high and low estimate taken from the NAO audit data. This is calculated as follows: $1 - [\text{Probability CRHT team are involved in the discharge (low 0.43 to high 0.53)} \times \text{probability that discharge is sooner due to CRHT involvement (low 0.43 to high 0.85)}]$.

$$\text{Hence highest estimate: } 1 - (0.43 \times 0.43) = 0.82$$

$$\text{and lowest estimate: } 1 - (0.53 \times 0.85) = 0.55.$$

P20a (probability that patient stays in hospital for 28 days after being admitted, after receiving low input from HT team, after being accepted for HT and after HT is considered):

23. As for P20.

P21 (probability that patient stays in hospital for 28 days after being admitted and after being rejected for HT):

24. Where the 'HT not considered' path is followed, we assume the CRHT team is unlikely to be involved in discharge, since NAO audit data showed that 'HT

not considered' is significantly more likely (Chi square value = 261.84, df =1, $p < 0.001$) where the CRHT team is not involved at admission. This makes 'admit 28 days' the most likely outcome (probability set to =1). We also assumed the same probability for a 28-day stay after 'HT rejected' and the patient is admitted. However, if the CRHT team rejects the patient, they may still be involved in early discharge, since they were involved in the admission in this case, and therefore it may be more realistic for the probability of a 28-day stay to be the same for all patients considered for HT. The uncertainty about this probability is addressed in the sensitivity analyses.

P21a (probability that the patient stays in hospital for 28 days after being admitted and after HT is not considered):

25. As for P21.

Costs used in decision model

26. The perspective of the model is the health service, so wider economic costs are not included here. The unit costs used are listed in Table 4 in the appendices. In some cases where patients receive treatment at home, there may be increased pressures on families and informal carers compared to where patients are admitted. Informal care costs may be substantial, but due to lack of robust data we have not included these in the model.¹¹

ANALYSES

27. The decision model allowed the costs of following any particular care pathway to be estimated. The model was also 'rolled back' to show the expected costs of providing the 'HT considered' and the 'HT not considered' pathways).

28. Threshold analyses were subsequently carried out by determining at which value, for each of the probabilities used in the base case model, the 'home

¹¹ McCrone P, Killaspy H, Bebbington P (2007) *The REACT study: cost-effectiveness of assertive community treatment in north London (unpublished)* found that approximately 4.28 hours a week, at a unit cost of £14 per hour, of informal care was received by assertive outreach service users. However, we have not assumed this finding can be generalised to CRHT patients.

treatment considered' service becomes more expensive than the 'home treatment not considered' service. Similar threshold analyses were performed by varying the costs in the model upwards/downwards by 50%. For those values where the results of the model changed (i.e. for some parameter values 'HT considered' was more expensive than 'HT not considered' and for other values it was less expensive) we conducted sensitivity analyses to show the costs of the two options as the parameter value changed.

29. Finally, we performed probabilistic sensitivity analysis (PSA) to explore the possible limitations of the model and the assumptions underpinning the base case. For this we had to make assumptions regarding the distribution of each probability used in the model. Most of the initial estimates were obtained from the NAO audit, and using these data we also used the minimum and maximum values to derive a triangular distribution for each probability. Where probabilities were derived from other sources we used broad ranges to reflect the uncertainty in the distributions. The minimum and maximum values for each probability are as follows:

P6, P6a	0.35-0.85
P9	0.2-1
P13	0-1
P15, P15a	0-1
P17	0-0.5
P20, P20a	0.55-0.82
P21, P21a	0.5-1

P6 and P6a were also varied between 0.25 and 1 in an additional analysis, with the other probability distributions remaining as above.

RESULTS

30. Over a 28-day period, if a service is provided following the 'Home Treatment considered' branch, then expected health care costs are **£2,224**. Otherwise, they are **£2,854** – a difference of **£630**.

31. The threshold analyses are shown in Figure 3. The blue shaded bars indicate the probability values which result in higher costs where CRHT is available and considered alongside inpatient services, whilst the red bars indicate the probability values which result in higher costs when it is not. The number next to each bar is the probability value used in the base-case analysis.
32. Figure 3 shows that if $P6^{12}$ is below 0.73 (less than around seven out of ten referrals that are considered for HT but rejected then result in an admission) then service costs are higher when 'HT is not considered', and above this value health costs are higher when HT is considered. For instance, the 'HT considered' pathway would be more expensive only if the CRHT team were rejecting more than seven out of ten of the referrals on the grounds that the patient's crisis could not be treated at home and required admission. This might occur if the CRHT team had insufficient capacity to provide an acute home treatment service. This is an important consideration, and trusts must ensure sufficient capacity is available to provide home treatments if CRHT is to deliver value-for-money.
33. If $P6a^{13}$ is below 0.39 (less than 39% of referrals are considered acute enough to warrant admission) then costs are higher when 'HT is considered', with values of $P6a$ above 0.39 resulting in higher costs when HT is not considered. This might only occur if the population of referrals direct to inpatient wards were very often (more than around six in ten cases) inappropriate, for instance, referring people who are not experiencing a psychiatric crisis to acute mental health services.
34. Health costs are higher after following the 'HT considered' pathway if $P9^{14}$ is below 0.07, and values above 0.06 indicate when health costs are higher if HT is not considered. This suggests that the service model that includes considering HT for potential admissions will be less expensive as long as HT is a viable alternative for more than one in every fourteen cases. The NAO audit data suggested that the acceptance rate was much higher than this, at around

¹² The probability of a patient being admitted after HT is rejected.

¹³ The probability of a patient being admitted after 'HT is not considered'.

