Factors influencing death at home in terminally ill patients with cancer: systematic review

Barbara Gomes and Irene J Higginson

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Factors influencing death at home in terminally ill patients with cancer: systematic review
Barbara Gomes, Irene J Higginson

Abstract

Objectives To determine the relative influence of different factors on place of death in patients with cancer.

Data sources Four electronic databases—Medline (1966-2004), PsycINFO (1972-2004), CINAHL (1982-2004), and ASSIA (1987-2004); previous contacts with key experts; hand search of six relevant journals.

Methods We generated a conceptual model, against which studies were analysed. Included studies had original data on risk factors for place of death among patients, >80% of whom had cancer. Strength of evidence was assigned according to the quantity and quality of studies and consistency of findings. Odds ratios for home death were plotted for factors with high strength evidence.

Results 58 studies were included, with over 1.5 million patients from 13 countries. There was high strength evidence for the effect of 17 factors on place of death, of which six were strongly associated with home death: patients' low functional status (odds ratios range 2.29-11.1), their preferences (2.19-8.38), home care (1.37-5.1) and its intensity (1.06-8.65), living with relatives (1.78-7.85), and extended family support (2.28-5.47). The risk factors covered all of the model: related to illness, the individual, and the environment (healthcare input and social support), the latter found to be the most important.

Conclusions The network of factors that influence where patients with cancer die is complicated. Future policies and clinical practice should focus on ways of empowering families and public education, as well as intensifying home care, risk assessment, and training practitioners in end of life care.

Introduction

For many people, home is more than a physical space; it represents familiarity, the presence of loved ones, and the possibility of enjoying “normal” life—reasons why well over half of people with a progressive illness want to die at home. Several countries are making substantial reforms to enhance home care. In October 2004, both the United States and Australia announced further increases in funding for home care. The United Kingdom has invested £12 million in the NHS end of life care programme (2003-6). Other initiatives are developing globally (for example, tele-homecare projects, paid leave for informal carers of dying patients in Canada). Despite these efforts, preliminary data reported in the 2004 WHO analysis of palliative care showed that most people in the UK, the US, Germany, Switzerland, and France die in hospitals.

In the UK, the proportion of home deaths for patients with cancer is falling, from 27% in 1994 to 22% in 2003. The widening gap between preferences and reality is poorly understood because of fragmented research and conflicting findings. We determined the relative influence of different factors on place of death for patients with cancer and developed a model to explain the variations.

Methods

Theoretical model for study and analysis
Taking previous models into account, we developed a conceptual model of place of death and its determinants on the basis of five relevant theories and models applied in health research. Place of death may result from interactions between three main groups of factors: those related to the illness, the individual, and the environment.

In September 2004, we searched four electronic databases (Medline, PsycINFO, CINAHL, and ASSIA) using MeSH headings (palliative care, terminal care, hospice care, terminally ill patients, hospice/s, death and dying, hospital and palliative nursing) and keywords (see table A on bmj.com). In a previous systematic review we contacted more than 300 authors and researchers to identify grey literature on place of care and death in those with cancer. Their references were accessed and searched. We assured the comprehensiveness of the search by scanning the references of three other reviews. In addition, we hand searched the most recent issues of six relevant journals (Palliative Medicine (2003-4), Journal of Palliative Care (2003-4), Journal of Pain and Symptom Management (2003-4), Journal of Palliative Medicine (1998-2000 and 2003-4), Supportive Care in Cancer (2003-4), and BMC Palliative Care (2002-4, available online) and checked reference lists of retrieved articles.

Selection criteria

Studies were included if they reported original data testing the effect of predisposing variables on place of death. More than 80% of the patients had cancer. Predisposing variables were defined as those associated with patients dying in a certain place. We included any studies conducted in specific populations (for example, one sex only, patients with a specific type of cancer, patients cared for at home) but noted this in the quality assessment and synthesis.

