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The (un)availability of prognostic information in the last days of life: a prospective observational study

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ABSTRACT

Objectives The aims of this study were (1) to document the clinical condition of patients considered to be in the last 2 weeks of life and (2) to compare patients who did or did not survive for 72 hours.

Design A prospective observational study.

Setting Two sites in London, UK (a hospice and a hospital palliative care team).

Participants Any inpatient, over 18 years old, English speaking, who was identified by the palliative care team as at risk of dying within the next 2 weeks was eligible.

Outcome measures Prognostic signs and symptoms were documented at a one off assessment and patients were followed up 7 days later to determine whether or not they had died.

Results Fifty participants were recruited and 24/50 (48%) died within 72 hours of assessment. The most prevalent prognostic features observed were a decrease in oral food intake (60%) and a rapid decline of the participant's global health status (56%). Participants who died within 72 hours had a lower level of consciousness and had more care needs than those who lived longer. A large portion of data was unavailable, particularly that relating to the psychological and spiritual well-being of the patient, due to the decreased consciousness of the patient.

Conclusions The prevalence of prognostic signs and symptoms in the final days of life has been documented between those predicted to die and those who did not. How doctors make decisions with missing information is an area for future research, in addition to understanding the best way to use the available information to make more accurate predictions.

Strengths and limitations of this study

► An observational study that prospectively documented prognostic signs and symptoms in relation to survival of 72 hours.
► Highlights the prevalence of missing data in palliative care.
► The results reflect only the participants that were recruited as part of this study, those who were referred to specialist palliative care. Other results might have been prevalent in a different population.

when patients are (or are not) imminently dying.

One way to improve this skill is to teach staff which signs and symptoms are most prevalent at the end of life. There are a number of reports from organisations such as The National Council for Palliative Care and the National Institute for Health and Care Excellence, which present narrative summaries of the symptoms and signs that are most common during the last few days of life.[6–11] Previous research and systematic reviews have identified which signs and symptoms are prevalent among patients dying from cancer[12–18] or other diseases.[19–27] Interviews or surveys with health professionals have also been used to determine which signs or symptoms staff believe are most indicative of imminent death.[28–31] From the literature, it appears that common signs include changes in breathing patterns, altered consciousness, agitation, changes to the appearance of the skin, incontinence or reduced urinary output, changes in functional ability and social withdrawal. Common symptoms include tiredness, reduced appetite and confusion.

Despite this body of evidence regarding signs and symptoms, these findings have not translated in to practice; medical teams continue to be inaccurate at recognising imminent death.[3] It has been highlighted from recent reports that evidence regarding

BACKGROUND

Caring for a dying person is a core skill required of every doctor and healthcare professional.[1] Part of this competency is to be able to recognise when the person is dying in order to facilitate a 'good death'.[2] Recognising this terminal phase can enable the dying person to spend time with their loved ones in a location of their choice. The 'More Care; Less Pathway' report[3] alongside other research[4 5] has highlighted that medical teams are not very accurate at recognising

the clinical presentation of people who were predicted to die, but subsequently did not, is lacking.[3 4] Finally, findings from palliative care research highlight the high degree of missing or unavailable data.[32] If the common signs and symptoms identified from previous research are not available, or are missing, in the final days of life, then just how is death recognised?

This study was the first stage of a larger study investigating the recognition of dying.[33] The objectives of this reasearch are:

1. To prospectively document the clinical condition of patients considered to be in the last 2 weeks of life.
2. To compare the clinical condition of patients who did or did not survive for 72 hours.

METHODS

A prospective observational study of patients referred to specialist palliative care. This study follows the Strengthening the Reporting of OBbservational Studies in Epidemiology reporting guidelines (see online supplementary file 1). The original protocol for the study is in online supplementary file 2.

Settings

Recruitment took place at two palliative care services in London, UK (a hospice and a hospital) between January 2015 and October 2015.

Participants

All inpatient referrals to the palliative care team were screened by their respective clinical teams for eligibility. Palliative care was selected as the specialty to mitigate risk that the death would be sudden or unexpected.

Inclusion criteria

1. 18 years old and over.
2. Identified by the palliative care team as likely to die in the next 2 weeks.
3. The patient or family could speak enough English for the researcher to discuss the study.

Exclusion criteria

1. Assessed as not suitable to approach by the clinical team (ie, discussing the research would cause too much distress)
2. Lacked capacity and no personal consultee (family member) available
3. Refused to participate, either verbally or through an advance directive

Sample size

This study formed part of a programme of research designed to devise a test for assessing clinicians' prognostic accuracy.[34] For the purpose of devising a prognostic test,[33] it was necessary to obtain data from at least 20 patients (10 of whom died and 10 of whom survived for 72 hours). To ensure that at least 20 cases were suitable for inclusion in the study to devise a prognostic test,

we aimed to recruit approximately 50 cases in total. The final sample was determined by the number of inpatient referrals who were eligible and willing to participate during the study recruitment period.

