

The effect of age on referral to and use of specialist palliative care services in adult cancer patients: a systematic review

Key points

- This is the first systematic review to explicitly quantify reported differences in use of specialist palliative care between older and younger cancer patients.
- There is some evidence that older cancer patients are less likely to be referred to or use specialist palliative care services than younger patients.
- However, there were important methodological weaknesses in all of the studies identified; most crucially, studies failed to consider variations in use in relation to need for specialist palliative care.

Key words

Palliative care; utilization; age factors; review, systematic.

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Abstract

Objective.

To investigate variations in the use of specialist palliative care services for adult cancer patients, in relation to age.

Design.

Systematic review of studies examining use of or referral to specialist palliative care services in adult cancer patients.

Search strategy and selection criteria

Five electronic databases (Medline, Embase, Web of Science, HMIC, SIGLE and AgeInfo) were searched for studies published between 1966 to March 2005, and references in the articles identified were also examined. Inclusion criteria were all studies which provided data on age in relation to use of, or referral to specialist palliative care. Two reviewers independently selected studies, extracted data and assessed methodological quality according to defined criteria.

Main outcome measures

Use of or referral to specialist palliative care services, determined from all sources of report (patient, informal carer, healthcare professional, healthcare records).

Results.

14 studies were identified. All reported a statistically significant lower use of specialist palliative care among older cancer patients (65 and above or older) at a univariate level (crude odds ratios ranged from 0.33 (0.15 to 0.72) to 0.82 (0.80 to 0.82)). However, there were important methodological weaknesses in all of the studies identified; most crucially, studies failed to consider variations in use in relation to need for specialist palliative care.

Conclusions.

There is some evidence that older people are less likely to be referred to, or use specialist palliative care. These findings require confirmation in studies using prospectively collected data which control for patient's need for specialist palliative care.

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Introduction

As populations age and disease patterns change, the need for access to high quality palliative care at the end of life is becoming of increasing public health concern. (1) For the growing numbers of older people with advanced, progressive illnesses, poor access to effective symptom control and psychosocial support as they near the end of life can lead to an increased risk of hospital admission and death in hospital. (2) Older people frequently present with complex needs as a result of co-morbidities, social isolation, frail older caregivers, and economic hardship. They may respond well to the expertise offered by specialist palliative care providers across all settings. (2) However, recent UK policy documents including the NHS Cancer Plan and the National Service Framework for Older People report that that older people have poorer access to palliative care compared with younger people. (3;4)

The debate about the appropriateness of rationing health care provision by age has been fuelled recently by a National Institute for Clinical Excellence (NICE) consultation document on social value judgments, which concluded that “where age is an indicator of benefit or risk, age discrimination is appropriate.” (5) The concept of a “fair innings” has also been used to justify the prioritisation of health

care resources to younger people. (6) However, these arguments refer to health care aimed at prolonging life, and are not applicable to palliative care, an intervention which improves the quality, rather than the length of life. (7)

Two previous reviews have investigated variations in access to specialist palliative care (SPC). (8;9) On the basis of seven studies published between 1997 and 2003, Ahmed et al concluded that there was some evidence that patients aged 65 and over have a reduced likelihood of referral to SPC. (8) Grande et al reviewed 14 studies and found that that older patients were less likely to receive home SPC. (9) However, neither review quantified the difference in use by younger and older patients to enable estimation of the scale of the problem. In addition, neither review applied a quality assessment to the included studies, which limits the confidence that can be placed in the conclusions.