¹⁴ The probability of a patient being accepted for HT after HT is considered.

one in two cases for referrals directly to the CRHT team. If, instead of the base-case value of 0.5, P9 was 0.6 then the expected health cost for the 'HT considered' pathway would fall from £2,224 to £2,079.

35. For values of P17¹⁵ below 0.43, health costs are higher for the 'HT not considered' pathway, and above 0.43 they are higher for the 'HT considered' pathway. This would suggest that, in order for 'considering HT' to become the more expensive service model, more than 43% of a CRHT team's clients would have to be admitted during their crisis. This is substantially higher than the evidence-based figure of 11% used in the base-case analysis.
36. Finally, health costs are higher for the 'HT considered' pathway if P21a¹⁶ is below 0.54, and higher for the 'HT not considered' pathway when P21a is above this value. This suggests that the 'gatekeeping' service model will be more expensive if around 90% of patients that are admitted (who are rejected for HT or not considered for it at all) are more likely to have a 14-day length of stay than a 28-day length of stay (or longer). This is highly unlikely because the median length of stay for admitted patients in England is 40 days for schizophrenia and 33 days for bipolar disorder (the mean lengths of stay are far higher due to a small number of long-stay patients).¹⁷ On average, a crisis being treated by a CRHT team will last for a period of 28 days. If many admissions are for a period longer than 28 days, then provision of CRHT services may avoid even more inpatient days.
37. Figure 3 also shows that health costs are highest when 'HT is not considered' regardless of the value of the remaining probabilities (P13,¹⁸ P15,¹⁹ P15a,²⁰ P20²¹), P20a,²² P21.²³

¹⁵ The probability that a patient is admitted to hospital after receiving high or low input from a HT team, after being accepted for HT and after HT is considered.

¹⁶ Probability that patient is admitted for 28 days after being admitted after HT is not considered.

¹⁷ Total 2005-06 admissions by primary diagnosis, categories F20–F25, F28–34, F38, F39, F40–F45 and F48.

Source: www.hesonline.nhs.uk.

¹⁸ Probability that patient receives high input from HT team after being accepted for HT and after HT is considered.

¹⁹ Probability that patient receives care from community mental health team after not being admitted, after being rejected for HT and after HT is considered.

²⁰ Probability that patient receives care from community mental health team after not being admitted and after HT is not considered.

²¹ Probability that patient stays in hospital for 28 days after being admitted, after receiving high input from HT team, after being accepted for HT and after HT is considered.

38. Figures 4-8 show the expected health costs for different values of P6, P6a, P9, P17 and P21a (i.e. the parameters which do change the results according to their values). These charts are similar to Figure 3, with the threshold values being the point at which the lines cross. Figure 4 indicates that as the probability of admission following rejection for HT increases, costs for 'HT considered' also increase, while those for 'HT not considered' remain constant. Figure 5 shows the converse as the likelihood of being admitted when HT is not considered increases. Figure 6 shows that the costs associated with 'HT considered' fall as the probability of acceptance by the HT team increases. In Figure 7 we can see that costs increase steadily if HT is considered when the probability of admission following HT team input increases. Finally, Figure 8 shows that if the probability of staying in hospital for 28 days when HT is not considered increases, so does the expected cost for both options, with little difference between the two.
39. Altering any of the individual cost parameters by +/- 50% did not change the results of the base-case model - we would expect costs to differ in rural and urban areas, but this sensitivity analysis showed that altering cost parameters did not change the results of the model. Similarly, where the provision and/or capacity of CRHT and inpatient services differs between rural and urban areas, resulting in different probabilities of high or low CRHT input, or of patients being accepted for HT, the 'HT considered' pathway remains the less expensive model subject to the threshold values above. There is no reason to expect those threshold values would be crossed even in rural services. This suggests that both urban and rural geographies should ensure that CRHT services are available alongside inpatient services in order to achieve cost savings.
40. The probabilistic sensitivity analysis allowed us to further explore the bounds of the model for a wide range of values for each of the key variables, and produce cost distributions for each arm. These are shown in Figure 9. The

²² Probability that patient stays in hospital for 28 days after being admitted, after receiving low input from HT team, after being accepted for HT and after HT is considered.

²³ Probability that patient is admitted for 28 days after being admitted after HT is considered.

distributions confirm that there is greater likelihood that not considering HT will result in greater costs. However, there is also substantial overlap between the distributions. Figure 10 shows very similar distributions produced when p6 and p6a varied between 0.25 and 1.

IMPLICATIONS

41. The base-model suggests savings of £610 in health costs if HT and inpatient services are considered together for a patient experiencing a mental health crisis. The PSA was used to compare this base case finding with what might happen if all key variables in the model were varied according to the distributions specified. Whilst this method did produce some situations where a service without CRHT proved cheaper than a service where CRHT is available and considered in all appropriate cases, this does not in itself suggest a compelling case for rejecting the assumptions of the base model. In reality, it is highly unlikely that the most extreme situations tested in this analysis would ever occur on a system-wide basis. And thus while such extremes could potentially occur in individual cases (particularly in areas of extreme prevalence), the data and assumptions underpinning the base case are the most robust empirical evidence currently available. Further data collection and analysis, beyond the scope of the current NAO audit, would be required to increase the precision of these estimates further.
42. In 2005/06 there were 84,702 admissions in England for patients with a psychosis, depression or an anxiety disorder.²⁴ The model assumes that 50% of people are considered for HT, and of these 31% are admitted and 69% are not, i.e. 15.5% (50% of 31%) of people experiencing crises have HT considered and are admitted, whilst 34.5% (50% of 69%) have HT considered and are not admitted. Of the 50% for whom HT is not considered, 50% are admitted and 50% are not. In each case this equals 25% of all crises. Overall, the percentage who are not admitted is 59.5% (34.5% plus 25%) with 40.5% being admitted (15.5% plus 25%). Therefore, the ratio of non-admissions to