Patient and public involvement

Feedback on the protocol was sought from a consumer research panel (South West London Cancer Research Group). The suggestions from the group were reflected in the study protocol, specifically the study information sheets.

Ethical issues

Recruiting people who are at the ends of their lives presents ethical challenges. In both the hospice and hospital, this may have been the first time that the individual had been referred to palliative care. An inclusion criterion for the study was that the patient was considered to be likely to die within 2 weeks. This information had the potential to cause upset to both the family and the patient, unless it was handled sensitively by clinical staff. We addressed these concerns by allowing clinical teams to exclude potentially eligible patients if they judged that discussing the research would cause too much distress. Since this study did not require a consecutive series of patients, it was not felt to affect the integrity of the study to allow clinical teams the discretion to operate this form of research 'gate-keeping'.

Consent procedure

We expected a high number of participants to be unconscious or unresponsive and, as a consequence, to lack capacity. We adhered to the Mental Capacity Act[35] guidelines for recruiting patients without capacity. We also mirrored the approach taken in a similar study that had recruited patients admitted to the acute setting.[36]

If the clinician felt that involvement in the study would not cause distress, the clinician asked the patient, or their family member, if they wished to meet the researcher to discuss taking part in the study. If they agreed to this, the researcher briefed the patient and/or their family member about the research and obtained either informed consent or personal consultee agreement.

Due to the time sensitive nature of the research, there was no enforced delay between informing the patient about the study and seeking consent to participate. Each patient who entered the study was informed that they could withdraw at any time, without reason and without consequence to their care. It was possible to gain telephone advice from a personal consultee should they not live locally. If telephone advice was obtained, an information sheet and a 'documentation of advice' form were posted to the family member with a return address. If the form was not returned, or was returned incomplete, the data pertaining to that patient were removed from the database and destroyed (see online supplementary file 3).

Procedure

All participants, on entering the study, underwent a single observer-rated assessment of key prognostic features (see below), medications and overall condition. Information regarding their medical history, their reason for admission and their demographic details were extracted from the medical notes. Data regarding signs and symptoms over the last 24 hours were obtained from direct observation of, or discussion with, the patient or from discussing their care with medical or nursing staff.

Measures

We collected data on prognostic variables that had previously been identified from the literature. We used validated measures to record agitation or sedation, functional ability and comorbidities.

Richmond Agitation Sedation Scale

This scale assesses patients' level of agitation or sedation. The scale ranges from +4 (combative) to −5 (unarousable). The Richmond Agitation Sedation Scale (RASS) has high validity and reliability within a hospital setting.[37] This measure has previously been used in mortality research.[38] It distinguishes in greater detail than other scales the different levels of sedation.

Palliative Performance Scale

This scale is used to assess palliative care patients' functional ability.[39] It consists of five domains: Ambulation, Activity and Evidence of Disease, Self-Care, Intake and Conscious Level. Scores can range between 10% (fully dependent) and 100% (fully independent). A decrease in the patient's functional ability has been shown to predict death.[40]

Charlson Comorbidity Index score

This score summarises the severity of chronic comorbidities. It includes 19 diseases that are weighted by their association with mortality. Higher scores reflect a greater number and/or severity of comorbidities.[41] This was obtained from the patient's medical records. The Charlson Comorbidity Index (CCI) has been shown to predict short and long term mortality.[42]

Clinical signs and symptoms

As we wanted to provide a rich description of the patients who were potentially in the final days of life, we included all symptoms and signs that have previously been identified as being potentially predictive of the dying phase[12 14–16 19–22 24–26 28–30]:

► Respiration (rate and character)
► Blood circulation (pulse rate, blood pressure, peripheral perfusion, cyanosis)
► Physical condition (performance status, mobility)
► Skin integrity
► Excretion (continence, presence of indwelling catheter)
► Oral intake
► Pain
► Consciousness (level of sedation or agitation)
► Psychological/Spiritual condition
► Other

The full list of clinical signs and symptoms recorded is shown in online supplementary file 4.

We reported on the prevalence of missing data, which are common in palliative care studies.[32] For example, for several self-reported symptoms, it was not possible to obtain an answer for patients who were unconscious, unless the patient's family members or attending nurse were able to act as a proxy provider of information. This was particularly common when assessing the psychological state of the participant. Similarly, when a patient had a urinary catheter or a stoma, it was not possible to determine continence level.