This review is the first to critically appraise published quantitative research on the effect of age on referral to and use of SPC for patients with cancer, and to quantify the impact of age on use. Cancer patients were chosen because they represent 95% of specialist palliative care users in the UK. (10)

Review methods

Search strategy and selection criteria

We searched Medline, Embase, Web of Science, HMIC, SIGLE and AgeInfo from 1966 to March 2005 for all studies which included quantitative data on referral to and/or use of specialist palliative care (SPC) by adult cancer patients (at any site and stage of disease), across all clinical settings. Settings included in-patient care in a designated palliative care unit (e.g. hospice), day care in a designated palliative care unit, home care received from a SPC team and hospital care received from a SPC team. Studies of care not provided by a dedicated SPC team, including generalist palliative care provided by e.g. family doctors and palliative radiotherapy, were excluded. Retrospective or prospective cohort studies, case-control studies and cross-sectional surveys were eligible for inclusion if they provided data on and included age within their analysis, even if age was not their primary predictor variable. All sources of report of referral or use (patient, informal carer, healthcare professional, healthcare records) were eligible for inclusion. There were no restrictions on the country of research, but the language of publication was restricted to English.

A combination of text words and thesaurus terms were used for two major search concepts and their synonyms – *referral/use* and *specialist palliative care* (Appendix 1 for full strategy). The search strategy was developed in Medline and then adapted for other databases. Bibliographies of full-text articles identified through database searching and included in the review were scrutinized for further relevant studies. The lists of titles, abstracts and then full texts were

scrutinized independently by two reviewers (JB and RR) to determine whether they met the inclusion criteria.

Data extraction, appraisal and synthesis

Extraction of data from each paper was performed by one reviewer (JB) and checked by a second (RR). Discrepancies were resolved by referral to the original studies. A checklist was used to extract data on the methods (including design, completeness of outcome ascertainment, analysis); size of study; study population (region, subjects and inclusion/exclusion criteria); outcomes of interest; and proportions of users/non-users by age. Components for quality assessment were adapted from the methodology checklists developed by the Scottish Intercollegiate Guidelines Network (SIGN) and used by organisations including the National Institute for Health and Clinical Excellence (NICE). (11) These series of questions, published for study designs including cohort and case-control studies, guide assessment of the internal validity of a study. Each study-design specific checklist covers details on the selection of subjects, the assessment of outcome, confounding, and statistical analysis. Criteria are answered on a scale from 'Not reported' to 'Well covered', and an overall assessment of the study is then made based on how many of the criteria are met. Cross-sectional studies were appraised using a modified version of the cohort study checklist.

Due to the diverse nature of the included study populations and of the outcomes, statistical synthesis of study findings was inappropriate. Where data allowed, crude odds ratios and 95% confidence intervals for the use of specialist palliative care in older versus younger cancer patients were calculated. We used an age cut-off of over and under 75 where original age categories allowed. Extracted data are presented in tabular form and a narrative synthesis conducted.

Results

Description of studies

Of ~~3184~~2652 citations initially identified, fourteen articles (which related to thirteen studies) met the inclusion criteria. (12-25)

<Insert Figure 1 here>

Nine of the thirteen studies were retrospective cohort studies which used administrative data and ranged in size from 521 (18) to 170,136 participants. (23) Two studies were cross-sectional surveys using retrospective reports of service use from proxy respondents (usually carers). They included 96 (24) and 2074 (12;13) participants respectively. One study used a retrospective case-control design (17) and one was a retrospective review of a palliative care service' records, with comparisons to the wider population of cancer deaths. (16) Studies covered deaths occurring from 1979 to 1999. Two studies restricted participants to patients aged 65 years and above at death, and one to 67 years and above; the remaining restricted participants to adults, or had no stated age restrictions.

<Insert Table 1 here>

Four articles focused specifically on the receipt of SPC at home. (13;15;17;24)

The remaining included one or more services providing SPC across a range of settings (e.g. home, hospital, and hospice). Studies based their outcome ascertainment on records kept or provided by the SPC service of interest, except the two surveys of proxy respondents, which relied on participant's reports of the deceased's use of services

Use of specialist palliative care in relation to age

All of the studies reported a statistically significant lower use of SPC among older cancer patients at a univariate level. Crude odds ratios for the use of SPC in older versus younger cancer patients ranged from 0.~~33~~37 (0.~~15~~23 to 0.~~72~~60) to 0.82 (0.80 to 0.84).

