Effectiveness of nurse delivered endoscopy: findings from randomised multi-institution nurse endoscopy trial (MINuET)

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ABSTRACT

Objective To compare the clinical effectiveness of doctors and nurses in undertaking upper and lower gastrointestinal endoscopy.

Design Pragmatic trial with Zelen's randomisation before consent to minimise distortion of existing practice.

Setting 23 hospitals in the United Kingdom. In six hospitals, nurses undertook both upper and lower gastrointestinal endoscopy, yielding a total of 29 centres.

Participants 67 doctors and 30 nurses. Of 4964 potentially eligible patients, we randomised 4128 (83%) and recruited 1888 (38%) from July 2002 to June 2003.

Interventions Diagnostic upper gastrointestinal endoscopy and flexible sigmoidoscopy, undertaken with or without sedation, with the standard preparation, techniques, and protocols of participating hospitals. After referral for either procedure, patients were randomised between doctors and nurses.

Main outcome measures Gastrointestinal symptom rating questionnaire (primary outcome), gastrointestinal endoscopy satisfaction questionnaire and state-trait anxiety inventory (all analysed by intention to treat); immediate and delayed complications; quality of examination and corresponding report; patients' preferences for operator; and new diagnoses at one year (all analysed according to who carried out the procedure).

Results There was no significant difference between groups in outcome at one day, one month, or one year after endoscopy, except that patients were more satisfied with nurses after one day. Nurses were also more thorough than doctors in examining the stomach and oesophagus. While quality of life scores were slightly better in patients in the doctor group, this was not statistically significant.

Conclusions Diagnostic endoscopy can be undertaken safely and effectively by nurses.

Trial registration International standard RCT 82765705.

INTRODUCTION

In the United Kingdom and the United States, gastrointestinal endoscopy is increasingly being carried out by nurses,[1 2] with approval from professional bodies.[3 4] Single centre studies have suggested that this is safe, effective, and acceptable to patients in both countries.[5-11] There has, however, been no rigorous, large scale evaluation of the clinical and cost effectiveness of nurses in this role.

METHODS

Study design and interventions

Our study[12] was a pragmatic randomised trial[13] designed to compare gastrointestinal endoscopy undertaken by doctors or nurses using the standard procedure of participating hospitals.

Recruitment

We invited hospitals in the UK with nurses who were undertaking independent gastrointestinal endoscopy to participate in the study, through the British Society of Gastroenterology (BSG) newsletter. We included patients aged over 18 who had been referred for oesophagogastroduodenoscopy or flexible sigmoidoscopy with symptoms of dyspepsia, weight loss, anorexia, anaemia, rectal bleeding, or change in bowel habit. On receiving referrals for either procedure—that is, before consent[14]—we stratified patients by hospital and procedure and randomly allocated them to endoscopy by doctor or by nurse. We estimated the experience of endoscopists with a questionnaire completed before participation.

Outcome measures and data collection

The primary outcome, measured at one year, was patients' self assessed scores on the gastrointestinal symptom rating questionnaire.[12] Secondary outcomes included scores on the symptom rating questionnaire at one month and the state-trait anxiety inventory,[15] SF-36,[16] and EQ-5D,[17] all measured at baseline, one day, one month, and one year after the procedure. We measured patients' satisfaction after one day using the gastrointestinal endoscopy satisfaction questionnaire.[12]

We compared operators' performance by analysing endoscopic video recordings using developed and validated measurement scales, and extracting data from clinical records. We also compared endoscopy

reports with the British Society of Gastroenterology's standards.[18] We extracted final diagnosis, incidence of late complications, new diagnoses, and subsequent contact with health professionals from hospital records after one year.

Analysis

We analysed participants' outcomes by intention to endoscope. Logistic regression tested the symptom rating score at one year for differences between groups after adjusting for covariates. We estimated mean differences between groups in one year symptom rating scores, and state-trait anxiety inventory, SF-36, and EQ-5D scores by analysis of covariance. We undertook a sensitivity analysis by excluding centres where large numbers of patients changed endoscopist after randomisation.

RESULTS

Endoscopist recruitment

Twenty three hospitals participated, of which three recruited patients only for oesophagogastroduodenoscopy, 14 only for flexible sigmoidoscopy, and six for both. Hospitals recruited participants from July 2002 to June 2003. Sixty seven doctors and 30 nurses took part, all of whom were fully trained to practise endoscopy independently. There was no difference between the two groups in their routine practice before and after endoscopy.

Recruitment and follow-up of participants

Of the 4964 patients referred for either flexible sigmoidoscopy or oesophagogastroduodenoscopy, 4128 were randomised before consent. Of these, 3133 (76%) attended the appointment and 1888 (46%) gave consent to participate in the trial. The characteristics of the randomised patients who did not take part in the trial were not significantly different from those who did. The two study groups were similar in age, sex, type of access, and presenting symptoms (see bmj.com).

The outcome questionnaire was completed by 1782 (94%) patients at baseline, 1536 (81%) at one day, 1427 (76%) at one month, and 1333 (71%) at one year.

Patients' outcomes

Table 1 shows that, after adjustment for baseline score, hospital, type of procedure, and age with analysis of covariance, there was no significant difference between the two groups on any of the four factors on the gastrointestinal symptom rating questionnaire at one year.

After adjustment for baseline SF-36 score, hospital, type of procedure, and age with analysis of covariance, there was no significant difference between the two groups on any of the eight subscales or two summary scores of the SF-36 at one day or one month. At one year there was a significant improvement in social functioning in favour of doctors. Given that the SF-36 gave rise to 24 significance tests, however, this does not provide prima facie evidence of differences between groups.

