CHAPTER 3

EFFICIENCY AND RATIONALITY IN THE PLANNING OF HEALTH CARE FOR PEOPLE WITH AIDS: AN APPLICATION OF THE BALANCE OF CARE APPROACH

A. Tramarin
K. Tolley
S. Campostrini
F. de Lalla
for the North-East Italian Group for Planning of AIDS Health Care

Published in AIDS (1997) 11:809-16
Summary

Objective: To demonstrate the application of an approach for assessing efficiency and rationality in the use of resources for the care of patients with AIDS (PWA), using data for north-east Italy.

Design: An economic methodology, the balance of care, (BoC) approach, enabled identification of scenarios for the current, planned and recommended provision of care in the study region.

Methods: Data on the supply and utilization of care by PWA across four locations (inpatient care, day care, home care and sheltered accommodation) was collected for a 6-month period during 1994. The current BoC measured in care contacts across AIDS Health Plan, and a recommended BoC scenario based on a Delphi expert panel judgement of the appropriate care location according to sets of hypothetical clinical and social characteristics of PWA. The cost consequences of reallocating patient contacts between the current BoC to the recommended BoC was assessed for inpatient and day care contacts.

Results: There is an overprovision of home care in the planned BoC scenario if applied to the study region. The cost consequences of a shift of care contacts according to the recommended scenario results in a potential cost reduction of 9.2% compared with the current scenario, and hence an expected efficiency improvement.

Conclusion: The BoC approach can be applied to improve the efficiency and rationality of resource use in planning care provision for PWA.

Introduction

The costs per patient for the treatment and care of HIV/AIDS has been constantly changing as the disease and its management evolves. Developments in new and costly drug therapies, shifts in the location of care from higher cost inpatient care to relatively less costly outpatient and day care, and reductions in the intensity of inpatient treatment and care were identified several years ago as important factors producing a “moving target for costs”[1,2].

A recent review of studies estimating the average cost of hospital treatment and care in the European Union countries identified a range of between 20 000 and 40 000 ECU per patient-years for AIDS stage patients (1 ECU = US$ 1.17 in 1993), and 2000-10 000 ECU per patient-year for HIV stage patients [3]. However, in planning HIV/AIDS care provision it is important
that planners take into account not just costs, but also consider whether the type and balance of care (BoC) provided with available resources best meets the needs of the patient population in a country or region. Cost saving are most desirable if they occur alongside greater efficiency in the use of resources so that current needs are still being met. However, increased costs might also be justified if greater levels of patient need are met.

Explicit and objective assessment of care supply, costs and needs of patients can be assisted by the application of a technique of economic analysis, known as the BoC approach. It has been applied to investigate care needs and cost consequences for elderly people \cite{4, 5}, but has not previously been used in the assessment of HIV/AIDS care. However, it has been argued that the care needs of the elderly and HIV/AIDS patients are similar \cite{6}, so that the BoC for the latter group can be analysed using the same approach.

In this study, using data for an AIDS study population in the north-east of Italy, we have used the BoC approach to assess care supply and costs across four care locations: inpatient care, day hospital, home medical care and sheltered housing. The two specific objectives were first, to assess the supply of care related to three scenarios (“current”, “planned” and “recommended”) of the BoC for people with AIDS (PWA) across care locations and secondly, to illustrate the cost consequences associated with a shift from the “current” to the “recommended” BoC scenario.

Our general hypothesis was that improved efficiency and rationality in AIDS care planning can be obtained through explicit and objective consideration of the appropriate care needs of PWA, and the cost consequences of care location decisions.

**Background and methods**

**Principles of the BoC approach**

The BoC approach provides a framework for improving the rationality of decision concerning the supply of resources across care locations for a patient group (i.e., care units or places), such as the elderly or PWA. Rationality is defined in this study as the explicit and objective consideration of the costs and benefits of alternative allocations and budget constraints. Efficiency improvements from a reallocation of resources across care
location are obtained if (i) there is an increase in overall patient benefit for the same cost, or (ii) the same level of overall patient benefit is obtained at lower cost (in which case freed resources can be used to benefit other patient groups or expand the total care places available if there are additional patients who can benefit).