We excluded studies with no assessment of place of death, with unknown diagnosis, exclusively on non-malignant diseases or children, on preferences or attitudes about place of death rather than actual place of death, and on association of place of...
Research

Fig 1 Algorithm for grading the strength of evidence. High quality studies had performed multivariate analysis and had a quality score of ≥70%; medium quality studies had multivariate analysis but a quality score of <70% or did not have multivariate analysis but had a quality score of ≥60%; and low quality studies had no multivariate analysis and a quality score of <60%. This method of grading evidence was based on a previous system used on risk factors, similar to the SORT taxonomy, a patient centred approach to grading evidence. To increase the methodological quality and robustness of the findings we raised the level for considering high quality scores for individual studies and high consistency of findings from 50% to 70%; said that high quality studies had to have used multivariate analysis; took high strength evidence exclusively from high quality studies; and required a minimum of three high quality or three medium quality studies about a topic.

determination of whether a different grading threshold altered the findings. When relevant we have referred to variables for which there was low strength evidence in the results. We then extracted the odds ratios reported in the papers and plotted them for factors associated with place of death for which there was high strength evidence, and revised the model as necessary.

Results

Characteristics of eligible studies and agreement between reviewers

We identified 224 articles from the electronic searches, excluding duplicates, and included 45 (20%) papers (fig 2). Hand searching, references provided by key experts, and follow-up of reference lists added 16 papers. The 61 papers accounted for 58 original studies; one paper provided two different sets of data (which we considered as two different studies); four papers reported on secondary analyses (these were merged with the first report) (see bmj.com for full list of references). Apart from nine studies that included patients without cancer (between 3% and 18%), all other studies were conducted exclusively in those with cancer.

The results were gathered from over 1.5 million patients from 13 different countries, mostly from the UK, the US, Australia, and Canada (see tables B-D on bmj.com for a full description of included studies). We disagreed on the data extraction of two papers and the quality assessment of six papers. These were minor disagreements, however, and didn’t alter the grading of the studies.

Heterogeneity between studies

Studies were heterogeneous in five main areas: design, population, methods of data collection, categories of place of death, and quality. Only six studies were longitudinal. The proportion of home deaths varied according to setting (table 1). Although home was the most common reference point in high quality studies (20 studies), it was compared with many places: metropolitan hospital, hospital, medical setting, hospital and hospice, institutional setting, acute hospital and chronic care facility, or elsewhere. Reflecting all these variations, the quality of the studies was highly varied (quality scores ranged from 23% to 88%).

Factors affecting place of death and their relative effects

We found high strength evidence for 17 factors associated with place of death for patients with cancer and moderate strength evidence for 20 (table 2). There were contradictory findings for the influence of social conditions, marital status, and the direction of historical trends. The sensitivity analysis identified a further variable—the availability of home care.

Factors related to illness

Evidence was highly consistent for three factors: non-solid tumours, length of disease, and functional status (table 2). Except in one dataset, low functional status was associated with dying at home. Functional status was usually assessed when the patient was admitted to the service, not at the time shortly before death. There were conflicting results for pain: two studies reported no effect, and two suggested that people who die at home may experience more pain. There were few data on the influence of other symptoms and comorbidities, though two studies showed that people with more than one illness were more likely to die in hospital.

Individual factors

Demographic variables—Six high quality studies supported the influence of social conditions (such as education, social class,
income), reporting data on over 1.3 million people in the UK, the US, Australia, and Italy.12 13 37–40 Two other high quality studies, however, showed no effect.45 46 Sixteen high quality studies analysed age,13 15–17 30 32 35 38–40 but the findings were extremely inconsistent, more often within than between countries.

**Personal variables**—Home death was associated not only with a preference for the home but also by the expression of a preference,45 confirmation from nurses,46 and an agreement between the preferences of patients and carers for home death.13 Two weak studies suggested that increasing awareness of dying may be associated with a home death.47 48

**Environmental factors**

**Healthcare input**—Use and intensity of home care were associated with a home death, though this was not supported by one UK multivariate analysis.13 Findings were, however, consistent for the influence of the intensity of home care. Patients who died at home not only had more homecare input but also more frequent home visits. This effect was found to be more significant in the last weeks of life.45 46 In the US, Italy, and Spain high quality evidence showed that people in rural environments are more likely to die at home.12 34 45 but there were conflicting findings for Canada, Australia, and the UK.17 37 41 50–52