<Insert Table 2 here>

~~Five~~Eight studies included a ~~multivariable~~multivariate regression analysis to investigate the effect of age on referral to or use of SPC, after controlling for potential confounding factors. (12-14;17;19-21;23) Of these, six reported older adults were significantly less likely to use specialist palliative care services. (12-14;19-21) However, age group cut-offs and variables included in regression models varied between studies, making direct comparison between them difficult. In Grande et al's (2002) case control study, the effect of age disappeared after controlling for other variables, including use of cancer and district nursing

~~services. (17) As the author's acknowledged, if age is related to use of other health care services, its relationship with hospice use may have been disguised in their analysis. The final study reported that, following multiple regression analysis, the effect of age (as a continuous variable) on the use of hospice care increased over the period of their study, 1991 to 1999. (23)ge group cut-offs varied between studies, making direct comparison between them difficult. Two studies reported a 'dose-response' relationship, with increasing, significant differences between older and younger patients, with lower use as age increased (over/under 65; (14) over/under 85 (21)). One study reported a similar linear relationship, but differences were only significant when comparing patients aged 80 and over to those aged under 60. (20) Another study found significantly lower use in patients aged 80 and over; the highest use was in those aged 40-59. (19) Finally one study found differences in the type of specialist care received by age, with those aged 75 and under significantly more likely to receive community specialist palliative care, and those aged 85 and under significantly more likely to receive inpatient hospice care. (12;13)~~

Discussion

Our findings suggest that patients' age may be an influential factor in use of or referral to SPC, with older patients less likely to receive these services than younger patients. However, important weaknesses in the studies reviewed limit the certainty of the findings.

~~Limitations of the evidence~~

Crucially, these studies did not explicitly explore the issue of *inequality* versus *inequity* of use. Inequality and inequity are related, but not equivalent, concepts. Inequities in the use of health care are inequalities (differences) in use which are considered to be unfair or unjust. (26) The judgement as to what is unfair or unjust is usually based on consideration of the need for health care and the extent to which health care inequalities are avoidable. An equitable health care system is one in which there is equal use of health care for equal need.

Therefore, the measurement of need is fundamental to studies of the fair use of health care. (27) This concept of fairness, rather than simply of equality, is widely recognised when the distribution of NHS care is considered. For example, standard one of the National Service Framework (NSF) for Older People states that “NHS services will be provided, regardless of age, on the basis of clinical need alone.” (4) Specialist palliative care is designed to meet only the most complex or persistent needs of cancer patients – and therefore not all patients require this care. (28)

Unequal use of health care between particular population groups is not inequitable if it reflects an unequal need for care. These findings may therefore reflect a reduced need for specialist palliative care amongst older people. It is not yet clear whether this is indeed the case, for two reasons. First, although it has been agreed that specialist palliative care should be reserved for those with “complex and persistent” needs, there has been little examination on how this

definition of need should be operationalised, resulting in a lack of agreement between medical and nursing staff as to which hospital inpatients require such care. (29) Secondly, the evidence on variations in the need for care by age, based upon the presence and impact of symptoms, is limited and conflicting. For example, one post-bereavement survey of carers found that patients over 85 years had a greater number of symptoms than patient under 65, but symptoms in the older group were less likely to “very distressing”. (30) By contrast, a secondary analysis of a retrospective survey of cancer patient carers suggested that both the number of symptoms and the proportion perceived to be “very distressing” declined with age, whilst the level of functional dependency did not vary. (31)

It is argued that the need for specialist palliative care should be determined by social, emotional and spiritual concerns as well as by health status. (1) Across a life span, patients’ health, social and economic status (including the presence of dependent children or partners, the likelihood of living alone and employment status) fluctuates. It is therefore possible that the need for specialist palliative care will vary with age. However, in the absence of explicit definitions of the needs that can be addressed by specialist palliative care, it is not possible to explore the extent to which they differ with age. Only one of the studies included in this review attempted to define patients’ need for specialist palliative care, and this was limited to a consideration of symptoms. (12;13)

An alternative explanation for lower use of specialist palliative care by older patients is that their needs are being met elsewhere. Perhaps health or social care services “fill the gap” for older cancer patients. It may be that a palliative care approach is used by generalist or care of the elderly services and that these meet the needs of older cancer patients. (28) The high proportion of older cancer patients dying in care homes may also reflect another effective approach to meeting the needs of these patients. (32) However, until a greater understanding of need is developed, it is difficult to judge how far specialist palliative care needs are met by alternative care sources.