The BoC approach involves the application of marginal analysis, a process of identifying those patients or patient contacts allocated to a specific care location whose needs (clinical, health-related and social) might be more appropriately met in a different care location. Ideally, this involves a complete assessment of the marginal (i.e., additional) costs and patient benefits (e.g., quality of life gains) of reallocating resources across care locations.

In practice, it is costly and difficult to evaluate the actual marginal costs and benefits of alternative BoC scenarios. A more pragmatic use of the BoC approach for health service planning is to generate expected costs and benefits of a range of alternative BoC scenarios compared with a reference scenario (which usually reflects the current BoC). Whether one BoC scenario is preferred to another depends on the relative expected costs and judgements concerning the relative expected benefits of a reallocation according to each scenario. The judgements can be made by planners, clinicians, society or from a range of other perspectives.

Drawing on previous studies [4,5] there are three main requirements for the application of the BoC approach.

**Identification of a dependent population**

Dependency has been defined as “a state in which an individual is reliant upon other(s) for assistance in meeting recognised needs”[7]. Therefore, to operate the BoC approach requires a measure of dependency for comparing recognised needs, both met and unmet by service provision.

**Data on existing service use and costs**

The allocation of patients in each dependency group to a specific care option (e.g. home care, hospital care) enables units of service supply required to be determined. By the use of various assumptions these can be aggregated to calculate total supply needs for the dependent population.
A method for allocation of patients to be most appropriate care location

Judgements of the appropriate care location for each patient contact might be expected to vary according to the perspective adopted. Clinicians, other health professionals, health service planners and patients are likely to have different criteria for “appropriateness”.

Italian AIDS care provision

The highest proportion of cases of AIDS in Italy have been injecting drug users, representing over 70% of cumulative AIDS cases. Unlike many European countries, care for PWA has centred around hospital infectious disease departments. In 1994, based on Italian AIDS epidemiology and existing care provision structures, the Italian Ministry of health produced an AIDS Health Plan (AHP) which set out a planned supply of care for HIV/AIDS patients in Italy for the period 1994-1996. This had the objective of shifting the balance of health-care provision away from hospital inpatient care to a greater provision of community care services, in particular home care. Specific provision at a national and regional level for four types of care location was identified in the AHP. The national supply plans were as follows.

Inpatient care

This was defined in the AHP as at least one overnight stay in a hospital bed. Planned supply was 5835 units per day, a unit representing one inpatient bed. These beds were to be located within existing infectious diseases departments. Of these beds 40% were intended for PWA (i.e., 2334 beds), with 20% of these for HIV-infected patients.

Day hospital care

This was defined as an inpatient admission without an overnight stay. Planned supply was 1165 units of day care, a unit according to the AHP representing the admission of two patients per day. In the AHP it was stated that day-care units should not exceed 10% of inpatient care units. In Italy, day care is the main alternative to inpatient care for non-severely ill PWA.
Home medical care

This was defined in the AHP as the provision in the home of nursing care, consultation with infectious disease specialists, and support from general practitioners and social services when available. Planned supply was 1575 units of home care intended for late-stage PWA. A unit represents 1 day (or part day) of home-care support. Home care was intended for PWA who have adequate family and economic support.

Sheltered accommodation

This was defined in the AHP as the provision of home-care services within special supported accommodation. Planned supply was 525 units per day, a unit representing a place in sheltered housing. This care option was intended for PWA who lack adequate family and economic support.

The care units planned were based on an expected number of PWA alive in Italy during 1995 of 10 000-12 000, with a median survival from diagnosis to death of 15.7 months. The AHP did not define care supply needs for outpatient care or for HIV-infected patients (with the exception of inpatient care), so it was only partial in its coverage. The supply of units of care in the AHP provided baseline data for construction of a “planned” BoC scenario for the north-east study region.