**Social support**—Social support influenced place of death through four factors: living arrangements (whether the patient was living with the spouse or the caregiver), the extent of family support (mainly the number of informal carers), marital status, and caregiver’s preferences. Seven high quality studies, including nearly 80 000 patients, showed that being married increased the chances of dying at home, though moderate quality evidence, the sensitivity analysis, and two other high quality studies did not support this finding.30–32

**Macrosocial factors**—Although there was high quality evidence supporting a trend towards home death in some areas of the US,19 Italy,20 and Canada,21 the same number of medium quality studies suggested a trend towards admission to hospital in some other regions of the US and in Italy.11 35 39 One study directly explored differences in place of death between countries and found that dying at home was less common in the UK than in Ireland and Italy.22

**The final model**

From the 17 factors with high evidence to support their effect on place of death, six were the most strongly associated with home death: low functional status, an expressed preference for home death, home care and its intensity (that is, frequent visits), living with relatives, and being able to count on extended family support. These factors showed the largest increase in the odds of dying at home, with maximum odds ratios ranging from 5.1 to 11.1 (fig 3).

Our final version of the model weighted the importance of the different groups of factors (related to illness, the individual, and the environment) and listed the variables with high evidence in each group (fig 4). Environmental factors were the most influential.

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**Table 1** Study settings and proportion of patients who died at home

<table>
<thead>
<tr>
<th>Setting</th>
<th>No (%) of studies</th>
<th>Range of patients (%) who die at home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home care</td>
<td>22 (38)</td>
<td>27–94</td>
</tr>
<tr>
<td>General (countries, regions)</td>
<td>22 (38)</td>
<td>5–75</td>
</tr>
<tr>
<td>Palliative care, hospice care</td>
<td>8 (14)</td>
<td>3–61</td>
</tr>
<tr>
<td>Hospital, cancer centre, oncology unit, tertiary facility, and patients with specific types of cancer</td>
<td>6 (10)</td>
<td>12–46</td>
</tr>
<tr>
<td>Total</td>
<td>58 (100)</td>
<td>3–94</td>
</tr>
</tbody>
</table>

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**Fig 2** Flow of studies through review
In this systematic review we found strong evidence for the complicated network of factors that affect the place where patients with cancer die. Our review has several limitations: the completeness of search, heterogeneity between studies, criteria for grading the strength of evidence, classification of place of death, the state of knowledge on the topic, and the reliance on retrospective and cross sectional data in many studies. Thus, we could show associations which do not necessarily indicate directionality or cause.

Factors related to illness

The influence of such factors highlights the issue of the timing of palliative care. Patients with non-solid tumours may be less likely to die at home because they have multiple options for treatment, even in the advanced stages of disease. Their transition and referral to palliative care is often blurry or missed.