²⁴ Total 2005-06 admissions by primary diagnosis, categories F20–F25, F28–34, F38, F39, F40–F45 and F48. Source: www.hesonline.nhs.uk.

admissions is 1.47 to 1. Consequently, the assumed number of crises which are referred to secondary services

$$\begin{aligned} &= (1.47 \times 84,702) \text{ plus } 84,702 \\ &= 209,141. \end{aligned}$$

43. If, in line with Department of Health policy, all potential admissions were considered for HT, then the cost saving to the NHS compared to an inpatient-only service would be around £132 million per year (assuming that savings only occur during the 28 days after the crisis starts). However, if we assume that 50% of admissions are already being gatekept by CRHT teams, as suggested by the NAO audit, then cost savings of around £66 million would be achieved by instead considering 100% of patients for HT. If gatekeeping levels were increased from 50% to 90%, there would be a cost saving of £53 million, and a saving of around £26 million if the gatekeeping was increased to 70%. The NAO audit identified that a number of CRHT teams were gatekeeping a below-average number of patients. If such teams were brought up to the average (53%), the cost savings would be around £12 million.
44. There are clearly limitations to this report. Most importantly, as this is a model it is by definition a simplification of the real world. It is, however, adaptable to different circumstances. We have conducted numerous sensitivity analyses around the parameters, and the main findings are robust to these. We have consulted with a number of experts about the model. Some felt that the likelihood of being admitted after a referral of a suspected psychiatric crisis would be higher than 50%, and therefore the cost savings indicated here may be conservative.
45. If the probability of being admitted after a referral of a suspected psychiatric crisis were 60%, then over a 28-day period with HT considered, the expected health care costs would be £2,502. This compares with expected costs of £3,409 if HT is not considered – a difference of £907. If the probability of admission were 70%, then over a 28-day period with HT considered the expected health care costs would be £2,779 and £3,964 respectively - a difference of £1,185.

46. In addition, we have confined the savings to the period of the crisis. Savings would increase if the input from the CRHT services had longer-term beneficial effects, for instance if admission in a crisis became less likely in future because of the previous experience of managing the crisis without admission.
47. However, it is critical to recognise and allow for the impacts which providing CRHT alongside inpatient services can create. As service users in crisis will be able to receive treatment at home when symptoms are less acute, and also be admitted when needed, over-occupancy on the wards should be relieved. However, this also means that at any one time the inpatient population is likely to be made up of more complex cases with high needs. Any potential savings that are afforded by the CRHT team reducing pressure on the wards will need to be balanced with the increased needs of patients and staff on the wards for a high-quality therapeutic environment. The value of savings created by CRHT teams should be seen in quality improvements across the acute mental health care pathway.

APPENDICES

Table 1 Outcomes for 500 referrals to CRHT teams

whether accepted or rejected, what outcome for service user? * did the CRHT refuse or accept this patient as a home treatment client? Crosstabulation

			did the CRHT refuse or accept this patient as a home treatment client?		Total
			refuse	accept	
whether accepted or rejected, what outcome for service user?	admission to inpatient	Count % within did the CRHT refuse or accept this patient as a home treatment client?	54 26.5%	21 7.1%	75 15.0%
	acute treatment from CRHT	Count % within did the CRHT refuse or accept this patient as a home treatment client?	1 .5%	250 84.5%	251 50.2%
	another acute treatment pathway	Count % within did the CRHT refuse or accept this patient as a home treatment client?	2 1.0%	0 .0%	2 .4%
	another non acute treatment	Count % within did the CRHT refuse or accept this patient as a home treatment client?	110 53.9%	21 7.1%	131 26.2%
	other	Count % within did the CRHT refuse or accept this patient as a home treatment client?	23 11.3%	2 .7%	25 5.0%
	no further mental health service needed	Count % within did the CRHT refuse or accept this patient as a home treatment client?	12 5.9%	1 .3%	13 2.6%
	don't know	Count % within did the CRHT refuse or accept this patient as a home treatment client?	2 1.0%	1 .3%	3 .6%
	Total	Count % within did the CRHT refuse or accept this patient as a home treatment client?	204 100.0%	296 100.0%	500 100.0%

Table 2 Percentage of CRHT teams referring to other agencies

	Where referred?	2-3 times daily	Daily	At least once a week	Less often
A	CMHT	6.7	24.8	58.2	9.1
B	Inpatient unit	0.6	7.9	61.0	30.5
C	Assertive outreach team		0.6	3.1	62.6
D	Rehab team		0.6	6.9	42.5
E	EI team		0.6	6.7	57.7

F	Substance misuse team		3.1	28.2	57.7
G	Primary care	2.5	18.4	39.3	30.7
H	A&E		3.1	18.5	54.9
I	Vol sector	0.6	8.0	25.8	49.1
J	Vol BME services		0.6	6.3	46.9
K	Police		0.6	5.5	60.7
L	Other alternatives to inpatient care	1.4	3.5	21.1	38.7
M	Other		3.8	5.0	28.8

Table 3 Base-case probabilities used in decision model

Label	Description	Probability	Source
p6	Admission for those rejected for HT	0.5	Estimate
p6a	Admission for those not considered for HT	0.5	Estimate
p9	Accepted for HT	0.50	Estimate based on NAO audit
p13	High HT input	0.63	Onyett et al. ²⁵
p15	CMHT after HT rejected and not admitted	0.5	Estimate
p15a	CMHT after HT not considered and not admitted	0.5	Estimate
p17	Admission after high/low HT input	0.12	Onyett et al
p20	28-day stay after receiving high input HT	0.68	NAO audit
p20a	28-day stay after receiving low input HT	0.68	NAO audit
p21	28-day stay for those admitted after HT was considered but rejected	1.00	Estimate
p21a	28-day stay for those admitted after not considered for HT	1.00	Estimate

²⁵ Onyett S, Linde K, Glover G, Floyd S, Bradley S, Middleton H (2006), *A National Survey of Crisis Resolution Teams in England*. London, Care Services Improvement Partnership.