After adjustment for baseline anxiety, hospital, type of procedure, and age with analysis of covariance, there was no significant difference in anxiety levels between the two groups at any point (table 2). There was a significant difference in patients' satisfaction after endoscopy in favour of nurses on all four factors of the gastrointestinal endoscopy satisfaction questionnaire (table 2).

We repeated our analyses after excluding the three centres where more than 30 patients changed endoscopist. None of our conclusions was sensitive to this change. We analysed findings about process and performance by operator rather than intention to scope. After one year we reviewed medical records for 1674 patients (89% of the 1888 recruited). There was no evidence that any major pathology had been missed. There were no significant differences in use of lidocaine spray or benzodiazepines for

Table 1 | Differences in primary outcome measure; figures are adjusted* mean scores (range 0 (no symptoms)-100) on gastrointestinal (GI) symptom rating questionnaire

	Doctor group		Nurse group		
	No of patients	Mean (SE)	No of patients	Mean (SE)	Difference† (95% CI)
At one month					
Factor 1: upper GI	675	12.6 (0.58)	701	13.8 (0.57)	−1.20 (−2.33 to −0.080)
Factor 2: lower GI	675	25.0 (1.02)	698	24.3 (1.01)	0.77 (−1.21 to 2.75)
Factor 3: wind	677	34.4 (0.92)	703	35.3 (0.91)	−0.87 (−2.66 to 0.92)
Factor 4: defecation	672	21.3 (0.90)	695	20.6 (0.88)	0.69 (−1.03 to 2.42)
At one year					
Factor 1: upper GI	634	11.8 (0.69)	645	12.4 (0.70)	−0.61 (−1.92 to 0.70)
Factor 2: lower GI	624	21.4 (1.16)	639	22.8 (1.17)	−1.46 (−3.67 to 0.75)
Factor 3: wind	635	32.6 (1.06)	646	31.6 (1.07)	0.98 (−1.04 to 3.00)
Factor 4: defecation	623	18.7 (0.98)	639	19.9 (0.99)	−1.23 (−3.10 to 0.64)

*Adjusted for baseline score, centre, type of procedure, and age with analysis of covariance.
†Difference for doctor minus nurse; thus negative difference indicates that patients in nurse group score worse on average than patients in doctor group and positive difference indicates that patients in nurse group score better on average than patients in doctor group.

Table 2 | Differences in secondary outcome measures, state-trait anxiety, and GESQ

| | Doctor | | Nurse | | |
	No of patients*	Adjusted† mean (SE) score	No of patients*	Adjusted† mean (SE) score	Difference‡ (95% CI)
State-trait anxiety inventory, state anxiety§					
One day	667	38.6 (0.45)	703	39.0 (0.44)	0.33 (−0.57 to 1.23)
One month	634	37.7 (0.54)	645	37.9 (0.53)	0.15 (−0.89 to 1.20)
One year	599	38.3 (0.61)	594	38.8 (0.61)	0.56 (−0.60 to 1.72)
GESQ¶ at one day					
Skills and hospital	619	14.5 (0.46)	710	12.0 (0.42)	2.57 (1.35 to 3.79)
Pain and discomfort	622	33.6 (0.80)	710	30.3 (0.75)	3.35 (1.19 to 5.50)
Information before endoscopy	623	21.2 (0.54)	716	18.3 (0.55)	2.97 (1.45 to 4.48)
Information after endoscopy	517	22.0 (0.88)	633	17.1 (0.79)	4.84 (2.53 to 7.15)

*Maximum number 737 for doctor group and 789 for nurse group.
†Adjusted for baseline score, centre, type of procedure, and age using analysis of covariance.
‡Difference for score with doctor minus score with nurse, thus negative difference indicates that patients in nurse group score worse on average than patients in doctor group and positive difference indicates that patients in nurse group score better on average than patients in doctor group.
§Range 20 (high anxiety)-80.[15]
¶Range 0 (satisfied)-100.[12]

oesophagogastroduodenoscopy, but nurses used the combination significantly more often than doctors (18% v 6%; P<0.001 by χ^2 test).

There was no difference between the two groups in the distance the endoscope was inserted into the colon, the mean duration of examination, the number of immediate or delayed clinical complications, defects identified in equipment, need for assistance during the procedure, or diagnoses made. Results of upper gastrointestinal endoscopies were reported as normal by 30% of doctors and 18% of nurses (P<0.001 by χ^2 test); the corresponding percentages for flexible sigmoidoscopies were 45% and 34% (P<0.001 by χ^2 test). More patients had biopsies in the nurse group (50% v 31% by doctors for oesophagogastroduodenoscopy, P<0.001 by χ^2 test; 35% v 27% by doctors for flexible sigmoidoscopy; P=0.006).

Analysis of video recordings of oesophagogastroduodenoscopy showed significantly better (that is, lower) scores by nurses in technique and thoroughness for the oesophagus (mean 23.7 (SD 8.8) v 28.7 (SD 12.8) for doctors; t=3.16, P=0.002) and stomach (43.7 (SD 13.8) v 54.2 (SD 20.3), t=4.16, P<0.001). There was no significant difference in the corresponding scores for the duodenum. For flexible sigmoidoscopy, there was no significant difference in the rating of technical performance between the two groups.

In 1784 endoscopy reports (760 by doctors; 1024 by nurses) there was no significant difference in the recording of most items, though type of episode, urgency, sedation, free text comments, discharge, and follow-up arrangements were recorded more consistently and significantly better by nurses.

Complications

There were no recorded complications with the endoscope. There was no significant difference between the number of immediate or delayed complications identified after endoscopy by a doctor or a nurse.[12]

DISCUSSION
Principal findings

We found little significant difference in the clinical outcomes of diagnostic endoscopy performed by doctors or nurses, as reported by participants at one day, one month, and one year after procedure. Patients were significantly more satisfied with nurses one day after the procedure. Nurses were more thorough in the examination of stomach and oesophagus, carried out more biopsies than doctors, and omitted fewer items from reports.