Data requirements for application of the BoC approach

Identification of the dependent population

The dependent population were PWA from the Veneto and Emilia Romagna regions of north-east Italy. The study area has an AIDS prevalence of 49 per 100 000 population (as of 31 December 1993). A cumulative total of 2031 AIDS cases have been notified to the National AIDS Registry, representing 9.5% of the total for Italy. No data was available for AIDS mortality in the study regions. Therefore, an estimate of 844 PWA was derived by applying the median national mortality rate for AIDS cases to the study regions. This represents an estimate of the total dependent population in the study region who were eligible for inclusion in the study. Data on patient characteristics, dependency level, the presence of dementia and health-related quality of life (measured by the Nottingham Health Profile) was collected for each patient at three timepoints over a 6-month period during 1994, using a self-
completion questionnaire. The only enrolment criteria were that the patient had an AIDS diagnosis according to the Centers for Disease Control and Prevention 1993 AIDS definition with the exclusion of paediatric AIDS \cite{8}.

Dependency measures included the following elements: ability to walk (inside/outside home), shop, dress, eat, bath, level of incontinence and dementia. Seven levels of disability were classified and used in the analysis (Table 1). The presence of AIDS dementia complex was considered as representative of the greatest level of dependency.

<table>
<thead>
<tr>
<th>Level</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fully independent</td>
</tr>
<tr>
<td>2</td>
<td>Able to walk, independent for self-care, partly dependent for home care</td>
</tr>
<tr>
<td>3</td>
<td>Able to walk, partly dependent for self-care and home care</td>
</tr>
<tr>
<td>4</td>
<td>Able to walk inside house only, partly dependent for self and home care</td>
</tr>
<tr>
<td>5</td>
<td>Able to walk inside house only, totally dependent for self and home care</td>
</tr>
<tr>
<td>6</td>
<td>Confined to bed, no mental deterioration</td>
</tr>
<tr>
<td>7</td>
<td>Confined to bed, mental deterioration or AIDS dementia complex</td>
</tr>
</tbody>
</table>

**Table 1.** Classification of dependency levels.

Determining existing service use and costs

Data on existing service use and costs enabled a reference BoC scenario to be produced. This scenario represented the perspective of existing clinicians as to the appropriate care location for each PWA admission.

Four PWA care options were included in the analysis corresponding to those covered by the Italian AHP: inpatient care, day care, home care and sheltered accommodation. During 1994, data were collected on the supply of facilities and care places for the four care options. In total there were 10 sites, each centred on a hospital providing care for PWA. Within these sites there were 326 inpatient places (nine of the 10 hospital places and 35 sheltered accommodation places (in four sheltered houses). There were no home-care places provided at the time of the survey in any of the 10 sites.

Prospective data collection on per patient service utilization (inpatient days, day-care visits, days in sheltered accommodation) and severity of illness was carried out for a 6-month period between June and December 1994. This involved investigation by trained medical personnel of the clinical records of PWA attending the 10 hospitals included in the study. Severity of
illness stage was identified for each patient using the Severity Classification System for AIDS Hospitalizations (SCSAH)\cite{9}.

Estimation of the total costs required the service units used by each patient to be multiplied by their unit cost. Costs were estimated in both It. Lira and 1994 dollars using the Gross Domestic Product Purchasing Power Parity exchange rate ($1 = 1533 Lira). Unit cost estimates for an inpatient day and a day hospital visit, including allowance for overheads, were derived from the accounting system in the three study hospitals that had the greatest PWA caseload. From these sources the cost per inpatient day on an AIDS ward was calculated as 507 000 Lira ($331) and 288 400 Lira ($188) for a day-care visit.

Unit cost estimates for sheltered accommodation and home care were based on the fixed reimbursement set for these services by the regional Health Authority (covering the whole of the north-east Italy region). This was 120 000 Lira ($78) or 1 day in sheltered housing and 80 000 Lira ($52) per day for home care. These are approximations of the costs for staff, volunteer time, overheads and payments to service users for sheltered accommodation, and the anticipated costs of nurse time and travel expenses for home care. It is uncertain how close these reimbursements relate to actual costs, but for home care the figure is similar to a previous published cost estimate for the same study region\cite{10}.