Table 4 Base-case costs used in decision model

Description	Unit cost	Source
Assessed for HT, 2 hours of time from community mental health nurse	£94	PSSRU ²⁶
High input	£1198	PSSRU, Onyett et al ²⁷
Low input	£599	PSSRU, Onyett et al.
Admitted (x28 or x14) Cost of an inpatient day:	£201	PSSRU
CMHT care for 28 day period	£117	Based on data from Lambeth Early Onset study
GP/non-acute care for 28 day period	£44	PSSRU, assumed fortnightly GP contact

²⁶ Curtis L, Netten A (2006) *Unit Costs of Health and Social Care*. Canterbury, Personal Social Services Research Unit.

²⁷ Onyett S, Linde K, Glover G, Floyd S, Bradley S, Middleton H (2006), *A National Survey of Crisis Resolution Teams in England*. London, Care Services Improvement Partnership.

Figure 1. Decision model

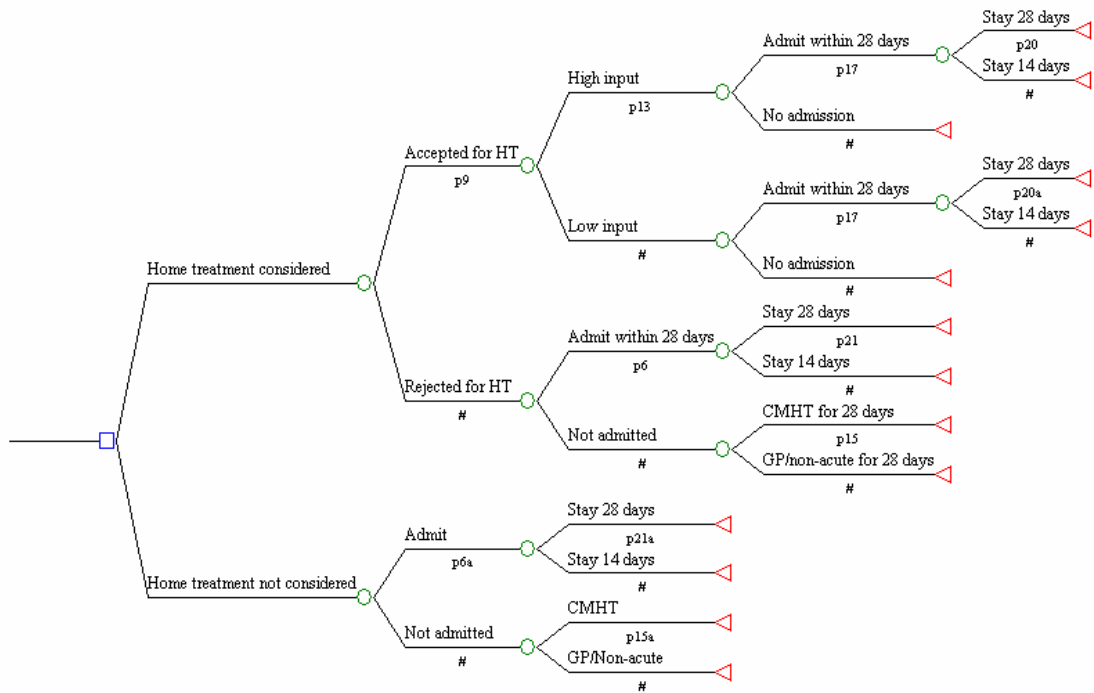


Figure 2. Model with full variable definitions

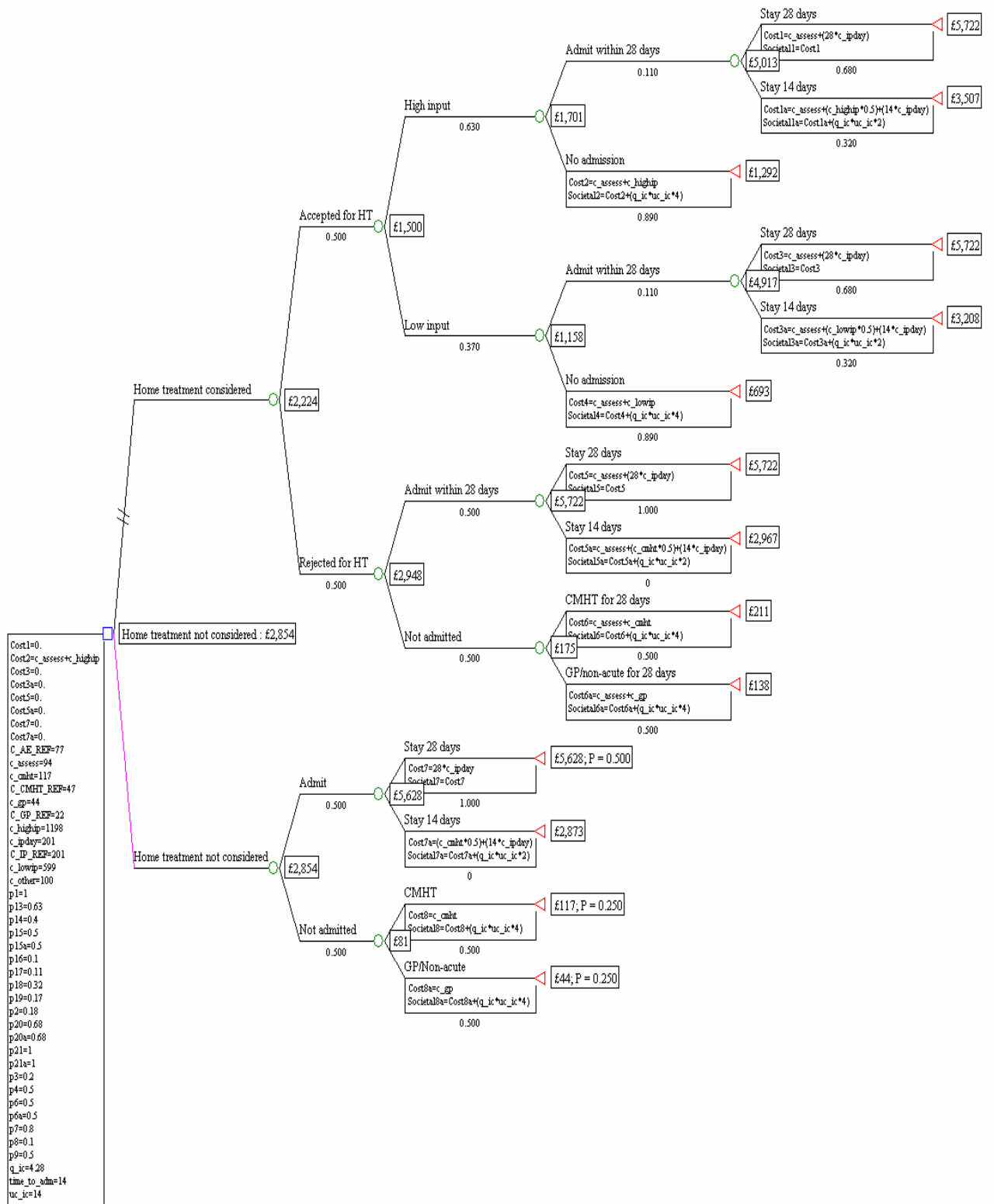


Figure 3. Probability values for which 'HT considered' and 'HT not considered' result in higher health costs.

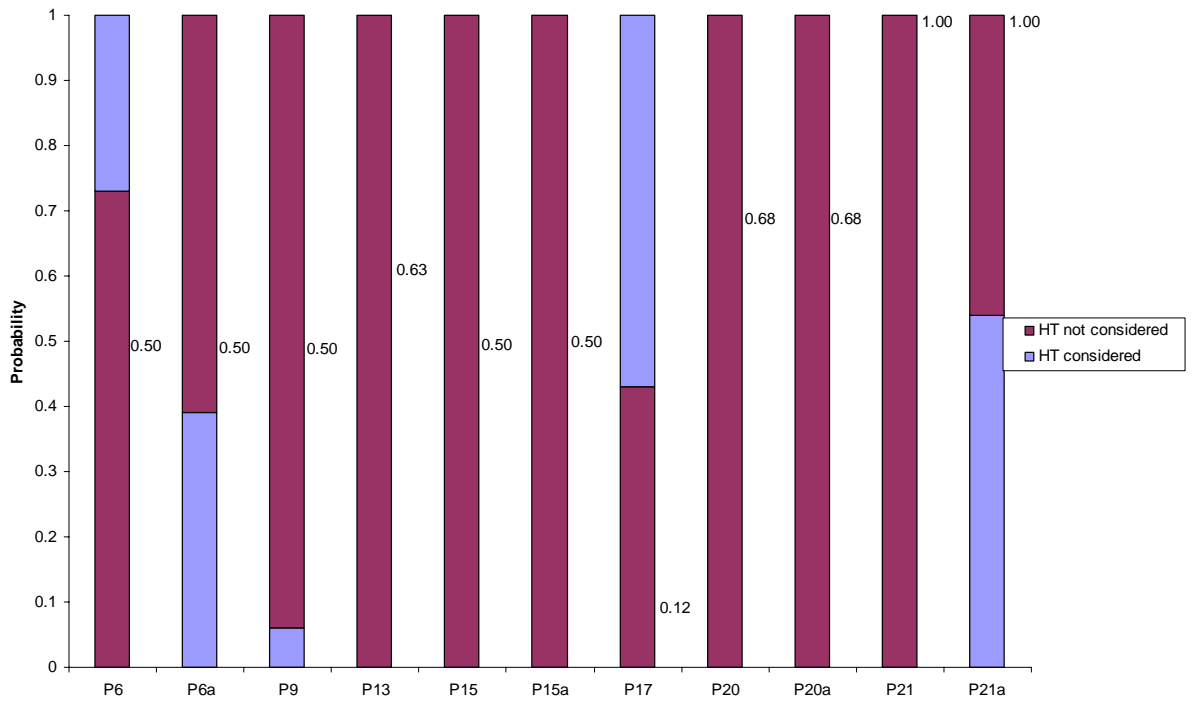


Figure 4. Impact on expected health costs of changing value of P6 (probability of being admitted when HT is rejected or is not considered).