Main outcome

The main outcomes of interest were the characteristics of patients who did and did not die within 72 hours of assessment. Each participant was followed up 7 days after the day of observation. During this time, if the participant died, the date of death was recorded.

Analysis

The purpose of this study was to describe the presence or absence of key prognostic features in patients who were or were not dying, under the care of palliative care services, rather than to test specific hypotheses about differences between subgroups of participants. Therefore, to avoid overinterpretation of our data, no statistical tests have been performed to assess for such differences. Results have been summarised using descriptive statistics.

RESULTS

Recruitment

In total, 60 patients were approached to participate in this study (see figure 1). Ten were not included because: they had died before the researcher could see them (n=5); they had declined to participate (n=3); or they had no personal consultee available (n=2). Therefore, 50
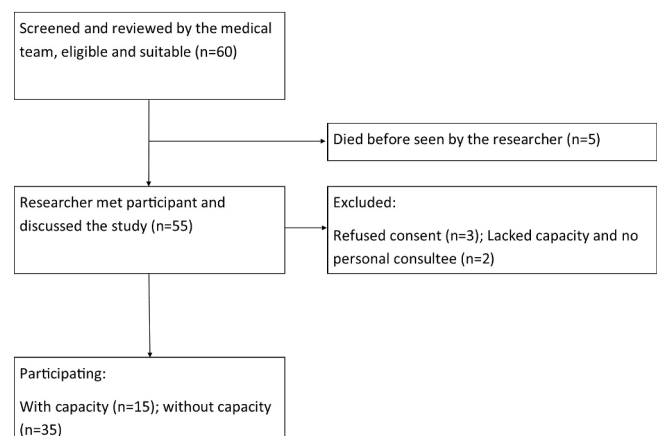

Figure 1 Recruitment flowchart.

Table 1 Participant characteristics

Demographics	Total
	n (%)
Participants	50 (100)
Gender	
Male	30 (60)
Female	20 (40)
Age (mean, SD)	72.0 (16.60)
Ethnicity	
White British	36 (72)
Other	14 (28)
Cancer diagnosis?	
Yes	33 (66)
No	17 (34)
Charlson score (mean, SD)	5.43 (2.05)
Length of survival	
Less than 72 hours	24 (48)
More than 72 hours	26 (52)

patients were included in this analysis, of whom 24 (48%) died within 72 hours of assessment.

Participant characteristics
The characteristics of participants recruited are presented in table 1.

By site
The patients in hospital were older compared with the hospice (mean 76 years, SD 16 vs 64, SD 14) with a higher prevalence of non-cancer diagnoses (48% vs 11%). They had fewer serious comorbidities than the patients from the hospice (CCI mean 5.0, SD 2.1 vs 6.2, SD 1.8) and more patients died within 72 hours within the hospital (65% vs 21%).

By survival
Slightly more men than women died within 72 hours (58% vs 42%). The mean age of patients who died within 72 hours was higher (78 years, SD 13) than those who did not (67, SD 18). There was little difference in comorbidities between those who died within 72 hours (CCI mean 5.2, SD 2.2) and those who did not (5.7, SD 1.9). Of those who died within 72 hours, 50% had cancer, and 50% did not.

Palliative Performance Scale
The Palliative Performance Status (PPS) was assessed for every participant. The PPS scores ranged between 10% and 70%, with a median of 30% (IQR 10, 40). The participants who died within 72 hours had a median PPS score of 10% (IQR 10, 30). Participants who survived beyond 72 hours had a median PPS score of 40% (IQR 20, 50).

Richmond Agitation Sedation Scale
Scores for the RASS ranged between +2 and −5. The median score for the total population was −1 (IQR −4, 0). The distribution of scores was bimodal; 12 patients (24%) had a score of 0 and nine (18%) had a score of −5. The participants who died within 72 hours of assessment were either deeply unconscious (n=15, 62.5% scored either −4 or −5) or were agitated (n=5, 20% scored +1 or +2) with a median score of −4 (IQR −4.5,−0.5). The participants who did not die within 72 hours were largely calm with mild agitation or sedation (n=18, 70% scored between −1 and +1) and a median score of −0.5 (IQR −2, 0).

Clinical signs and symptoms prevalence
Table 2 details the prevalence of the signs and symptoms noted during the study. Overall, the most prevalent features observed were a decrease in oral food intake (60%) and a rapid decline of the participant's global health status (56%).