Allocations of PWA to specific care options: alternative BoC scenarios

This is the central part of the application of the BoC approach. In order to specify alternative BoC scenarios, a method for allocating care units or groups of patients with different needs (i.e., proxied by dependency levels) to specific care options is required. The perspective adopted is important for defining appropriate alternative BoC scenarios.

Two alternative BoC scenarios were produced for comparison with the current or reference scenario. First, a “planned” scenario for the study region was constructed based on the care provision set out in the AHP for 1994-1996. This scenario represented the perspective of national health-care planners as to the appropriate BoC for PWA in Italy. Second, a “recommended” scenario was based on the judgement of a delphi panel of 11 senior clinical and public health expert, covering all 10 sites in the study region. Each expert was a leading clinician or health policy advisor in the
field of infectious diseases in the study region. They determined by consensus the appropriate care location for different combinations of hypothetical clinical and social characteristics for PWA.

The set of characteristics that panel members had to take into account for determining the choice of appropriate care location were as follows: (i) the risk of death and survival prognosis determining the decision as to whether a PWA should receive inpatient care (high risk, poor prognosis) or (out-of-hospital) palliative care (low risk, good prognosis); (ii) distance from home to the AIDS clinic to receive day care (if poor access home care is the preferred option); (iii) level of family support determining whether a PWA should receive sheltered accommodation (if poor) or home care (if good); and (iv) dependency level. Several variables existed for each of these characteristics. A matrix containing 144 cells was produced with the four types of care location as the columns and the rows consisting of combinations of the characteristics and variables.

The delphi panel process involved the following steps to reach a consensus on the appropriate care location for each PWA type. First, the panel members were independently sent the matrix and asked to assign a score between 0 and 5 for each PWA type representing the extent to which a care location was appropriate according to each characteristic and variable. A score of 5 represented high appropriateness, and 0 an inappropriate care location. Second, they subsequently met as a panel to discuss the cases for which they had given a different score, in order to reach a consensus decision. In this meeting a computer network was set up through which panel members were invited to modify their original score for the appropriate PWA care location, taking into account other opinions expressed during discussion. The process continued until consensus was reached for each cell of the matrix. At the end of the meeting members were asked to register their level of satisfaction with the outcomes of the delphi process, with 10 out of 11 stating they were fully satisfied.

Outside of the delphi panel process, each actual PWA contact was assigned to a cell of the matrix using data collected during the study period. The social characteristics of the PWA (i.e., home distance, family support, dependency) were classified using SAS statistical software (SAS Institute, Cary, North Carolina, USA). Risk of death was assessed according to the APACHE II classification and prognosis of survival of fewer than 6 months was based on stage 3 of the SCSAH. This was matched with the
actual care location admission of each PWA contact in order to assign each contact to a cell of the matrix. The quantitative rating this provided was compared with the scores for a location identified by the panel as appropriate for PWA with the same set of characteristics as each actual PWA contact. A PWA contact in an existing care location with a score above 3 was considered appropriate. PWA contacts with a score for an existing care location of three or less were defined as “marginal” patients, who should be reallocated to a care location with a score above 3. For scores above 3, but where a difference of less than one existed between alternative care locations, each was considered of equal appropriateness. It was not possible for an appropriate location to be defined in those cases where no care location achieved a score above 3. In interpreting the comparison of scores, a reasonable assumption is that if an alternative care location is found to be more appropriate than an existing one for a PWA contact then their care needs are more likely to be met by the former, resulting in a greater expected patient benefits.

Results

Characteristics of the study population

A total of 325 PWA were followed up during the study period. Incomplete data existed for 79 PWA. These patients were excluded from further analysis. Due to longer follow-up, the remaining study population might be expected to have a higher average utilization of care than the excluded patients; however, because the focus is on the BoC rather than absolute levels this should not alter the study conclusions. At the end of the 6-months study period there were 171 complete follow-up and data for a further 75 PWA who had died.