Strengths and weaknesses of trial

Our pragmatic trial compared endoscopy by nurses and doctors operating in their usual environment with their usual working practices. We used Zelen's design of randomisation before consent. Not surprisingly many potential participants left after randomisation. Nevertheless, we recruited 1888 (60%) of the 3133 eligible patients who attended for the procedure after randomisation. Furthermore, proportions recruited were similar in both groups, and the characteristics of those recruited were representative of those randomised.

We assessed patients recruited on the basis of symptoms reported before diagnosis. We found no validated instrument to do this and so developed a system specific gastrointestinal symptom rating questionnaire. We followed established practice by developing the questionnaire clinically, then testing it on patients with known disorders, and finally validating it on a large clinical sample.[19]

Our results showed that the gastrointestinal symptom rating questionnaire is a valid questionnaire for assessing gastrointestinal symptoms.[12] We assessed 86% of the endoscopy procedures using objective measures. Response rates were acceptable for a pragmatic trial, and similar in the two groups. The low incidence of new diagnoses did not differ between the two groups. We believe it unlikely that longer

WHAT IS ALREADY KNOWN ON THIS TOPIC

Nurses are increasingly undertaking both upper and lower gastrointestinal endoscopy

Single centre studies suggest that nurse endoscopists are competent and are appreciated by patients

WHAT THIS STUDY ADDS

There is no significant difference between doctors and nurses in their clinical effectiveness in diagnostic endoscopy

Nurses are more thorough than doctors in examination of the oesophagus and stomach

Patients are more satisfied after an endoscopy by a nurse

follow-up would have yielded further findings after oesophagogastroduodenoscopy.

Participating hospitals included large and small, urban and rural, and teaching and non-teaching. Thus trial recruitment reflected variations in the organisation of endoscopy services across the UK and a wide spectrum of common indications. The number of trained nurse endoscopists has increased since the trial, but we judge that those who participated were representative of the growing expertise in endoscopy in the UK. The trial shows how the performance of the typically female but formally trained nurse endoscopist compares with that of the typically male medical endoscopist who learnt through apprenticeship.

Strengths and weaknesses in relation to other studies

These findings reinforce results of single centre studies suggesting that nurses can safely and effectively carry out flexible sigmoidoscopy.[5-8] We have confirmed that quality of life improves after endoscopy by both doctors and nurses.[20] We have also confirmed the findings of a single centre trial that nurses are as competent as doctors in examining the upper gastro-intestinal tract.[21]

Unanswered questions

Our economic evaluation suggests that doctors are likely to be more cost effective than nurses in the current state of their training and experience.[22] Planners need to consider the relative clinical effectiveness and cost effectiveness for endoscopy services of the two professions. They also need to consider the availability of potential staff. As nurses grow in experience over time, it will be important to continue to monitor effectiveness and cost effectiveness.

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ABSTRACT

Objective To compare the cost effectiveness of nurses and doctors in performing upper gastrointestinal endoscopy and flexible sigmoidoscopy.

Design As part of a pragmatic randomised trial, the economic analysis calculated incremental cost effectiveness ratios, and generated cost effectiveness acceptability curves to address uncertainty.

Setting 23 hospitals in the United Kingdom.

Participants 67 doctors and 30 nurses, with a total of 1888 patients, from July 2002 to June 2003.

Intervention Diagnostic upper gastrointestinal endoscopy and flexible sigmoidoscopy carried out by doctors or nurses.

Main outcome measures Estimated health gains in QALYs measured with EQ-5D. Probability of cost effectiveness over a range of decision makers' willingness to pay for an additional quality adjusted life year (QALY).

Results Although differences did not reach traditional levels of significance, patients in the doctor group gained 0.015 QALYs more than those in the nurse group, at an increased cost of about £56 (€59, $78) per patient. This yields an incremental cost effectiveness ratio of £3660 (€3876, $5097) per QALY. Though there is uncertainty around these results, doctors are probably more cost effective than nurses for plausible values of a QALY.

Conclusions Though upper gastrointestinal endoscopies and flexible sigmoidoscopies carried out by doctors cost slightly more than those by nurses and improved health outcomes only slightly, our analysis favours endoscopies by doctors. For plausible values of decision makers' willingness to pay for an extra QALY, endoscopy delivered by nurses is unlikely to be cost effective compared with endoscopy delivered by doctors.

Trial registration International standard RCT 82765705.

INTRODUCTION

Endoscopy is becoming widely practised by nurses in the United Kingdom.[1] There has been little evaluation of the cost effectiveness of procedures undertaken by nurses rather than by doctors.

Economic evaluations of screening tests often estimate a "cost per condition detected". We focused not on the cost effectiveness of endoscopy itself but on whether or not there is a difference in endoscopy delivered by doctors or nurses. We assessed relative cost effectiveness as part of a pragmatic randomised controlled trial undertaken in the UK.[2]

METHODS

Study design and interventions

The clinical study was a pragmatic randomised trial in 23 hospitals in the UK.[3] A total of 1888 patients were randomised to either a doctor or a nurse for upper gastrointestinal endoscopy or flexible sigmoidoscopy. We collected health outcome measures at baseline, one day, one month, and one year after the intervention. We take a UK National Health Service (NHS) perspective with effects assessed in terms of health gains measured in QALYs.

Data collection and outcome measures

We extracted information on resources used during endoscopy from resource time sheets. Information included duration of endoscopy, number of patients undergoing endoscopy, staffing, and consumables used.

We obtained data on resource use after the endoscopy from examination of patients' medical records and patients' questionnaires administered at baseline and 12 months. We estimated the cost of the intervention from data on the duration of intervention from the clinical trial multiplied by estimated costs per minute in 2002-3 prices.[4]

The EQ-5D instrument[5] measured patients' health states across five dimensions (mobility, self care, usual activities, pain and discomfort, and anxiety and depression) and ascribes values to those states.