Participants who died within 72 hours were more frequently noted to have: a rapid decline of their global condition (75% vs 38%); decreased urine production (71% vs 23%); more concentrated urine (67% vs 31%); incontinence of faeces (71% vs 19%); noisy respiratory secretions (54% vs 15%); Cheyne-Stoke breathing (17% vs 4%); peripheral cyanosis (21% vs 4%); and refusal of food (21% vs 4%). There were two symptoms that were only seen in participants who died within 72 hours: respiration with mandibular movement (n=2; 8%) and pulselessness of the radial artery (n=2; 8%). Participants who survived longer than 72 hours were more frequently noted to have a loss of appetite (69% vs 25%) and pain (42% vs 4%) and were more likely to express anxiety or fear (54% vs 17%) and were more accepting of their death (38% vs 8%); however, these data were more likely to be missing for patients who survived less than 72 hours.

Missing data
As shown in table 2, there were some prognostic features for which almost half of the data were recorded as missing. In general, the proportion of missing data was higher in patients who died within 72 hours compared with those who survived. Measures such as the physical condition, oral intake, psychological well-being and whether they were experiencing shortness of breath were often not available either because there was no meaningful answer (ie, the patient had a catheter/stoma or the patient was not alert enough to respond, with no proxy measure available) or the information was not recorded. The aim of this study was to document all previously identified prognostic features in patients who were referred to specialist palliative care teams. While the diminished consciousness of the patient, which is an evidence-based prognostic indicator in its own right, could have limited the ability to collect some of this data; the fact that data relating to some of these features were frequently missing in those who died within 72 hours is a relevant and novel finding which has implications for clinical practice.

Table 2 Prevalence of key prognostic features over the previous 24 hours in patients who did or did not die imminently

	Died <72 hours (n=24)			Died >72 hours (n=26)		
	Present	**Absent**	**Missing**	**Present**	**Absent**	**Missing**
	n (%)			n (%)		
Respiration						
Short of breath	2 (8)	5 (21)	17 (71)	8 (31)	12 (46)	6 (23)
Noisy respiratory secretions	13 (54)	11 (46)	0 (0)	4 (15)	22 (85)	0 (0)
Cheyne-Stokes type breathing	4 (17)	20 (83)	0 (0)	1 (4)	25 (96)	0 (0)
Abdominal swelling	4 (17)	20 (83)	0 (0)	9 (35)	17 (65)	0 (0)
Respiration with mandibular movement	2 (8)	22 (92)	0 (0)	0 (0)	26 (100)	0 (0)
Blood circulation						
Pulselessness of the radial artery	2 (8)	13 (54)	9 (38)	0 (0)	24 (92)	2 (8)
Peripheral cyanosis	5 (21)	17 (71)	2 (8)	1 (4)	25 (96)	0 (0)
Nose becomes more 'pointed'	0 (0)	21 (88)	3 (13)	0 (0)	26 (100)	0 (0)
Change in skin condition (moisture, colour, temperature)	8 (33)	16 (67)	0 (0)	8 (31)	18 (69)	0 (0)
Physical condition						
Extreme tiredness	4 (17)	4 (17)	16 (67)	11 (42)	9 (35)	6 (23)
Insomnia	1 (4)	7 (29)	16 (67)	6 (23)	14 (54)	6 (23)
Surges of energy	0 (0)	8 (33)	16 (67)	2 (8)	18 (69)	6 (23)
Rapid decline of global condition	18 (75)	6 (25)	0 (0)	10 (38)	16 (62)	0 (0)
Skin integrity						
Wounds, ulcers or sores on the skin	6 (25)	18 (75)	0 (0)	7 (27)	19 (73)	0 (0)
Excretion						
Catheter	16 (67)	8 (33)	0 (0)	11 (42)	15 (58)	0 (0)
Stoma	1 (4)	23 (96)	0 (0)	6 (23)	20 (77)	0 (0)
Concentrated urine	16 (67)	7 (29)	1 (4)	8 (31)	12 (46)	6 (23)
Incontinence (urinary)	5 (21)	3 (13)	16 (67)	5 (19)	10 (38)	11 (42)
Incontinence (faecal)	17 (71)	6 (25)	1 (4)	5 (19)	14 (54)	7 (27)
Vomiting	3 (13)	21 (88)	0 (0)	9 (35)	17 (65)	0 (0)
Altered defecation—diarrhoea	4 (17)	19 (79)	1 (4)	6 (23)	19 (73)	1 (4)
Altered defecation – constipation	9 (38)	14 (58)	1 (4)	10 (38)	15 (58)	1 (4)
Decreased production of urine	17 (71)	5 (21)	2 (8)	6 (23)	13 (50)	7 (27)
Oral intake						
Decreased eating	13 (54)	1 (4)	10 (42)	17 (65)	4 (15)	5 (19)
Decreased drinking	13 (54)	2 (8)	9 (38)	13 (50)	8 (31)	5 (19)
Refusing food	5 (21)	5 (21)	14 (58)	1 (4)	18 (69)	7 (27)
Swallowing difficulty	4 (17)	4 (17)	16 (67)	8 (31)	13 (50)	5 (19)
Loss of appetite	6 (25)	1 (4)	17 (71)	18 (69)	2 (8)	6 (23)
Pain						
Patient reported pain	1 (4)	8 (33)	15 (63)	11 (42)	10 (38)	5 (19)
Clinician reported pain	3 (13)	21 (88)	0 (0)	10 (38)	16 (62)	0 (0)
Pain is less responsive to treatment	1 (4)	20 (83)	3 (13)	1 (4)	23 (88)	2 (8)
Psychological condition/spiritual						
Confusion	6 (25)	2 (8)	16 (67)	7 (27)	11 (42)	8 (31)
Delirium	2 (8)	6 (25)	16 (67)	1 (4)	18 (69)	7 (27)
Anxiety/fear	4 (17)	2 (8)	18 (75)	14 (54)	5 (19)	7 (27)