BoC scenarios for the supply of care

The supply of care for each of the three scenarios considered is presented in Table 2. To enable comparisons between to care units. Care units are based on the definitions used in the AHP, except for day care where, for simplicity, a unit equals one patient visit. It is not possible to use this data to interpret the relative magnitude of care provision across each care location within a BoC scenario. However, it can be used to make comparisons with units supplied across the BoC scenarios. For the current BoC there was an estimated 294 units of care available across the four care locations as
follows. Inpatient, 127; day care, 132; sheltered accommodation, 35; home care, 0. The 127 inpatient beds occupied by PWA were 39% of available bed capacity in the region (i.e., 326 beds in infectious disease departments, based on an 80% occupancy rate), similar to that assumed in the national AHP.

Although regional provision was documented in the AHP, it was not available at the level of the two districts covered by the study. Therefore, the distribution of care units for the planned scenario are assumed to be equivalent to that planned in the AHP at the national level (Table 2).

<table>
<thead>
<tr>
<th>Scenario (%)</th>
<th>Care location (units)*</th>
<th>Planned+</th>
<th>Current</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient</td>
<td>29.6</td>
<td>43.2</td>
<td>36.4</td>
<td></td>
</tr>
<tr>
<td>Day care</td>
<td>37.0</td>
<td>44.9</td>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>Home care</td>
<td>25.0</td>
<td>0</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Sheltered accommodation</td>
<td>8.3</td>
<td>11.9</td>
<td>13.5</td>
<td></td>
</tr>
</tbody>
</table>

*Inpatient care, 1 unit = 1 bed; day care, 1 unit = 1 patient visits per day; home care, 1 unit = 1 home care visit (in 1 day); sheltered accommodation, 1 unit = 1 place. Note that in the Italian AIDS Health Plan (AHP) 1 unit of day care corresponds with the current and recommended scenario 20% of inpatient bed units included from the planned scenario.

Table 2. Percentage of care units supplied according to different balance of care scenarios

In total over the study period there were 866 PWA contacts with the four care locations. The appropriate care location identified according to the scoring system for each of these contacts were as follows: inpatient care, 299 contacts (34.5%); day care, 356 contacts (41.1%); home care, 14 contacts (1.6%); sheltered accommodation, 81 contacts (9.3%). Contacts for which there were two locations equally appropriate were as follows: inpatient/sheltered accommodation, five contacts (0.5%); home care/day care, 18 contacts (2.0%); home care/sheltered accommodation, one contact (0.1%); home care/inpatient care, 11 contacts; day care/sheltered accommodation, 52 contacts (6.0%). No allocation of contacts was possible for 29 contacts (3.3%). These allocations were made independently of the actual supply of care (units) and the actual type of care used by the PWA.

These results represented the recommended BoC scenario. To enable comparison of this scenario with the current and planned scenarios in Table 2, the contacts were converted into units of care supply (assuming
appropriate care contacts can be related directly to care supply; as it is the relative and not total supply that is being assessed this assumption is tenable). The contacts identified as having more than one care location that was appropriate were divided equally between the relevant care locations. The 29 contacts for which a care allocation was not possible were equally distributed across the four care locations in the recommended BoC scenario (i.e., 0.9% to each location).

Results from Table 2 demonstrate that current inpatient bed provision is a higher proportion of the total units supplied for PWA compared with the planned scenario (43.2 versus 29.6%). The planned scenario contains a relatively large proportion of home care units (25.0 versus 0%). The recommended scenario demonstrates the importance attached to inpatient care (36.4% of units) compared with the planned scenario, although it is less than in the current scenario. A slightly higher proportion of units for day care are indicated in the recommended scenario compared with the other two scenarios. According to the recommended scenario, 4.2% of care units should be allocated to home care, which is much lower than in the planned scenario.

The cost consequences of the recommended BoC scenario

An assessment of the cost consequences of reallocating marginal patients from their actual use of health services (the existing BoC scenario) to the BoC identified by the recommended scenario was undertaken for two sets of PWA: (i) those who had used inpatient care only (five PWA with a total of 44 inpatient contacts), and (ii) those who had used day care only (79 PWA with a total of 229 day care contacts). This represented 49.1% of the total PWA using health services in the study period. In addition, 82 PWA had used both inpatient care and day care and five PWA had used sheltered accommodation for a total of 111 days.