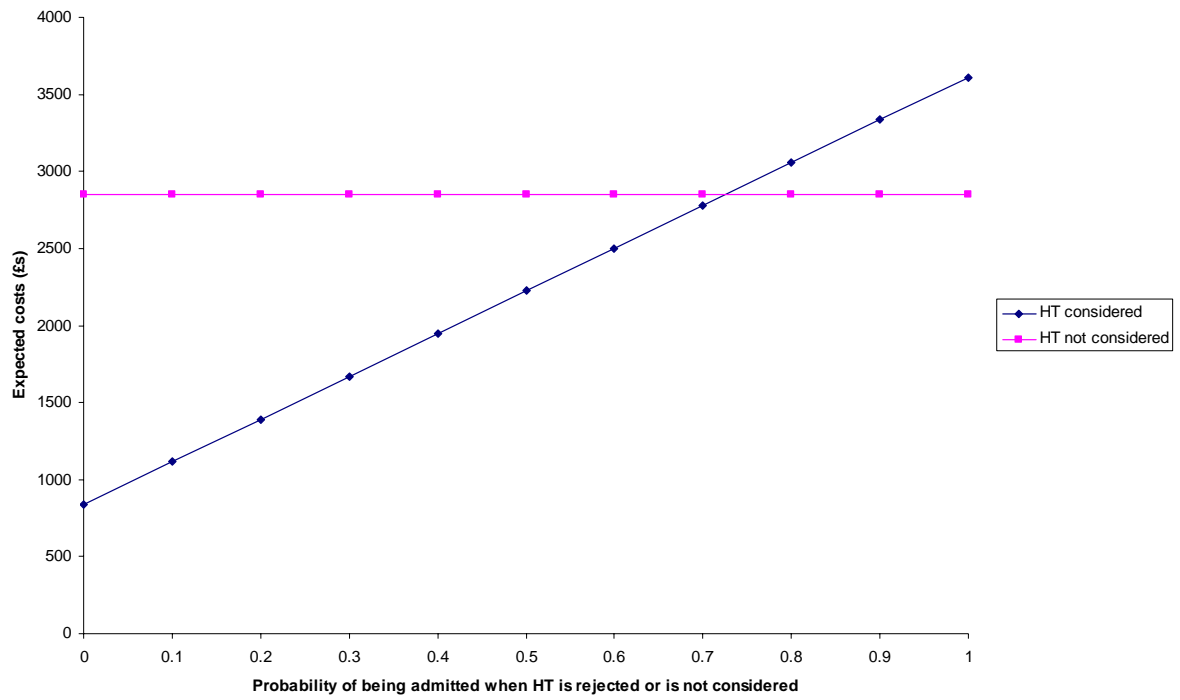


Figure 5. Impact on expected health costs of changing value of P6a (probability of being admitted to hospital after HT is not considered).

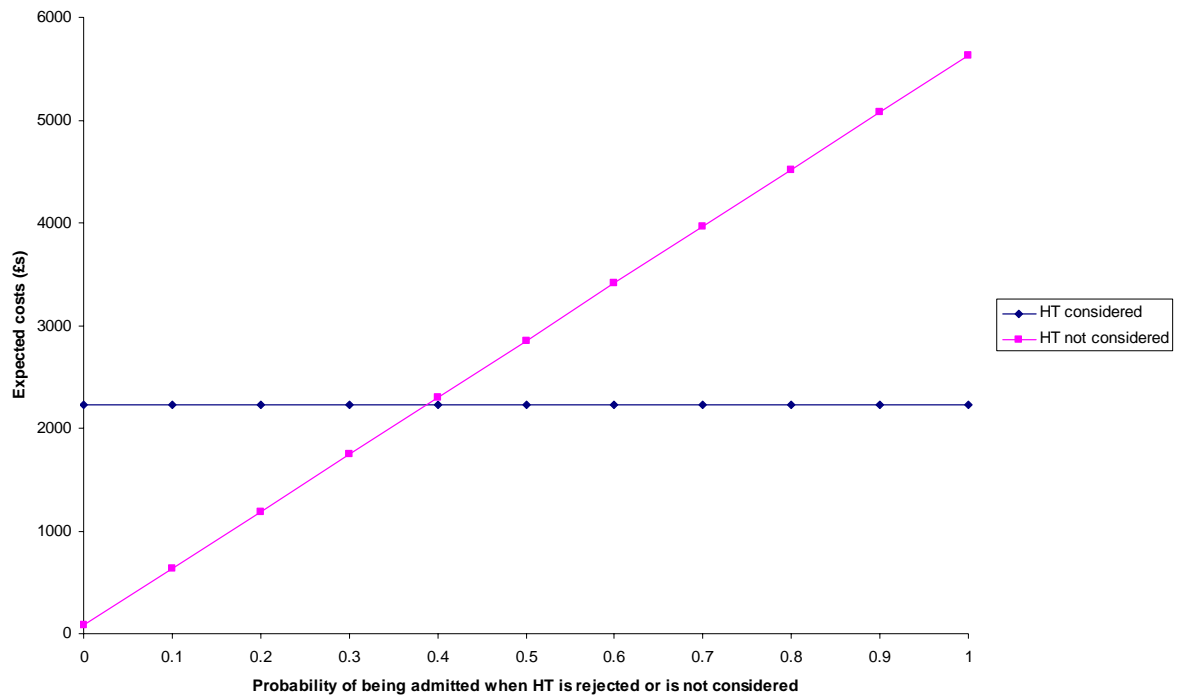


Figure 6. Impact on expected health costs of changing value of P9 (probability of being accepted for HT).