Some further limitations of the studies included in this review should be pointed out. Firstly, four studies gave an inadequate description of SPC services that were included, their setting, and the care offered, limiting their generalisability. (14;20;22;23) Secondly, the quality of the outcomes data was often poor. All the studies were based on retrospective investigations of service use, relying on routine administrative data or recall of service use by proxy respondents. It is understandable why such data sources are used in preference to prospectively collected data from patients themselves. In this field prospective data collection is challenging, due to the terminal nature of illness, and risk of loss of data due to participants’ incapacity or death. However, the limitations of retrospective methods should be recognised. For example, referral to, or use of SPC has been shown to be inconsistently recorded in patient records; (33) the validity of responses about service use and subjective symptoms from proxies such as

carers is uncertain; (34) and questions asked of proxy respondents to determine use of SPC are often insufficiently comprehensive. (24) The sensitive nature of terminal illness research should not exclude the use of prospective studies. Instead discerning methods of data collection should be designed, which may include, for example, flexibility in data collection intervals and settings. If retrospective methods continue to be used, validation methods should ascertain the accuracy of their outcomes data. These could include prospective investigation of the completeness and accuracy of medical records, or cross-validation of respondent reports with data from SPC services.

Implications

This review highlights the requirement to investigate the use of SPC in relation to the need for such care in order to understand whether the objectives of the NHS Cancer Plan and the NSF for Older People are being fulfilled in line with the principles of the NHS. Sensitive and flexible prospective methods should be developed to examine the extent to which the use of specialist palliative care is fair. This review also highlights wider issues about how need for SPC may be defined. Although this paper is restricted to cancer patients, the ongoing debate about SPC for non-cancer patients may present an opportunity to focus on and clarify what SPC actually is and offers, and who has a need for such care.

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Conflicts of interest

None declared

Ethical approval

Not required.