For the day care only patient group, by applying the unit costs of each type of care to the actual days used per PWA and that derived from the recommended BoC scenario, the cost consequences of a reallocation of marginal PWA contacts can be illustrated (Table 3). There is an increased cost of 75.9% for inpatient care (159.1 million Lira or $103.6 thousand) required at the margin, but a reduction in cost for each of the other care location shifts recommended. Overall, the estimated cost of a reallocation is an increase of 12.1% (83.9 million Lira or $54.7 thousand).
<table>
<thead>
<tr>
<th>PWA care location</th>
<th>Appropriate location for day care PWA contacts</th>
<th>Actual days per PWA in day care +</th>
<th>Total cost of recommended BoC</th>
<th>Total cost of current BoC</th>
<th>Cost consequences of recommended versus current BoC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient care+</td>
<td>63</td>
<td>11.5</td>
<td>368.7 ($239.8)</td>
<td>209.6 ($136.2)</td>
<td>159.1 ($130.6)</td>
</tr>
<tr>
<td>Remain in day care</td>
<td>118</td>
<td>10.4</td>
<td>353.8 ($230.7)</td>
<td>353.8 ($230.7)</td>
<td>0 ($0)</td>
</tr>
<tr>
<td>Home care</td>
<td>1</td>
<td>5.0</td>
<td>0.4 ($0.3)</td>
<td>1.4 ($0.9)</td>
<td>-1.0 (-$0.6)</td>
</tr>
<tr>
<td>Sheltered accommodation</td>
<td>17</td>
<td>218</td>
<td>44.5 ($29.0)</td>
<td>107.0 ($69.7)</td>
<td>-62.5 (-$40.7)</td>
</tr>
<tr>
<td>Day care or sheltered accommodation</td>
<td>9</td>
<td>7.1</td>
<td>7.7 ($5.0)</td>
<td>18.5 ($12.0)</td>
<td>-10.8 (-$7.0)</td>
</tr>
<tr>
<td>Day care or home care</td>
<td>1</td>
<td>4.0</td>
<td>0.3 ($0.2)</td>
<td>1.2 ($0.8)</td>
<td>-0.9 (-$0.6)</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>11.4</td>
<td>775.4 ($505.0)</td>
<td>691.5 ($450.3)</td>
<td>83.9 (-$54.7)</td>
</tr>
</tbody>
</table>

**Table 3.** Cost consequences of the recommended balance of care (BoC) for persons with AIDS (PWA) day-care contact*.

*Actual days and costs are for the 6-month study period. +An example of the calculation of costs for the 63 patients who would be more appropriately located in inpatient care according to the recommended scenario. The costs of the current scenario for these patients is calculated as follows: 63 patients x 11.5 days per patient in day care x 288 400 Lira ($188) (cost per day) = 209.6 million Lira ($136.2). If these patients are reallocated to inpatient care according to the recommended scenario the cost of this scenario is calculated as follows: 63 patients x 11.5 days (see below) x 507 000 Lira ($331) (cost per inpatient day) = 368.7 million Lira ($239.8). Cost for all other reallocations are calculated in the same way. ++An assumption is that the mean days per PWA spent in day care can be substituted by are equivalent time in any of the alternative recommended care locations. This assumption could be relaxed to investigate the cost consequence of different periods of time spent in alternative care locations.
For the inpatient care only group, the cost consequences of shifting marginal patients according to the recommended BoC scenario is a reduction in total cost (Table 4). Overall, a cost reduction of 45.4% is estimated (-184.0 million Lira or -$120.3 thousand).