Table 2 Factors associated with place of death, their grades and consistency

<table>
<thead>
<tr>
<th>Variables</th>
<th>High strength evidence</th>
<th>Moderate strength evidence</th>
<th>Sensitivity analysis (high and medium quality studies)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Death more likely in</td>
<td>Consistency*</td>
<td>Death more likely in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No of patients</td>
<td>Hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hospital</td>
</tr>
<tr>
<td>Factors related to illness</td>
<td></td>
<td></td>
<td>Hospital</td>
</tr>
<tr>
<td>Type of cancer:</td>
<td>Non-solid tumours (leukaemia, lymphoma)</td>
<td>Hospital</td>
<td>100% (7/7)</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>No effect</td>
<td>No effect</td>
<td>Hospital</td>
</tr>
<tr>
<td>Prostate; gastrointestinal tract; breast</td>
<td>No effect</td>
<td>No effect</td>
<td>Hospital</td>
</tr>
<tr>
<td>Dying trajectory:</td>
<td>Long length of disease</td>
<td>Home</td>
<td>100% (6/8)</td>
</tr>
<tr>
<td>Low functional status‡</td>
<td>Home</td>
<td>80% (45)</td>
<td>4 477</td>
</tr>
<tr>
<td>Symptons:</td>
<td>Fatigue/weight loss/weakness; dyspnoea/breathlessness; nausea/vomiting; psychological symptoms</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Individual factors</td>
<td>Demographic variables:</td>
<td>Home</td>
<td>75% (6/8)</td>
</tr>
<tr>
<td></td>
<td>Good social conditions§</td>
<td>Home</td>
<td>75% (3/4)</td>
</tr>
<tr>
<td></td>
<td>Ethnic minorities¶</td>
<td>Hospital</td>
<td>100% (6/6)</td>
</tr>
<tr>
<td></td>
<td>Sex</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Personal variables:</td>
<td>Patient’s preferences</td>
<td>Home</td>
<td>80% (45)</td>
</tr>
<tr>
<td>Environmental factors</td>
<td>Healthcare input:</td>
<td>Home</td>
<td>75% (3/4)</td>
</tr>
<tr>
<td>Use of home care</td>
<td>Home</td>
<td>75% (3/4)</td>
<td>41 050</td>
</tr>
<tr>
<td>Intensity of home care**</td>
<td>Hospital</td>
<td>100% (6/6)</td>
<td>1 917</td>
</tr>
<tr>
<td>Availability of home care</td>
<td>Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability of inpatient beds</td>
<td>Hospital</td>
<td>75% (3/4)</td>
<td>8 174</td>
</tr>
<tr>
<td>Previous admission to hospital</td>
<td>Hospital</td>
<td>100% (3/3)</td>
<td>1 220</td>
</tr>
<tr>
<td>Long length of admission††</td>
<td>Hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity and family physician support</td>
<td>Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural environment</td>
<td>Home</td>
<td>75% (3/4)</td>
<td>46 204</td>
</tr>
<tr>
<td>Areas with greater hospital provision</td>
<td>Hospital</td>
<td>75% (3/4)</td>
<td>30 296</td>
</tr>
<tr>
<td>Social support:</td>
<td>Living with relatives‡‡</td>
<td>Home</td>
<td>100% (3/3)</td>
</tr>
<tr>
<td>Extended family support§§</td>
<td>Home</td>
<td>100% (3/3)</td>
<td>943</td>
</tr>
<tr>
<td>Being married</td>
<td>Home</td>
<td>78% (7/9)</td>
<td>78 384</td>
</tr>
<tr>
<td>Caregiver’s preferences</td>
<td>Home</td>
<td>100% (3/3)</td>
<td>1 023</td>
</tr>
<tr>
<td>Caregiver’s age</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Caregiver’s sex</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Caregiver’s relationship to patient</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Macrosocial variables:</td>
<td>Historical trends</td>
<td>Home</td>
<td>100% (3/3)</td>
</tr>
</tbody>
</table>

*Shown as percentage (No of high quality studies pointing in same direction/total No of high quality studies on topic).
†Assessed by No of days/months/years from diagnosis till death (with different cut points: 1, 2, 6, and 12 months).
‡‡Assessed by activities of daily living and Karnofsky index, among other systems.
§Includes living in areas of low deprivation, medium or high social class, higher level of education or increased years of study, and medium or high income.
¶Includes non-whites, black minorities, Hispanics, immigrants, and those whose first language was not English.
**Assessed by No of homecare visits/week or total No of homecare visits.
††Related to No of days as inpatient (either at hospital or at hospice).
‡‡Includes both living with spouse (as opposed to living alone) and living with caregiver.
§§Assessed by No of available caregivers and quality of family support.

Discussion

In this systematic review we found strong evidence for the complicated network of factors that affect the place where patients with cancer die. Our review has several limitations: the completeness of search, heterogeneity between studies, criteria for grading the strength of evidence, classification of place of death, the state of knowledge on the topic, and the reliance on retrospective and cross sectional data in many studies. Thus, we could show associations which do not necessarily indicate directionality or cause.

Factors related to illness

The influence of such factors highlights the issue of the timing of palliative care. Patients with non-solid tumours may be less likely...
Individual factors
Generally patients’ preferences seem to have a powerful influence on achieving a home death. This might be due to patients’ personal investment in attaining this end of life goal, but it also seemed to be mediated by a clearer recognition of the patients’ preferences by the others involved in care—both professional and informal carers—presumably allowing the mobilisation of resources to fulfil that wish. The influence of social factors and ethnicity on place of death, however, raises the problem of equity as it may reflect a differential access to home care by socially disadvantaged people. Koffman et al found that despite wanting to be at home, many people from ethnic minorities feel they aren’t provided with enough choice. Possible explanations—whether environment, resources, housing, availability of private/statutory/voluntary care, or culture—need further investigation.