Table 2 Continued

	Died <72 hours (n=24)			Died >72 hours (n=26)		
	Present	**Absent**	**Missing**	**Present**	**Absent**	**Missing**
Recoil behaviour (withdrawn)	0 (0)	7 (29)	17 (71)	1 (4)	18 (69)	7 (27)
Acceptance of death	2 (8)	4 (17)	18 (75)	10 (38)	9 (35)	7 (27)
Saying goodbye to family members	0 (0)	6 (25)	18 (75)	0 (0)	19 (73)	7 (27)

DISCUSSION

This study described the presence or absence of key prognostic features in palliative care patients who were thought to be in the last 2 weeks of life and who did or did not die within 72 hours of assessment.

In patients thought to be in the last 2 weeks of life, there was a reduction in physical ability, as measured by the palliative performance scale. Three symptoms affected at least half of the patients: reduced oral intake, a rapid decline in condition and a change in excretions. This result is slightly inconsistent with other studies that have suggested that other symptoms such as fatigue and mental haziness are more prevalent in the last weeks of life.[43–45]

Different symptoms were prevalent in patients who died within 72 hours and in those who survived for longer. Patients who died within 72 hours had a lower palliative performance score and experienced either more agitation or more sedation than patients who survived longer than 72 hours. Some symptoms were more prevalent in patients who died imminently, such as a rapid decline in global condition, decreased urine output, increased anxiety, incontinence, noisy respiratory secretions, Cheyne-Stoke breathing and peripheral cyanosis. The small sample size of this study means that the estimates of the prevalence of particular symptoms should only be regarded as tentative. Two symptoms, although uncommon, were only noticed in patients who died imminently: respiration with mandibular movement and pulselessness of the radial artery. These symptoms have been previously suggested to predict imminent death.[12 13 16] One previous study reported that observations of the patient, such as heart rate and oxygen saturation, may also be predictive of imminent death but that for a large portion of patients, these vital signs were within a normal range in the last days of life.[17] Most of the patients in our study did not have routine observations undertaken and so no such data were available.

This reiterates the importance of further research within a palliative care context particularly in the final days of life and about how to make prognostic decisions in the context of incomplete data.[32] A large volume of data was recorded as missing for patients who died within 72 hours in this study. This is an interesting finding and highlights the complicated landscape in which the medical team are asked to make predictions about imminent death based on information that is not always possible to obtain about the patient. The prevalence of prognostic factors in this study demonstrates the large amount of potential prognostic information that medical teams have to weigh up when making a decision about end of life care. Further research is required to determine how these decisions are made in practice.

Strengths and weaknesses

This study is one of the first, to the authors knowledge, to prospectively observe prognostic signs and symptoms in the final days of life. However, these data are only taken from two london specialist palliative care teams. If a different population had been recruited, it is possible that other signs and symptoms may have been more prevalent. For example, patients who are not referred to specialist palliative care teams might present differently towards the end of life. This is an area for further research. This study was not designed to demonstrate an association between the prevalence of symptoms at the end of life and death within days, and any apparent differences between groups need further confirmation in a comparative study.

CONCLUSION

This study lends support to the usefulness of certain key prognostic features for predicting imminent death in palliative care inpatients. Further work is required to understand how clinicans should best integrate these prognostic features, while taking into account the volume of missing information, to refine their prognostic estimates of imminent death.

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