<table>
<thead>
<tr>
<th>PWA care location</th>
<th>Appropriate location for inpatient PWA contacts</th>
<th>Actual inpatient days per PWA +</th>
<th>Total cost of recommended BoC</th>
<th>Total cost of current BoC</th>
<th>Cost consequences of recommended versus current BoC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remain in inpatient care</td>
<td>16</td>
<td>17.1</td>
<td>139.0 ($90.6)</td>
<td>139.0 ($90.6)</td>
<td>0 ($0)</td>
</tr>
<tr>
<td>Day care</td>
<td>8</td>
<td>14.7</td>
<td>34.0 ($22.1)</td>
<td>59.8 ($38.9)</td>
<td>-25.8 (-$16.8)</td>
</tr>
<tr>
<td>Home care</td>
<td>1</td>
<td>6.0</td>
<td>0.5 ($0.3)</td>
<td>3.0 ($2.0)</td>
<td>-2.5 (-$1.7)</td>
</tr>
<tr>
<td>Sheltered accommodation</td>
<td>10</td>
<td>31.4</td>
<td>37.7 ($24.5)</td>
<td>159.0 ($103.9)</td>
<td>-121.3 (-$79.4)</td>
</tr>
<tr>
<td>Inpatient care or sheltered accommodation</td>
<td>9</td>
<td>89.0</td>
<td>10.7 ($7.0)</td>
<td>45.1 ($29.4)</td>
<td>-34.4 (-$22.4)</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>15.9</td>
<td>221.9 ($144.5)</td>
<td>405.9 ($264.8)</td>
<td>-184.0 (-$120.3)</td>
</tr>
</tbody>
</table>

**Table 4.** Cost consequences of recommended balance of care (BoC) for current persons with AIDS (PWA) inpatient care contacts*

*Actual days and costs are for the 6-month study period. + See notes in Table 3.

Table 5 combines data from Table 3 and 4 to demonstrate the overall cost consequences of a reallocation of resources according to the recommended BoC scenario for current day/inpatients care PWA contracts. Overall there is an estimated cost reduction of 92% (-100.1 million Lira or -$65.7 thousand) (Table 5).
### Table 5. Cost consequences of reallocating resources according to the recommended scenario for current day care/inpatient care persons AIDS (PWA) contacts.

<table>
<thead>
<tr>
<th>Recommended PWA care contact location</th>
<th>Recommended BoC</th>
<th>Current BoC</th>
<th>Cost consequences of recommended vs current scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient care</td>
<td>221.9 ($144.5)</td>
<td>405.9 ($264.8)</td>
<td>-184.0 ($-120.3)</td>
</tr>
<tr>
<td>Day care</td>
<td>775.4 ($505.0)</td>
<td>691.5 ($450.3)</td>
<td>+83.9 ($-54.7)</td>
</tr>
<tr>
<td>BoC costs</td>
<td>997.3 ($649.5)</td>
<td>1097.4 ($715.1)</td>
<td>-100.1 ($-65.7)</td>
</tr>
</tbody>
</table>

BoC: Balance of care

### Discussion

The appropriate BoC provision across alternative care locations for HIV/AIDS patients is an important consideration for aiding efficient use of scarce health service resources. Efficiency in the use of resources is vital to ensure that in the face of increasing costs the available resources are put to best use and optimal patient outcome. This study has illustrated the use of the BoC approach for improving efficiency in PWA care resource allocation in the study region of north-east Italy.

The BoC approach provides a framework for objective and explicit consideration of the costs of alternative care provision and the expected benefits according to the judgement of the decision-maker. Each BoC scenario considered in this study has involved a normative judgement of the decision-maker about expected patient benefit from different perspectives. The current scenario represents the perspective of the actual doctors caring for PWA in the study region and making the decisions about the appropriate care location. Their decisions are constrained by the availability of care; for example, the absence of decisions to use home care would be due to the lack of home-care provision in the study region. The planned scenario represents the perspective of national health-care planners through the Italian AIDS Health Plan, and has an emphasis on expanding home-care provision. The implicit judgement in the planned scenario was that a reallocation in the balance of resource provision to home care would produce the greatest...
patient health benefits at least cost. In contrast, in the recommended scenario (which is not directly constrained by considerations of availability of care) the perspective of the delphi panel of senior clinicians and health service planners was the basis for identifying the appropriate care location for each PWA contact. The assumption in this scenario was that PWA needs would be better met with the provision of “appropriate” care producing an increase in total expected patient outcomes (e.g., in terms of health-related quality of life). A further perspective that could have been directly considered is that of the patient. However, if it is assumed that clinicians and health service planners within a public health-care system are attempting to provide a health service that serves the best interests of patients, then the patient perspective is implicitly contained within each of the perspectives included in this analysis.