We converted all EQ-5D scores to "utilities" through a tariff derived from a representative UK population sample.[6] We compared mean QALYs generated in the two groups over the 12 month period. We plotted utility at baseline and subsequent points and calculated the area under the curve to estimate QALYs gained by each patient,[7] adjusting these estimates for baseline EQ-5D and including sex and age as covariates. In a subgroup analysis we separately considered the cost effectiveness of sigmoidoscopy and oesophagogastroduodenoscopy.

Analysis

We calculated net monetary benefit[8] for each group. To calculate patient specific net monetary benefits we multiplied each patient's QALYs by the assumed maximum value of a QALY and subtracted that patient's costs. We used these patient specific net monetary benefits to derive cost effectiveness acceptability curves and estimated the aggregate net benefit.

We used uncertainty around the net monetary benefit to estimate the probability that a strategy is cost effective through the cost effectiveness

acceptability curve. This is a graphical representation of the probability of an intervention being cost effective over a monetary range for a decision maker's willingness to pay for an additional unit of health gain.

RESULTS

Resource use

Endoscopy by nurses was followed by slightly more use of all primary care resources except home visits from general practitioners. In secondary care there were increased attendances at day hospital and outpatient clinics. These differences were small, however, and did not reach significance.

Health states

There was little effect in either group on usual activities or self care. Both groups showed an increased proportion of patients in the least severe pain and discomfort and anxiety and depression groups, and these differences favoured endoscopy delivered by doctors. Mobility deteriorated in both groups, with the nurse group again performing slightly less well than the doctor group.

QALYs

We estimated changes in EQ-5D over one year (table). We used these estimates to generate QALYs. Though differences were small, the gain in QALYs was greater after endoscopy by doctors than by nurses. Adjustment for EQ-5D score at baseline reduced the difference in QALYs to 0.0153 (95% confidence interval −0.008 to 0.039) (table). We used this estimate in the construction of cost effectiveness acceptability curves, which reflect the finding that EQ-5D score at baseline was higher for the doctor group.

While this difference in QALYs seems to be small in absolute terms, it equates to a difference of five to six days of additional perfect health each year. The most likely explanation for this difference is that nurses requested more subsequent tests that might have a negative effect on patients' wellbeing.

Total cost

The table shows estimated differences in cost per patient between groups, including the cost of the intervention. As there was uncertainty around these estimates, the difference was not significant. The
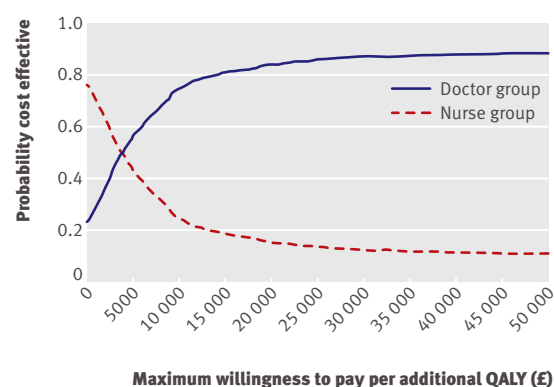
Cost effectiveness acceptability curve

intervention cost more in the doctor group because doctors' time costs more than nurses' time. There was little difference in the duration of endoscopy between groups. Patients allocated to doctors had slightly higher costs in both primary and secondary care.

Incremental cost effectiveness ratio (ICER)

The doctor group generated 0.0153 more QALYs than the nurse group, at a net cost of £56 per patient. This resulted in an incremental cost effectiveness ratio of £3660 per QALY. The difference in patients' outcomes and costs did not approach significance.

Net monetary benefits and cost effectiveness acceptability curves

The figure shows the cost effectiveness acceptability curve for values of a QALY between zero and £50 000. Attaching no value to a QALY yields a probability of 78% that nurses reduced costs. The probability of nurses being cost effective, however, decreases as the value of a QALY increases and as doctors become more cost effective. At a value of £30 000 per QALY, often stated to be the borderline for the NHS, nurses have only a 13% chance of being cost effective. There is, however, much uncertainty around this result (see cost effectiveness scatter on bmj.com).

Sigmoidoscopy v oesophagogastroduodenoscopy

For doctors sigmoidoscopy showed an incremental cost effectiveness ratio of £2600 per QALY.

Mean EQ-5D scores, QALYs, and costs (£) per patient over 12 months by group

	Doctor group (n=931)	Nurse group (n=957)	Difference (95% CI)
Mean EQ-5D scores:			
Baseline	0.700	0.689	0.011 (−0.014 to 0.040)
One month	0.713	0.697	0.016 (−0.009 to 0.041)
One year	0.710	0.693	0.017 (−0.008 to 0.043)
QALYs	0.712	0.695	0.0153* (−0.008 to 0.039)
Primary care costs	135	128	7 (−3 to 15)
Secondary care costs	565	538	27 (−127 to 181)
Intervention costs	39	16	23 (20 to 26)
Total cost	739	683	56 (−100 to 213)

*Difference in QALYs allows for baseline differences in EQ-5D, sex, and age.

WHAT IS ALREADY KNOWN ON THIS TOPIC

To meet increasing demand for gastrointestinal endoscopy, nurses are increasingly undertaking both upper and lower endoscopy in the UK

Clinical studies, mainly observational and non-randomised, have established the safety and acceptability of this, but there has been little evaluation of the cost effectiveness

WHAT THIS PAPER ADDS

Though there is uncertainty around the results, doctors are likely to be more cost effective than nurses for plausible values of a QALY

Oesophagogastroduodenoscopy cost relatively more, resulting in a higher ratio of £7850. Both ratios would be acceptable for most reasonable values of a decision maker's willingness to pay for a QALY.