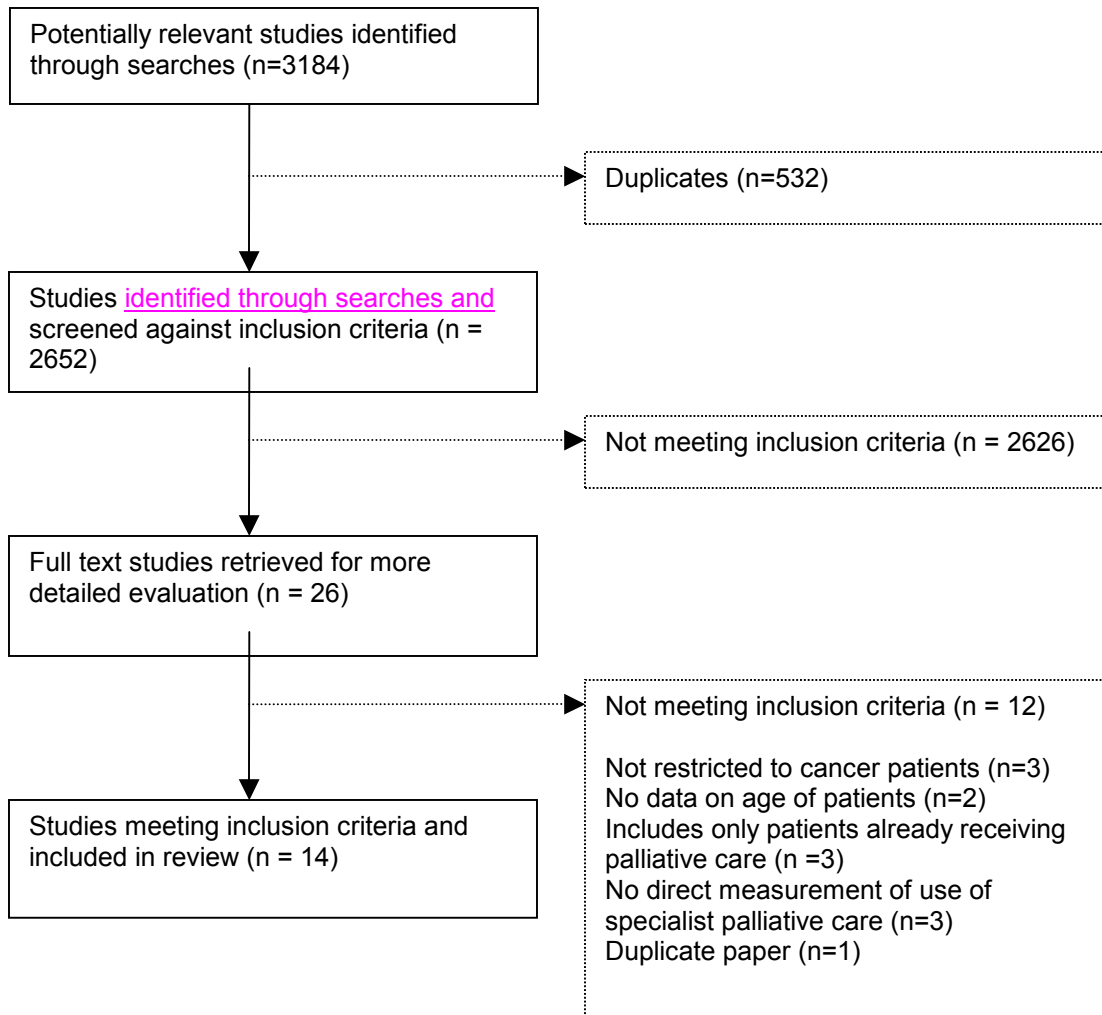


Fig 1. Flowchart of literature search and study selection

Table 1. Characteristics and quality appraisal of studies

Study (location)	Age of patients	Participants	Outcome	SIGN score*
Retrospective cohort studies				
Burge 2002 (Canada) (14)	No stated restrictions	4376 cancer deaths (1992 to 1997) identified from death certificates in one municipality. No stated age restrictions.	Referral to the municipality palliative care programme. Not stated how determined.	2-
Costantini 1993 (Italy) (15)	18+	12,343 cancer deaths (1986 to 1990) identified from local department of statistics in one city.	Use of the palliative home care service. Determined from clinical records of the service.	2-
Evans 1984 (UK) (16)	No stated restrictions	125 patients (referred between May 1982 and June 1983) identified from the clinical records of the service and who received continuing care. 437 cancer deaths (1982) in one district identified from the death records of the Office of Population Censuses and Surveys.	Receipt of continuing care from the multidisciplinary terminal care support team.	2-

The effect of age on use of specialist palliative care

Gray 1997	16+	521 cancer deaths (1991) identified from death register held by the Director of Public Health. Participants included if postcode of residence within District Health Authority; cancer recorded as a causal or contributory factor in death. 16 years and over	Receipt of care from one or more specialist palliative care agencies, last 12 months of life. Determined from in-patient and day hospice records; Marie Curie and Macmillan nurse' case load diaries	2-
(UK)	(18)			
Hunt 1996	No stated restrictions	2800 cancer deaths (1990) identified from Central Cancer Registry (CCR) database. Deaths attributable to a non-cancer cause – based on State death records – excluded. No stated age restrictions.	Use of one of South Australia's inpatient hospice or outreach palliative care services. Determined from lists provided by all hospice and palliative care services of their patients who died in 1990.	2-
(Australia)				
(19)				
Hunt 2002	No stated restrictions	3086 cancer deaths (1999) identified from State Cancer Registry database. No stated age restrictions.	Use of one of South Australia's inpatient hospice or outreach palliative care services. Determined from lists provided by all hospice and palliative care services of their patients who died in 1999.	2-
(Australia)				
(20)				

