extra time provided by the effects of treatment in a conscious way to achieve their personal goals.

Breaking the cycle of collusion between doctor and patient is not primarily a question of whether the patient has to be informed at all, which usually is the case, but rather how doctors and patients deal with these facts in practice. Awareness cannot be forced on the patient, it can only be supported. This requires an active, patient orientated approach from the doctor. Perhaps solutions to the problem of false optimism about recovery and not knowing a poor prognosis have to be found outside the doctor-patient relationship itself. An example of such a solution would be the involvement of "treatment brokers," people who are trusted by the doctor and the patient and can help both parties in clarifying and communicating their (otherwise implicit) assumptions and expectations.

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1 Meredith C, Symonds P, Webster L, Lamont D, Pyper E, Gillis CR, et al. Information needs of cancer patients in west Scotland: cross sectional survey of patients' views. *BMJ* 1996;313:724-6.
2 Costain Schou K, Hewison J. *Experiencing cancer*. Buckingham: Open University Press, 1999.
3 Leydon G, Boulton B, Moynihan C, Jones A, Mossman J, Boudioni M, et al. Cancer patients' information needs and information seeking behaviour: in depth interview study. *BMJ* 2000;320:909-13.
4 Weeks JC, Cook FE, O'Day SJ, Peterson LM, Wenger N, Reding D, et al. Relationship between cancer patients' predictions of prognosis and their treatment preferences. *JAMA* 1998;21:1709-14.
5 Christakis NA. *Death foretold; prophecy and prognosis in medical care*. Chicago: University of Chicago Press, 2000.
6 Smith TJ, Swisher K. Telling the truth about terminal cancer (editorial). *JAMA* 1998;21:1746-8.
7 The A-M. *Nursing dilemmas in euthanasia and other end-of-life decisions*. Houten: Bohn Stafleu Van Loghum, 1997 (in Dutch).
8 Mays N, Pope C. Qualitative research: observational methods in health care settings. *BMJ* 1995;311:182-4.
9 The A-M. *Palliative care and communication*. Houten: Bohn Stafleu Van Loghum, 1999 (in Dutch).
10 Geertz C. *The interpretation of cultures*. New York: Basic Books, 1973.
11 Nuland SW. *How we die: reflections on life's final chapter*. London: Chatto and Windus, 1994.
12 Frank AW. *The wounded storyteller: body, illness and ethics*. Chicago: University of Chicago Press, 1995.

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Using the modified Barthel index to estimate survival in cancer patients in hospice: observational study

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Professionals in palliative care often base clinical decisions on estimated prognosis, but it has been shown that they are less accurate than the Karnofsky index at predicting prognosis in terminally ill patients.[1 2] Because our clinical experience suggested that in patients in hospice the rate of change in physical functioning was a more useful indicator of survival than absolute measures, we investigated the use of rate of change of physical function in estimating survival of terminally ill patients with cancer by using the modified Barthel index. This comprises 10 activities of daily living, each with five levels of dependency; the maximum score is 100 points, representing independence in daily living. We thought it was a more sensitive index for measuring physical functioning in this patient group than the Karnofsky index.[3 4]

Patients, methods, and results

We studied two samples of patients with cancer from the same hospice to generate and test the model. We determined sample sizes empirically from patients admitted consecutively over two different periods of two months (January-February and March-April 1998), in whom the modified Barthel index was determined weekly from admission for the duration of inpatient stay. Barthel score at admission, mean weekly change in score during inpatient stay (defined as final score minus admission score divided by length of stay), and survival from date of admission were recorded.

The two populations were similar with respect to Barthel score at admission, length of stay, and survival (table). In sample 1, survival correlated with Barthel score at admission ($r_s = 0.25$, $P = 0.014$) but more closely with mean weekly change ($r_s = -0.52$, $P < 0.001$). To examine this relation further, three groups were pragmatically constructed from the first sample on the basis of mean weekly change in Barthel scores. These represented clinical patterns commonly seen in terminally ill patients: stable physical functioning (no loss of points), moderate deterioration (1-9 points lost per week), and marked deterioration (10 or more points lost per week).

This model was applied to sample 2 to assess its ability to estimate survival. Survival correlated with Barthel score at admission ($r_s = 0.3$, $P = 0.002$) but more closely with mean weekly change ($r_s = -0.52$, $P < 0.001$). Corresponding groups between samples had similar median survival, but the differences in survival between the three groups within each sample were significant (table).