Fig 3 Factors with high strength evidence from 15 studies. Each point represents results on one study, except when study provided ranges, when both odds ratios are shown. Numbers indicate minimum and maximum odds ratios for each variable

Fig 4 Model of variations of place of death
Research

Healthcare input
The place where patients with cancer die depends heavily on the formal healthcare services available in their local area. Not surprisingly, contact with hospitals was related to hospital death, and provision of home care—particularly of intensive home care—with dying at home. There was, however, an apparent paradox for patients living in rural areas: these patients have increased difficulties in accessing health care and palliative care, yet they are more likely to die at home. Even in countries where this difference didn't seem to apply, such as in the UK, other geographical variations exist. These differences question whether home deaths in some areas result from limited resources and lack of alternatives rather than preferences.

Social support
The effect of patients' social support network mirrors the active involvement of families in end of life care. Our findings show that the sustainability of keeping terminally ill patients at home depends on how close the families are and how able they are to care for their loved ones at home. The sharing of responsibilities between family members, besides taking the burden of care from one person's shoulders, also offers a source of mutual support for carers. More difficult though, is the scenario for those who live alone and have no family to take care of them. Our findings also revealed the importance of families' wishes for place of care and death, suggesting that a final decision on this matter is reached through negotiation between the patient and family.

Macrosocial factors
Although the effect of historical trends towards home death should be considered with caution, our findings suggest that macrosocial forces might play a part on where patients die. Further comparisons between countries might determine the influence of different health policies and stages of development of palliative care, but also of different cultural beliefs and attitudes on place of death and dying at home.

Support for current initiatives to improve home death
Our findings compel any initiative aiming to enable people to remain at home to respond adequately to all the identified risk factors.

Worldwide, many initiatives target some of these factors: the three assessment tools developed in the UK documenting care progress and planning end of life care; home based models of palliative care such as in North America where more than 90% of these services are provided at home; tele-homecare, used in the US, Canada, Japan, and Europe; the inclusion of training in end of life care as mandatory for physicians; and the compassionate care benefits, in the form of a paid leave for carers of dying patients implemented by the Canadian government since January 2004.

There are three main criticisms of these initiatives. Firstly, most are not horizontal programmes—that is, they do not address all key areas and risk missing important aspects. This is particularly conspicuous for risk assessment. By appraising the end of life tools, we found that they all showed gaps in some risk factors: the preferred place of care document is vague on assessing factors related to illness, probably because it is a record held by the patient; the Liverpool care pathway misses the preferences of patients and families; the gold standards framework offers detailed care planning yet overlooks patients' functional status, ethnicity, and caregivers' preferences. What is also worrying is when key areas can potentially be compromised—for example, as a result of changes in the organisation of the health system. That might happen with the new general practitioner contract in the UK, where general practitioners will be able to opt out of out of hours care. We should be aware that this may compromise the general practitioners' ability to provide continued care to terminally ill patients at home (especially out of hours), which will not help to reduce crisis admissions to hospital.

Secondly, we identified two important gaps in current initiatives. All are focused on assessment and intervention. Preventive strategies such as raising public awareness of palliative care have not yet been regarded as a priority, although this could deal with risk factors before problems arise. Ways of helping families and enhancing their power are also still limited. Initiatives such as the Canadian compassionate benefits system should be taken up as examples of creative and fair measures to respond to families' needs. Thirdly, there are still few data related to the evaluation of these initiatives, especially on their impact in place of death, which limits the extent to which we know if their goals are being achieved.

Actions to enable people to die at home should focus on the empowerment of families, public education, home based models of care, assessment of risk, and training of practitioners in palliative care.

What is already known on this topic
Numerous studies worldwide on factors affecting the place where terminally ill cancer patients die have resulted in three decades of fragmented evidence.