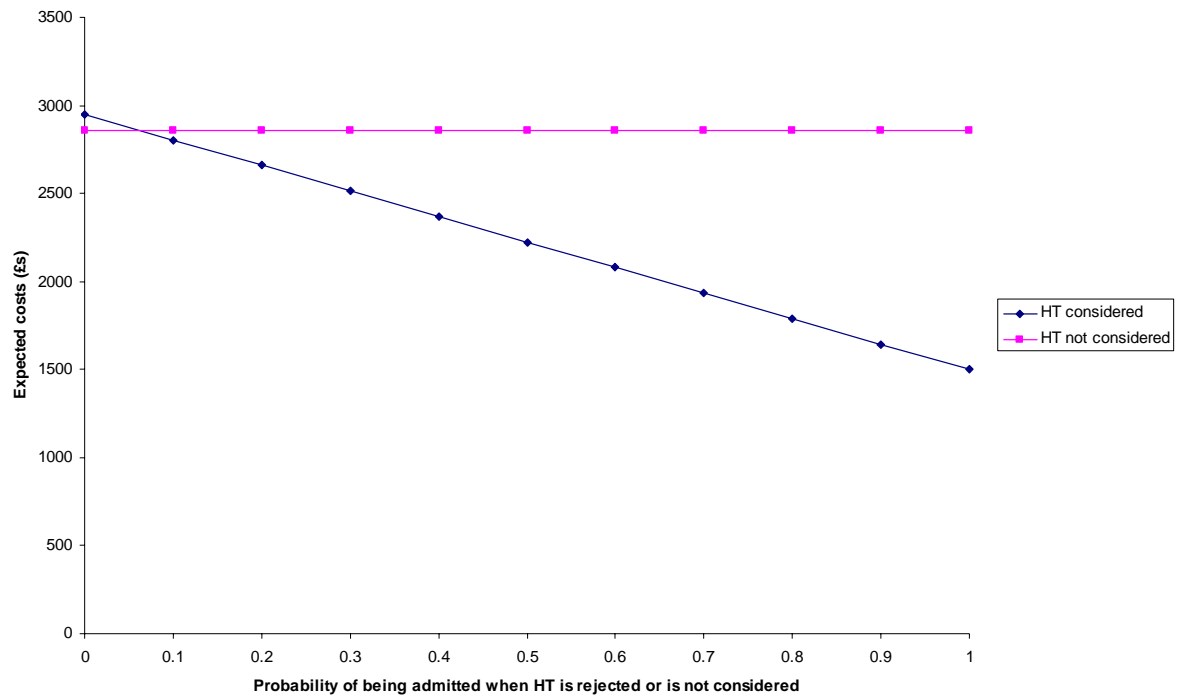


Figure 7. Impact on expected health costs of changing value of P17 (probability of being admitted to hospital after receiving high/low input from HT team, after being accepted for HT).

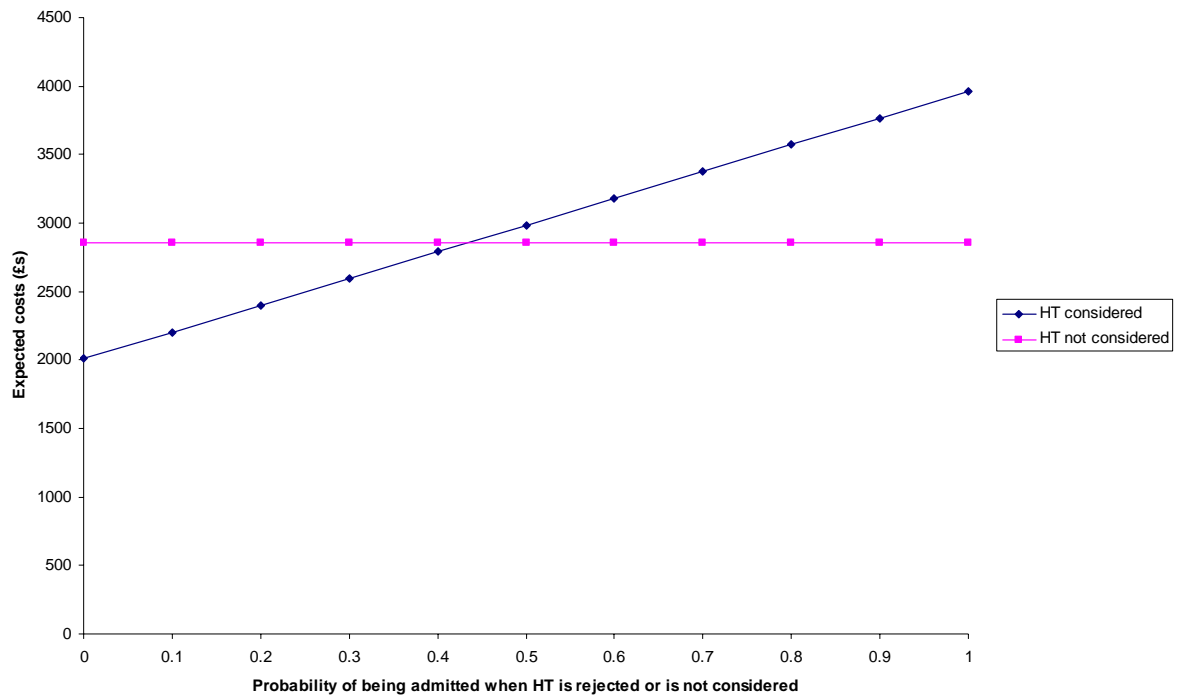


Figure 8. Impact on expected health costs of changing value of P21a (probability of 28-day length of stay following admission after HT was not considered).