Comment

In terminally ill patients in a hospice, rates of change were more important indicators of survival than absolute measures. Mean change in weekly Barthel scores was calculated to provide a crude clinical marker of changing physical function. Using mean change assumes that the modified Barthel index is an interval

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A table showing scores on admission is available on the BMJ's website

Barthel score, change in Barthel score, and survival time of patients in hospice with cancer

	Sample 1 (n=93)	Sample 2 (n=104)	P value (Mann-Whitney U test)
Mean (range) Barthel score at admission	66 (3-100)	58 (2-100)	0.056
Median (range) length of stay (days)	18 (5-104)	19 (3-86)	0.82
Median (range) survival (days)	35 (5-473)	27 (3-349)	0.2
Median (interquartile range) change in Barthel index:			
No loss of points	56 (23-137) (n=50)	68 (19-128) (n=41)	0.91
1-9 points lost	32 (17-56) (n=24)	31 (15-45) (n=39)	0.51
⩾10 points lost	14 (11-20) (n=19)	15 (6-20) (n=24)	0.65
P value (Kruskal-Wallis test)	<0.001	<0.001	–

measure, but this has not been supported.[4] Despite this, half of patients with advanced cancer who lose 10 or more points per week die within two weeks (95% confidence interval 8.6 days to 19.4 days), and three quarters are dead at three weeks. In contrast, 50% of patients in whom the weekly score does not deteriorate survive for two months (35.2 days to 76.8 days).

Although Barthel score at admission correlated with overall survival, no differences in scores on admission were found among the three groups in either sample (sample 1, P = 0.08, and sample 2, P = 0.74, Kruskal-Wallis; see table on website). Admission score therefore cannot be used to determine pattern of subsequent change and hence to estimate survival more accurately.

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1 Evans C, McCarthy M. Prognostic uncertainty in terminal care: can the Karnofsky index help? *Lancet* 1985;i:1204-6.
2 Yates JW, Chalmer B, McKegner FP. Evaluation of patients with advanced cancer using the Karnofsky performance status. *Cancer* 1980;45:2220-4.
3 Shah S, Vanclay F, Cooper B. Improving the sensitivity of the Barthel index for stroke rehabilitation. *J Clinical Epidemiol* 1989;42:703-9.
4 Tennant A, Geddes JM, Chamberlain MA. The Barthel index: an ordinal score or interval level measure? *Clin Rehab* 1996;10:301-8.

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Drug points

Apparent interaction between warfarin and levonorgestrel used for emergency contraception

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Emergency contraception with progestogen only (two doses of levonorgestrel 0.75 mg given 12 hours apart and within 72 hours of unprotected intercourse) is better tolerated and more effective than the combined oestrogen-progestogen (Yuzpe) regimen.[1] Furthermore, treatment with progestogen only may be preferable to the Yuzpe regimen in women with a known thrombophilic defect or history of thromboembolic events. For women receiving warfarin, drug information cites either no interaction between progestogens and warfarin[2] or a reduction in anticoagulant effect.[3] We describe an enhanced anticoagulant effect of warfarin after giving a woman levonorgestrel for emergency contraception.

A 35 year old woman with familial type 1 (quantitative) antithrombin deficiency and a history of extensive deep venous thrombosis and pulmonary thromboembolism, attended the clinic after an episode of unprotected intercourse. She was receiving warfarin 7 mg daily for anticoagulation but no other drugs. Her international normalised ratio was 2.1, which was within the therapeutic range (2.0-3.0). She requested emergency contraception. After counselling, she declined the insertion of an intrauterine contraceptive device, preferring the progestogen only regimen. Her international normalised ratio was rechecked three days later and was reported as 8.1. She was advised to discontinue warfarin treatment for two days, at which point her international normalised ratio was 2.5, and then to restart it at a dose of 5 mg once daily. No haemorrhagic problem occurred.

One possible explanation for this enhanced anticoagulant effect is the displacement of warfarin by levonorgestrel from the F1S binding site of human α_1-acid glycoprotein, the main transport protein for drugs in plasma.[4] The variant of the F1S binding site comprises part of the F1S/A phenotype of α_1-acid glycoprotein, which is encountered in 50% of the population.

Thus women receiving warfarin treatment may be at risk of an interaction between warfarin and levonorgestrel if they are prescribed the progestogen only regimen because of its apparent safety. The manufacturer of levonorgestrel (Wyeth) has not received any reports describing such an interaction with warfarin. This potential interaction requires prompt investigation, particularly in light of recommendations that emergency contraception be made available over the counter.[5] If patients are fully anticoagulated with warfarin, the conventional Yuzpe regimen may be effective without being associated with any increased risk of venous thromboembolism.

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1 Task Force on Postovulatory Methods of Fertility Regulation. Randomised controlled trial of levonorgestrel versus the Yuzpe regimen of combined oral contraceptives for emergency contraception. *Lancet* 1998;352:428-33.
2 Crowther NR, Holbrook AM, Kenwright R, Kenwright M. Drug interactions among commonly used medications. *Can Fam Physician* 1997;43:1972-81.
3 Appendix 1: interactions. *British national formulary*, No 39. Bath: British Medical Association and Royal Pharmaceutical Society of Great Britain, 2000:614.
4 Herve F, Duche J-C, d'Athis P, Marche C, Barre J, Tillement J-P. Binding of disopyramide, methadone, dipyridamole, chlorpromazine, lignocaine and progesterone to the two main genetic variants of human α_1-acid glycoprotein: evidence for drug-binding differences between the variants and for the presence of two separate drug-binding sites on α_1-acid glycoprotein. *Pharmacogenetics* 1996;6:403-15.
5 Royal College of Obstetricians and Gynaecologists and the Faculty of Family Planning and Reproductive Health Care. *Joint statement on emergency hormonal contraception*. London: RCOG, 1995.