What this study adds
There is high quality and consistent evidence for the effect of 17 factors on place of death.

The most important factors linked to dying at home are patients' low functional status, patients' preferences, use and intensity of home care, living arrangements, and extended family support.

Actions to enable people to die at home should focus on the empowerment of families, public education, home based models of care, assessment of risk, and training of practitioners in palliative care.


What is already known on this topic

Male students and those with lower A level grades and of non-white ethnicity may perform less well on the undergraduate medical course.

What this study adds

Late acceptance on to the course and the presence of “negative comments” in the academic reference are additional risk factors at Nottingham medical school.

in the academic reference. Powis et al found that interviewers’ negative remarks had weak predictive value for course withdrawal,1 and Papadakis et al suggested some correlation between negative statements regarding unprofessional undergraduate behaviour and later disciplinary action in graduates.6 In view of our results, statement review remains an integral part of our admissions process. Similarly, we are not aware that others have examined the timing of course offers in relation to undergraduate progress.

Future policy and research

Many medical schools in the United Kingdom are exploring more varied admissions policies, perhaps incorporating elements of the successful Australian policies of lower examination grades accompanied by psychometric testing.7 Their outcome evaluations, especially in relation to non-traditional students, may be important in guiding future policy across the UK.6 7 Our data suggest that the current four stage approach to student selection is sound, but we now have concerns that the introduction by UCAS of open references will reduce the opportunities for head teachers to draw attention to personal qualities or difficulties that might make it difficult for a student to succeed in medicine. A structured reference might be more helpful.

Pastoral support at Nottingham includes informal meetings with personal tutors and more intensive formal mechanisms, yet some students still hide, or deny, their difficulties until they reach a crisis point. In the course of this research we noticed a high incidence of depressive illnesses in struggling, which is of particular concern. We intend to review our struggling and our pastoral practices more closely to see what further support could be offered, perhaps as targeted interventions to those at greatest risk. Research elsewhere has identified personal, social, cultural, and financial pressures that may particularly affect students from non-mainstream backgrounds and that may need to be addressed explicitly and proactively.10 Failure in clinical examinations may have a sex related or cultural basis because the current emphasis on patient centred, empathetic care may be more natural for women than for men10 and may present a considerable difficulty for students from more paternalistic cultures.11 Language barriers may be important because fluency in standard English may not be adequate for medical and colloquial needs.11

We plan further investigations into the nature of negative comments and the characteristics and difficulties of those who do less well on the course.

The 1991 Townsend deprivation scores were accessed via the Census Data Service at http://census.ac.uk/cdu/Datasets/1991_Census_datasets/. We were grateful to Chris Rix of UCAS for providing approval and data for Nottingham applicants specifically for this study and to Carol Coupland for statistical advice. We thank David Powis and Eamonn Ferguson for reviewing an early draft of this paper and for providing valuable suggestions and advice, Caroline Mulvaney for performing statement validation, and members of the interviewing pool who responded to our questionnaire on negative comments.

Contributors: DJ conceived the study and is guarantor. JY collected and analysed the data. Both authors contributed to interpretation and wrote the paper.

Funding: JY is paid by Service Increment for Teaching (SIFT). Competing interests: None declared.

Ethical approval: Faculty of Medicine research and ethics committee.

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Corrections and clarifications

Factors influencing death at home in terminally ill patients with cancer: systematic review

In this article by Barbara Gomes and Irene J Higginson the linked website in reference 64 (Macmillan Cancer Relief) was correct for the Gold Standards Framework (GSF) when the paper was written (BMJ 2004;329:315-21, 4 Mar) but Macmillan Cancer Relief, however, ceased functioning as a support for the GSF Programme in 2004. The programme is now supported by the NHS End of Life Care Programme, and the correct web address is www.goldstandardsframework.nhs.uk.

Reproductive outcome after chromosome analysis in couples with two or more miscarriages: case-control study

In this research paper by Maureen TFM Fransen and colleagues (BMJ 2006;332:759-62, 1 Apr) we wrongly described the study as a case-control study when it should have been an index-control study. The error, which happened during editing, occurred in the title and the abstract.

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