DISCUSSION

Principal findings

Patients undergoing endoscopy carried out by doctors gained 0.015 QALYs more than those treated by nurses, at an increased cost of around £56 per patient, yielding an incremental cost effectiveness ratio of £3660 per QALY. Endoscopy delivered by nurses is unlikely to be cost effective compared with endoscopy delivered by doctors based on the evidence of this single trial analysis. There is considerable uncertainty around these estimates, which indicates that further research is needed.

Strengths and weaknesses

We used a randomised trial to compare the cost effectiveness of doctors and nurses performing endoscopy. The study lasted only one year, though there is potential for later effects in this population. However, the similarity of immediate and delayed complications between nurses and doctors suggests there is little difference in their long term performance.

It is possible that the use of the EQ-5D and the resulting estimates of QALYs are not sensitive enough in these patients to identify differences in their health related quality of life. The results of our economic analysis, however, are similar to those of the clinical analysis in that there was a non-significant effect in favour of doctors.

As nurses' experience and confidence grows, they might become more confident and order fewer follow-up tests. The higher frequency of tests and interventions in the nurse group, however, might reflect intrinsic differences between the professions in terms of attitudes to risk.

Meaning of the study

Rawlins and Culyer[9] argue that the National Institute for Health and Clinical Excellence would be unlikely to reject a technology with a cost of between £5000 and £15 000 per QALY. On the evidence of this trial, therefore, doctor delivered endoscopy seems cost effective.

Our economic analysis estimates the probability of cost effectiveness from the uncertainty around the estimates of costs and effects, rather than discarding differences that do not reach "significance." Hence this methodological paradigm leads to a different interpretation of our results from that adopted in the clinical effectiveness paper.[3]

Classic statistical inference fails to reject the null hypotheses that there is no difference in effectiveness or cost effectiveness between endoscopy delivered by doctors and nurses. Policy makers might therefore view nurse endoscopists as an acceptably safe and effective way of changing skill mix in health care, releasing medical resources and increasing the role of nurse specialists. Bayesian analysis estimates the probability that the intervention estimated cost per QALY exceeds a given threshold. This form of analysis leads to the conclusion that the average doctor endoscopist has a probability of 80-90% of being more cost effective than the average nurse endoscopist at commonly used values of willingness to pay for a QALY. Decision makers pursuing efficiency alone would therefore choose endoscopy delivered by doctors.

Unanswered questions

The choice of skill mix in endoscopy might be influenced by factors other than cost effectiveness, such as affordability, staff shortages, and access to health care. As nurses grow in experience over time it will be important to continue to monitor both effectiveness and cost effectiveness.

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Association between change in high density lipoprotein cholesterol and cardiovascular disease morbidity and mortality: systematic review and meta-regression analysis

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ABSTRACT

Objective To investigate the association between treatment induced change in high density lipoprotein cholesterol and total death, coronary heart disease death, and coronary heart disease events (coronary heart disease death and non-fatal myocardial infarction) adjusted for changes in low density lipoprotein cholesterol and drug class in randomised trials of lipid modifying interventions.

Design Systematic review and meta-regression analysis of randomised controlled trials.

Data sources Medline, Embase, Central, CINAHL, and AMED to October 2006 supplemented by contact with experts in the field.

Study selection In teams of two, reviewers independently determined eligibility of randomised trials that tested lipid modifying interventions to reduce cardiovascular risk, reported high density lipoprotein cholesterol and mortality or myocardial infarctions separately for treatment groups, and treated and followed participants for at least six months.

Data extraction and synthesis Using standardised, pre-piloted forms, reviewers independently extracted relevant information from each article. The change in lipid concentrations for each trial and the weighted risk ratios for clinical outcomes were calculated.

Results The meta-regression analysis included 108 randomised trials involving 299 310 participants at risk of cardiovascular events. All analyses that adjusted for changes in low density lipoprotein cholesterol showed no association between treatment induced change in high density lipoprotein cholesterol and risk ratios for coronary heart disease deaths, coronary heart disease events, or total deaths. With all trials included, change in high density lipoprotein cholesterol explained almost no variability (<1%) in any of the outcomes. The change in the quotient of low density lipoprotein cholesterol and high density lipoprotein cholesterol did not explain more of the variability in any of the outcomes than did the change in low density lipoprotein cholesterol alone. For a 10 mg/dl (0.26 mmol/l) reduction in low density lipoprotein cholesterol, the relative risk reduction was 7.2% (95% confidence interval 3.1% to 11%; P=0.001) for coronary heart disease deaths, 7.1% (4.5% to 9.8%; P<0.001) for coronary heart disease events, and 4.4% (1.6% to 7.2%; P=0.002) for total deaths, when adjusted for change in high density lipoprotein cholesterol and drug class.

Conclusions Available data suggest that simply increasing the amount of circulating high density lipoprotein cholesterol does not reduce the risk of coronary heart disease events, coronary heart disease deaths, or total deaths. The results support reduction in low density lipoprotein cholesterol as the primary goal for lipid modifying interventions.

INTRODUCTION

Large cohort studies have identified high density lipoprotein cholesterol as a strong, independent, inverse predictor of risk of coronary heart disease.[1 2] This association, based on observational data, does not establish the extent to which changes in high density lipoprotein cholesterol will alter the risk of coronary heart disease events. Many large randomised trials and meta-analyses led to the identification of low density lipoprotein cholesterol as the principal target for lipid modifying interventions.[3 4]

Clinical trials of the high density lipoprotein raising agent niacin have shown a reduction in coronary events, but these trials either did not measure change in high density lipoprotein cholesterol or failed to include analyses adjusted for changes in low density lipoprotein cholesterol.[5-9] Sub-studies of two trials using the fibrate gemfibrozil suggested that an increase in high density lipoprotein cholesterol reduces the risk of coronary heart disease.[10 11] However, new approaches to increase high density lipoprotein cholesterol by the cholesteryl ester transfer protein inhibitor torcetrapib or by infusion of reconstituted high density lipoprotein failed to show beneficial effects.[12-15]

We used meta-regression techniques in an updated, comprehensive systematic review of randomised trials to explore an independent link between changes in high density lipoprotein cholesterol, covering all lipid modifying treatment, and coronary heart disease related morbidity and mortality.