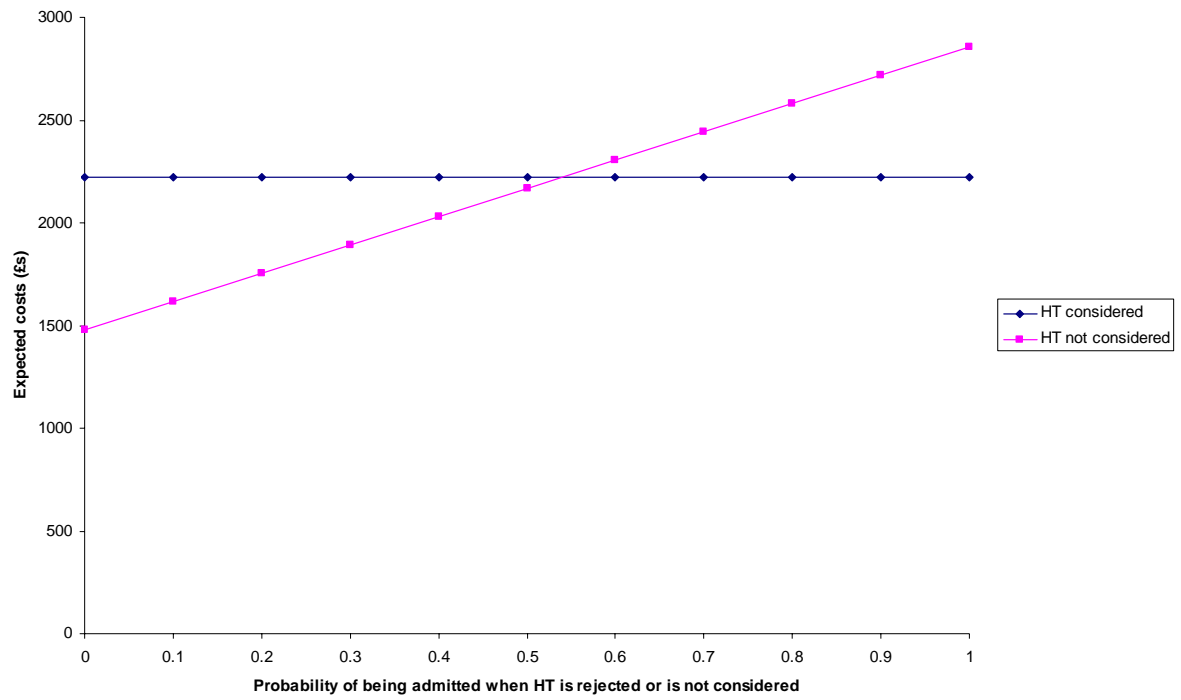


Figure 9. Distribution of costs based on probabilistic sensitivity analysis (PSA).

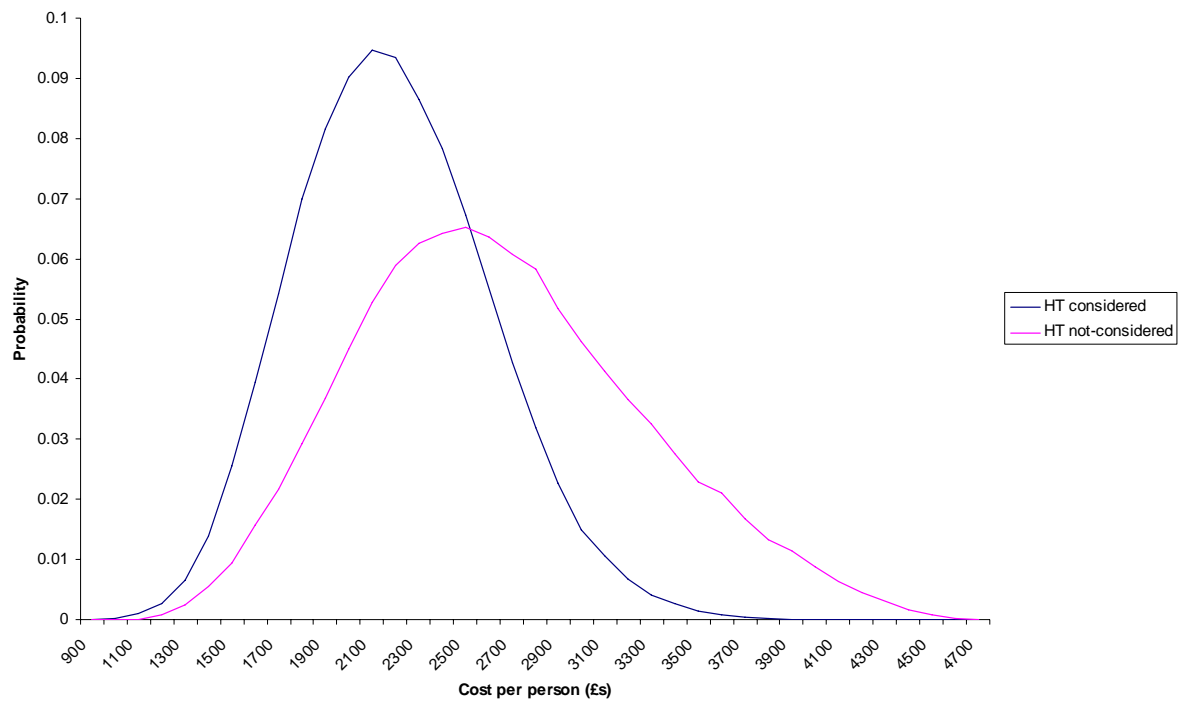


Figure 10. Distribution of costs based on probabilistic sensitivity analysis (PSA) with p6 and p6a varied between 0.25 and 1.