The effect of age on use of specialist palliative care

Johnston	20+	14,494 cancer deaths (1988 to 1994) identified from death certificate data included in the Cancer Registry in one region. 20 years and over.	Referral to a comprehensive Palliative Care Program (PCP) based in one Infirmary. Inpatient unit, hospital consultation, clinic follow-up, home consultation and bereavement support. Determined from clinical records of the service.	2-
1998 (Canada) (21)				
Lackan 2003 (USA) (22)	65+	25,161 breast cancer deaths (1991 to 1996) identified from Surveillance, Epidemiology and End Result (SEER) Medicare databases - population-based registry for incident cancer cases. SEER areas represent about 14% of the US population. Diagnosed with breast cancer between 1986 and 1996. Aged 65 years and over.	Receipt of hospice care. Determined by existence of a hospice claim in the hospice standard analytic file [Medicare claims].	2-
Lackan 2004 (USA) (23)	67+	170,136 breast, colorectal, lung and prostate cancer deaths (1991 to 1999) identified from Surveillance, Epidemiology and End Result (SEER) Medicare databases - population-based registry for incident cancer cases. SEER areas represent about 14% of the US population. Diagnosed with cancer between	Receipt of hospice care. Determined by existence of a hospice claim in the hospice standard analytic file [Medicare claims].	2-

1991 and 1996. Aged 67 years and over.

Virnig 2002 (USA) (25)	65+	388,511 deaths from one of seven cancers (1996) identified from the National Center for Health Statistics' Report of Final Mortality Statistics. Aged 65 years and over.	Use of hospice care. Determined from 1996 hospice claims data submitted to the Health Care Financing Administration.	2-
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Retrospective surveys of proxy respondents

Addington-Hall 1998 (UK) (12)	No stated restrictions	2074 of 2094 (71% response rate) cancer deaths randomly sampled from 20 self-selected health authorities. Deaths occurring in last quarter of 1990. For each death, the best informant about the deceased's last 12 months of life sought, and interviewed using a structured questionnaire.	Receipt of hospice inpatient care. Determined by respondent's recollection of the names of hospitals and hospices to which the deceased was admitted. Names cross-checked with the 1990 Directory of Hospice Services.	2-
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Addington-Hall 2000 (UK) (13)	No stated restrictions	2074 of 2094 (71% response rate) cancer deaths randomly sampled from 20 self-selected health authorities. Deaths occurring	Receipt of CSPC nursing. Determined by respondent's reports of use of these services –	2-
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The effect of age on use of specialist palliative care

		in last quarter of 1990. For each death, the best informant about the deceased's last 12 months of life sought, and interviewed using a structured questionnaire.	no further details.	
McCusker 1985 (USA) (24)	No stated restrictions	133 cancer deaths randomly selected from deaths in one county, December 1979 to January 1980. Surviving relatives contacted and interviewed (96/133 – 72% response rate).	Use of the county home-hospice programme.	2-
Retrospective case-control study				
Grande 2002 (UK) (17)	No stated restrictions	121 cancer patients referred to HAH from June 1994 to June 1995 (cases) and 206 cancer deaths randomly sampled from the area Cancer Registry who were not referred to HAH (control).	Referral to the Hospital at Home palliative care service. Not stated how determined.	2+

* Based on the SIGN methodological quality checklists. ~~Indicates how well the study was done to minimize the risk of bias or confounding, and to establish a causal relationship between exposure and effect.~~ Code 2 ++ (High quality case-control, cohort or cross-sectional studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal), 2 + (Well conducted case control, cohort or cross-sectional studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal), 2 - (Case control, cohort or cross-sectional studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal). NB: retrospective studies can only score + or -.