METHODS

Data sources and searches

We included studies if they compared any lipid modifying agent or diet with placebo or usual care or compared a more intensive with a less intensive lipid

modifying treatment; targeted reduction in cardiovascular risk; had a randomised control design; reported mortality or myocardial infarctions; and followed patients for at least six months. We excluded studies that failed to report either change from baseline or follow-up concentrations of high density lipoprotein cholesterol and low density lipoprotein cholesterol.

We searched Medline, Embase, Central, CINAHL, and AMED. We reviewed reference lists of eligible articles, editorials, and reviews and consulted with experts.

Study selection and quality assessment
We assessed the methodological quality of eligible studies by using the following criteria: concealment of allocation; blinding of patients, caregivers, or clinical outcome assessors; adherence to the intention to treat principle; stopping early for benefit; and the proportion of patients lost to follow-up.

Data extraction and end points
We recorded all baseline and follow-up concentrations of total cholesterol, low density lipoprotein cholesterol, high density lipoprotein cholesterol, and triglycerides. Clinical end points were total deaths, coronary heart disease deaths, and coronary heart disease events (combined outcome of non-fatal myocardial infarction and coronary heart disease death).

Data synthesis and analysis
We calculated change in lipid concentrations for each trial and pooled treatment effects across studies. We used meta-regression analysis to investigate the association between differences in the change in high density lipoprotein and low density lipoprotein cholesterol concentrations between treatment and control groups and the risk ratios of clinical outcomes of interest.[16] To take into account non-lipid

effects of specific drugs, we included a variable of drug class in the meta-regression model and did a meta-regression analysis stratified by drug class. We measured the proportion of the variability in the log risk ratio of an outcome explained by the statistical model (R^2). We found little evidence for interactions between change in high density lipoprotein cholesterol and different classes of interventions (P=0.73), so we omitted interaction terms.

In pre-specified sensitivity analyses, we focused on a more homogeneous sample of trials that used interventions known to raise high density lipoprotein cholesterol concentrations. In addition, we excluded trials with agents that are associated with harmful effects, such as torcetrapib or hormones. We did further pre-specified sensitivity analyses excluding trials with one year or less of follow-up or two years or less of follow-up, as lipid effects may take more than a year to translate fully into clinical effects.[17]

RESULTS
Of 158 eligible randomised controlled trials, 50 did not report change or follow-up values for both high density lipoprotein cholesterol and low density lipoprotein cholesterol and were excluded, leaving 108 trials for analysis. In total, 146 890 participants were included in the intervention groups and 152 520 in the control groups. We classified trials according to 11 classes of intervention (table 1).

Lipid modifying effects
Table 1 summarises the baseline concentrations and changes in lipid subfractions for the different classes of intervention. The average weighted mean baseline low density lipoprotein cholesterol concentration of all included participants was 140 (SD 23; range 84-279) mg/dl (3.62 mmol/l), and the high density lipoprotein cholesterol concentration was 47 (7.4; 32-62) mg/dl (1.22 mmol/l). The weighted mean change in low

Table 1 | Effects of different lipid modifying interventions on lipid subfractions. Values are weighted mean (SD) unless stated otherwise

Trials	No of trials	No of randomised participants	Median (interquartile range) follow-up (months)	Total cholesterol (mg/dl) Baseline	Total cholesterol (mg/dl) Change	LDL cholesterol (mg/dl) Baseline	LDL cholesterol (mg/dl) Change	HDL cholesterol (mg/dl) Baseline	HDL cholesterol (mg/dl) Change	Triglycerides (mg/dl) Baseline	Triglycerides (mg/dl) Change
All trials	111*	299 310	34 (24-54)	222 (23)	−27 (22)	140 (23)	−23 (19)	47.3 (7.4)	1.7 (3.1)	155 (19)	−15 (18)
Statins	62	157 151	32 (24-51)	221 (25)	−43 (15)	142 (24)	−38 (13)	44.7 (5.5)	1.6 (1.5)	156 (18)	−21 (9)
Fibrates	9	22 370	60 (55-60)	213 (32)	−15 (7)	138 (29)	−8.9 (6.7)	41.1 (4.9)	2.6 (2.3)	162 (16)	−44 (14)
Resins	3	4005	60 (39-89)	280 (4)	−23 (7)	206 (6)	−25 (8)	44.2 (1.2)	2.7 (0.5)	155 (6)	6.1 (1)
Combinations with niacin	6	779	27 (24-30)	231 (65)	−41 (28)	156 (57)	−42 (28)	39.9 (5.4)	12 (3.0)	166 (26)	−48 (30)
n-3 fatty acids	9	13 768	24 (12-27)	216 (14)	1.1 (2.2)	142 (13)	7.6 (1.9)	41.8 (1.9)	−0.1 (0.3)	166 (11)	−12 (15)
Diet/surgery	5	62 645	78 (39-97)	228 (7)	−4.0 (6)	139 (10)	−6.4 (8.4)	55.5 (7.2)	−0.1 (0.4)	152 (23)	0.8 (5)
ACAT inhibitors	2	717	12 (6-18)	179	−23	106	−2.1	42.5	−0.3	156	−10
Probucol	2	481	16 (7-24)	242	−31	160	−19	48.2	−12.3	171	1.1
Glitazones	2	9589	42 (36-48)	204	NA	116	3.6	44.5	3.1	162	−15
Hormones	9	25 710	38 (24-49)	226 (6)	−2.4 (1.4)	132 (9)	−13 (5)	53.1 (2.3)	4.3 (3.1)	148 (17)	26 (11)
Torcetrapib (+ statin)	2	2095	24 (24-24)	182	5.1	107	−21	48.5	27.7	112	−6.2