In our analysis we specifically applied the BoC approach to the assessment of AIDS care provision in the north-east Italy study region in two main ways.

First, we sought to examine the planned BoC provision as set out in the 1994-1996 Italian AHP (assuming it would be implemented in the study region according to national plans). Our main finding was that if the AHP was implemented at the local level in the study region according to the national plan, then its emphasis on expanding home care would result in an oversupply of such places and a potential decrease in efficiency in the use of available resources. Home care is suitable for a limited number of PWA with good family and economic support, and not useful as a cost-saving measure for a wider range of PWA [10].

Second, we sought to illustrate the cost consequences of a reallocation of patient contacts (those originally in day care and inpatient care only) and hence resources to care locations proposed in the recommended scenario. The main finding from this exercise was that an efficiency improvement could be obtained from such a reallocation, based primarily on an increased use of relatively low cost day care in place of inpatient care. The overall cost consequences was a reduction of 100 million Lira (over $65 thousand). If the recommended scenario had resulted in higher costs compared with the current scenario, a decision would be required by health service planners as to whether they are willing (or able within the budgets available) to increase and reallocate resources for PWA care to obtain the expected improvement in total patient benefits.
There are a number of ways the analysis using the BoC approach could be extended to improve the generalizability of the results. First, care provision and costs could be examined for non-AIDS HIV patients to help ensure rationality and efficiency in overall HIV/AIDS care planning. Second, there are likely to be some problems in comparing the current BoC scenario with the responses of the delphi panel judging the appropriate care location for each PWA type as they were not directly constrained by the availability of care facilities in the study region. In particular, this refers to the unavailability of home-care places constraining doctors’ choice of this care location for PWA in the current scenario. However, the small number of PWA contacts for whom home care was identified to be appropriate in the recommended scenario implies that supply constraints were not the major factors restricting use in the current scenario. Third, the PWA contacts and health-care facilities for PWA in the study region may not be representative of all regions of Italy. For example, the planned BoC scenario may be much more appropriate in urban areas such as Milan and Rome, with 15% of all AIDS cases in Italy. This possibility needs closer examination. Finally, the cost estimates and cost consequences are based on an assumption that all costs are variable. However, in practice any actual reallocation of resources between care locations, for example for the provision of new day-care places, may well have both fixed (i.e., cost of new capital, new staff paid on an annual basis) and variable cost implications. As average costs of hospital and day care have been used, the full cost reduction of 100 million Lira ($65 thousand) (Table 5) will only be achieved if facilities (i.e. hospital beds treating PWA) could be removed. If hospital wards are operating with excess spare capacity then the marginal cost of hospital care will be below the average cost, and the total cost reduction will be lower than that estimated. If they are above full capacity the apposite pattern exists. There is no evidence that either situation existed for the infectious disease departments in the study region. However, in any general use of the BoC approach in planning AIDS care these factors would need to be taken into account.

In conclusion, the BoC approach can be applied to improve the rationality and efficiency of resource use in planning care provision for PWA. The approach offers a general framework that could be applied at the local or national level in Italy, but also in other countries. In addition, it could also provide the basis for the production of BoC impact scenarios at a multinational level such as the European Union [12].
References

Appendix

Members of the North-East Italian Group for Planning of AIDS Health Care


Acknowledgements

The authors acknowledge the benefits obtained from collaboration with the European Union Concerted Action on Multinational Scenario Analysis concerning the epidemiological, social and economic impacts of HIV/AIDS on society, coordinated by J.C. Jager at the National Institute of Public Health and Environmental Protection. The Netherlands. Many thanks also to D. Whynes, Reader in Health Economics for useful comments on an earlier draft.