Table 2: Estimates of use of specialist palliative care by age group

Study	Results:	Extracted results:			Multivariable <u>Multivariate</u> analysis
	Use of SPC by age	Crude (unadjusted) odds ratios			
		Comparison group	Odds ratio	95% CI	
Retrospective cohort studies					
Burge 2002 (14)	< 65 = 75% 65-74 = 70% 75-84 = 53% ≥85 = 38% * * NB: No numerator or denominator data shown	-	-	-	Patients older than 65 less likely to receive SPC than patients under 65. Controlled for sex, cancer type, year of death and receipt of palliative radiotherapy. Odds ratios (OR): < 65 = 1.00 65-74 = 0.72 (0.60, 0.85) 75-84 = 0.44 (0.37, 0.53) ≥85 = 0.21 (0.17, 0.27)
Costantini 1993 (15)	<55 = 8.1% (92/1142) 55-64 = 6.1% (139/2287) 65-74 = 5.0% (179/3590) 75-84 = 2.8% (110/4005)	Over / under 75	0.41	0.33 to 0.50	Multivariable <u>Multivariate</u> analysis not conducted to investigate use of SPC (investigated predictors of home death for patients receiving care from SPC home care service)

The effect of age on use of specialist palliative care

	≥85 = 1.6%	(21/1319)				
Evans 1984	<44 = 75.0%	(9/12)	Over / under	0.40 <u>0.3</u>	0.26 <u>0.23</u>	MultivariableMultivariate analysis not conducted
(16)	45-54 = 66.7%	(18/27)		6.5 <u>7</u>	0.64 <u>0.60</u>	
	55-64 = 30.9%	(29/94)				
	65-74 = 28.7%	(41/143)				
	75-84 = 19.3%	(23/119)				
	≥ 85 = 9.5%	(4/42)				
Gray 1997 (18)	Mean age at death:		-	-	-	MultivariableMultivariate analysis not conducted
	Use SPC: 66.6 (SD 11.9)					
	No use SPC: 73.0 (SD 10.6)					
Hunt 1996 (19)	<40 = 56.7%	(51/90)	Over / under 80	0.47	0.39 to 0.57	Patients older than 80 less likely to receive SPC compared to patients under 40. Controlled for area of residence, site, survival, place of birth, other variables uncertain/not stated. ORs:
	40-59 = 66.3%	(299/451)				<40 = 1.00
	60-79 = 58.1%	(963/1657)				40-59 = 1.26 (0.78, 2.03)
	≥80 = 41.2%	(248/602)				60-79 = 0.89 (0.57, 1.39)
						≥80 = 0.41 (0.26, 0.65)

The effect of age on use of specialist palliative care

Hunt 2002 (20)	<60 = 73.3% (356/486) 60-69 = 73.6% (457/621) 70-79 = 70.9% (778/1097) ≥80 = 58.3% (514/882)	Over / under 80	0.54	0.46 to 0.63	Patients older than 80 less likely to receive SPC compared to patients under 60. Controlled for area of residence, country of birth, primary cancer site, survival from diagnosis. ORs: <60 = 1.00 60-69 = 0.96 (0.72, 1.27) 70-79 = 0.83 (0.64, 1.07) ≥80 = 0.50 (0.39, 0.65)
Johnston 1998 (21)	20-74 = 50.1 % (409/817) ≥75 = 35.0% (182/520)	Over / under 75	0.54	0.43 to 0.67	Older patients less likely to receive SPC compared to younger patients. Controlled for sex, cancer cause of death, provision of palliative radiation, year of death, time between diagnosis and death, place of residence. ORs: 20-54 = 4.9 (3.2, 7.6) 55-64 = 3.4 (2.2, 5.1) 65-74 = 3.1 (2.1, 4.5) 75-84 = 2.1 (1.4, 3.1) ≥85 = 1.0
Lackan 2003 (22)	67-74 = 25.4% (1383/5443) 75-84 = 22.8% (2432/10666) 85-89 = 18.1% (861/4756)	Over / under 75	0.71	0.66 to 0.76	Effect of age in multivariable <u>multivariate</u> analysis not reported