ACAT=acyl-CoA:cholesterol acyltransferase; HDL=high density lipoprotein; LDL=low density lipoprotein; NA=not available.
*Includes three studies with three trial arms; excludes one study that did not report baseline values (only change during follow-up).

density lipoprotein cholesterol was −23 (SD 19) mg/dl (−0.59 mmol/l), and the weighted mean change in high density lipoprotein cholesterol was 1.7 (3.1) mg/dl (0.04 mmol/l). Almost all classes of intervention reduced low density lipoprotein cholesterol except for n-3 fatty acids and glitazones. High density lipoprotein cholesterol was raised by most classes of intervention except for n-3 fatty acids, low-fat diets, acyl-CoA:cholesterol acyltransferase inhibitors, and probucol. In addition, high dose statin treatment slightly reduced high density lipoprotein cholesterol compared with less intensive statin treatment (weighted mean change −0.23 (SD 0.83) mg/dl), [w56-w59 w61 w62] whereas statins overall raised it moderately (weighted mean change 1.6 (1.5) mg/dl).

Meta-regression analysis for clinical outcomes

Change in low density lipoprotein cholesterol was associated with and explained a statistically significant degree of variability in the log risk ratio for coronary heart disease events, coronary heart disease death, and total death in univariable and multivariable meta-regression analysis adjusted for change in high density lipoprotein cholesterol and different drug classes (table 2). Change in low density lipoprotein cholesterol explained 32% of the variability in the log risk ratio for coronary heart disease events (see R^2 for univariable model with low density lipoprotein cholesterol in table 2).

We found no significant association of change in high density lipoprotein cholesterol with the log risk ratio in any model after adjustment for changes in low density lipoprotein cholesterol (see table 2). Change in high density lipoprotein cholesterol hardly explained any variability in any of the outcomes (see R^2 results in table 2). The change in the quotient of low density lipoprotein cholesterol and high density lipoprotein cholesterol explained 32%, 12%, and 15% of the variability in log risk ratios for coronary heart disease events, total death, and coronary heart disease death, which is no more than the change in low density lipoprotein cholesterol alone explained for these outcomes (see R^2 results for univariable models with low density lipoprotein cholesterol in table 2).

Sensitivity analyses focusing on a more homogeneous sample of trials revealed a significant association of change in high density lipoprotein cholesterol and the log risk ratio for coronary heart disease events in univariable analysis, with a 29% (51.7% to 6.6%; P=0.01) risk reduction for each 10 mg/dl increase in high density lipoprotein cholesterol. This association was, however, no longer detectable in models adjusted for changes in low density lipoprotein cholesterol (bivariable or multivariable). Change in low density lipoprotein cholesterol remained significantly associated with the log risk ratio for coronary heart disease events, explaining greater variability in trials that had longer follow-up (R^2 of 0.41, 0.46, and 0.51 for trials with a follow-up of six months or more, more than one year, and more than two years).

DISCUSSION

This systematic review and meta-regression analysis of 108 randomised controlled trials using lipid modifying interventions did not show an association between treatment mediated change in high density lipoprotein cholesterol and risk ratios for coronary heart disease events, coronary heart disease deaths, or total deaths whenever change in low density lipoprotein cholesterol was taken into account. We found a statistically significant, substantial association between change in low density lipoprotein cholesterol and risk ratios for coronary heart disease events, coronary heart disease deaths, or total deaths, adjusted for other lipid subfractions and drug class. Our results indicate a 7% relative risk reduction in coronary heart disease events for every 10 mg/dl (0.26 mmol/l) reduction in low density lipoprotein cholesterol, which is equivalent to a 10% relative reduction in coronary heart disease events for every 10% decrease in low density lipoprotein

Table 2 | Meta-regression models investigating association of change in HDL cholesterol, LDL cholesterol, or both with log risk ratios of clinical outcomes

Regression model and predictor	Change in risk per 10 mg/dl increase in lipid subfraction—% (95% CI)	P value	R2*
CHD events (CHD death and non-fatal MI) (n=95)†			
Univariable:			
Change in LDL	4.9 (3.4 to 6.5)	<0.001	0.32
Change in HDL	−8.2 (−24.7 to 8.1)	0.32	0.01
Bivariable:			
Change in LDL	5.1 (3.6 to 6.7)	<0.001	0.33
Change in HDL	6.4 (−7.8 to 20.4)	0.37	
Multivariable‡:			
Change in LDL	7.1 (4.5 to 9.8)	<0.001	0.46
Change in HDL	16.0 (−4.2 to 36.9)	0.12	
Total death (n=107)†			
Univariable:			
Change in LDL	2.8 (1.4 to 4.3)	<0.001	0.12
Change in HDL	5.5 (−8.5 to 19.2)	0.44	0.01
Bivariable:			
Change in LDL	3.1 (1.7 to 4.6)	<0.001	0.15
Change in HDL	12.1 (−1.1 to 25.2)	0.07	
Multivariable‡:			
Change in LDL	4.4 (1.6 to 7.2)	0.002	0.28
Change in HDL	11.0 (−6.5 to 28.1)	0.21	
CHD death (n=94)†			
Univariable:			
Change in LDL	4.5 (2.4 to 6.6)	<0.001	0.16
Change in HDL	−0.2 (−24.0 to 23.1)	0.99	<0.01
Bivariable:			
Change in LDL	4.8 (2.6 to 7.0)	<0.001	0.17
Change in HDL	11.3 (−10.8 to 32.9)	0.31	
Multivariable‡:			
Change in LDL	7.2 (3.1 to 11.3)	0.001	0.33
Change in HDL	12.2 (−18.0 to 41.5)	0.42	

CHD=coronary heart disease; HDL=high density lipoprotein; LDL=low density lipoprotein; MI=myocardial infarction.
*Proportion of total variability in log risk ratio of outcome explained by model.
†Absence of outcome events in intervention and control groups or absence of reporting this outcome event led to reduced sample of trials.
‡Models include adjustment for drug class in addition to variables of lipid subfractions.