The effect of age on use of specialist palliative care

	≥90 = 12.3%	(528/4293)				
Lackan 2004 (23)	67-74 = 33.1%	(18377/55520)	Over / under 75	0.82	0.80 to 0.84	<u>Effect of age in multivariableMultivariate analysis showed the effect of age (as a continuous variable) on use of hospice increased between 1991 and 1999 – adjusted odds ratios for use of hospice in 1991 were 0.99 (0.99–1.00), and in 1999 0.98 (0.97–0.98) is not reported</u>
	75-84 = 31.2%	(23411/75035)				
	≥85 = 24.3%	(9557/39329)				
Virnig 2002 (25)	65-69 = 41.8	Rate per 100	-	-	-	<u>MultivariableMultivariate analysis not conducted (rates standardised for sex and race)</u>
	70-74 = 45.0	deaths,				
	75-79 = 45.3	standardised for				
	80-84 = 45.0	sex and race				
	85-89 = 43.1					
	90-94 = 41.0					
	≥95 = 38.2					

Proxy surveys

The effect of age on use of specialist palliative care

Addington-Hall 1998 <u>(12)</u>	<55 = 17.9% (37/207) 55-64 = 20.9% (67/321) 65-74 = 19.5% (111/570) 75-84 = 15.3% (105/686) ≥85 = 7.9% (22/277)	Over / under 75	0.62	0.49 to 0.79	Being under the age of 85 years was significantly associated with an increased likelihood of receiving inpatient hospice care. Under 85 odds ratio 2.82 (1.59 – 5.00). Variables included in model not explicitly stated.
Addington-Hall 2000 <u>(13)</u>	<55 = 43.0% (89/207) 55-64 = 39.3% (126/321) 65-74 = 31.1% (177/570) 75-84 = 21.1% (145/686) ≥85 = 13.4% (37/277)	Over / under	0.45 <u>0.4</u>	0.36 <u>0.34</u> to 0.55 <u>0.51</u>	Being under the age of 75 years was significantly associated with an increased likelihood of receiving community specialist palliative care nursing. Under 75 odds ratio 1.77 (1.4 – 2.3). Variables in model – 23, including type of respondent, marital status, whether had living children and symptoms.
McCusker 1985 <u>(24)</u>	<65 = 61.9% (26/42) 65-74 = 35.9% (14/39) ≥75 = 34.1% (14/41)	Over / under	0.33 <u>0.5</u>	0.15 <u>0.25</u> to 0.72 <u>1.15</u>	Multivariate analysis not conducted
Retrospective case-control study					

The effect of age on use of specialist palliative care

Grande 2002 (17)	Users mean age <u>70.5 (SD 13.8)</u> - Non-users mean 74.7 (SD 12.0) age 70.5 (SD 13.8)	-	<p><u>Effect of age significant at a univariate level (difference in mean age between Hospice at Home and control groups P=.006); Effect of age disappeared in multivariate logistic regression analysis, not reported. Variables in the final model predicting membership of the Hospice at Home group included noncancer causes of death, cancer diagnosis, contact with oncologist, late start for acute hospital care, late start for district nursing input, and receipt of Marie Curie nursing care.</u></p>
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Appendix 1 – search strategy

	Medline example search strategy
	1966 to March 2005 Week 1
#1	Explode "Palliative Care" / all SUBHEADINGS
#2	"Terminal Care" / all SUBHEADINGS
#3	"Hospice Care" / all SUBHEADINGS
#4	palliat* adj (care or treat* or nurs* or medic*)
#5	terminal adj (care or nurs* or medic*)
#6	hospice adj (inpatien* or care or treat* or nurs*)
#7	end*of*life adj care
#8	Macmillan adj nurs*
#9	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8
#10	"Referral and Consultation" / all SUBHEADINGS
#11	Explode "Health Services Accessibility" / all SUBHEADINGS
#12	referral
#13	utili*ation
#14	access
#15	#10 or #11 or #12 or #13 or #14
#16	#9 and #15
#17	#16 Limit to English Language

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