WHAT IS ALREADY KNOWN ON THIS TOPIC

Current guidelines recognise high density lipoprotein cholesterol as an independent cardiovascular risk factor

The extent to which changes in high density lipoprotein cholesterol alter risk of coronary heart disease events remains controversial

WHAT THIS STUDY ADDS

No association exists between treatment induced change in high density lipoprotein cholesterol and risk ratios for coronary heart disease events, coronary heart disease deaths, or total deaths when changes in low density lipoprotein cholesterol are adjusted for

Whereas change in high density lipoprotein cholesterol failed to explain variability in risk ratios for coronary heart disease events across studies, change in low density lipoprotein cholesterol explained about one third of the variability

Scepticism about interventions to lower coronary heart disease risk by increasing the amount of circulating high density lipoprotein cholesterol without considering effects on its function is reinforced

cholesterol; this is consistent with the magnitude of reduction reported in current National Cholesterol Education Program guidelines.[3]

Strengths and limitations

Strengths of this study include a comprehensive scope that included a wide range of patients at risk of cardiovascular events and a wide variety of lipid modifying interventions. Our extensive literature search supplemented by contacting experts in the field minimised the potential for publication bias, but we cannot exclude it completely. We could not include 50 trials that failed to report follow-up values or change in low density lipoprotein cholesterol or high density lipoprotein cholesterol.

To limit the risk of data driven spurious associations and overfitting, we pre-specified a limited number of predictors for our statistical models.[18] Our results proved robust in pre-specified sensitivity analyses and were consistent with other investigations that have examined similar data.[3] Our systematic review is far more comprehensive than previous studies on this subject.[19] Nevertheless, the relation described by a meta-regression is observational—a meta-regression across trials does not have the benefit of randomisation to support a causal interpretation and thus risks bias by confounding.

Our classification of lipid modifying interventions may be argued to combine antilipidaemic agents and diets that have important pharmacological differences or mechanisms of action.[20] Different interventions that alter high density lipoprotein cholesterol may have different impacts on cardiovascular risk. Our adjustment of the analysis by type of intervention (drug class) deals with this problem to a considerable extent but may not fully solve it.

Finally, meta-regression relies on aggregated data from studies rather than data from individual patients. Ideally our results would be confirmed by an analysis of data from individual patients, with a large pooled dataset of trials.

New views on high density lipoprotein cholesterol

Our findings contribute to accumulating evidence that simply increasing the amount of circulating high density lipoprotein cholesterol does not necessarily confer cardiovascular benefits.[12-15 21] In the case of torcetrapib, the failure to improve intracoronary atheroma burden in ultrasound studies and the excess mortality seen in the ILLUMINATE trial may be explained by a molecule specific increase in blood pressure or unforeseen interactions between torcetrapib and atorvastatin.[12 13 15 22] Recent data suggest the former possibility[23]; if so, other cholesteryl ester transfer protein inhibitors may still hold promise.

An alternative hypothesis would suggest that inhibition of the cholesteryl ester transfer protein leads to production of dysfunctional high density lipoprotein cholesterol with pro-inflammatory and atherogenic properties.[24] Lipid modifying agents and diets may affect the functionality of high density lipoprotein cholesterol.

Implications for clinical practice and future research

Our findings raise questions about the rationale for developing therapeutic agents that increase high density lipoprotein cholesterol without considering effects on its function. Future research should prospectively consider the results of assays to measure high density lipoprotein function and then provide definitive evidence of pharmacological effects on patient important outcomes in long term randomised trials.[25] Results from this study corroborate recommendations from current clinical guidelines that emphasise targeting primarily low density lipoprotein cholesterol in the prevention of cardiovascular morbidity and mortality.[3 4 26]

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Vulnerability and access to care for South Asian Sikh and Muslim patients with life limiting illness in Scotland: prospective longitudinal qualitative study

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ABSTRACT

Objectives To examine the care experiences of South Asian Sikh and Muslim patients in Scotland with life limiting illness and their families and to understand the reasons for any difficulties with access to services and how these might be overcome.

Design Prospective, longitudinal, qualitative design using in-depth interviews.

Setting Central Scotland.

Participants 25 purposively selected South Asian Sikh and Muslim patients, 18 family carers, and 20 key health professionals.

Results 92 interviews took place. Most services struggled to deliver responsive, culturally appropriate care. Barriers to accessing effective end of life care included resource constrained services; institutional and, occasionally, personal racial and religious discrimination; limited awareness and understanding among South Asian people of the role of hospices; and difficulty discussing death. The most vulnerable patients, including recent migrants and those with poor English language skills, with no family advocate, and dying of non-malignant diseases were at particularly high risk of inadequate care.

Conclusions Despite a robust Scottish diversity policy, services for South Asian Sikh and Muslim patients with life limiting illness were wanting in many key areas. Active case management of the most vulnerable patients and carers, and "real time" support, from where professionals can obtain advice specific to an individual patient and family, are the approaches most likely to instigate noticeable improvements in access to high quality end of life care. Improving access to palliative care for all, particularly those with non-malignant illnesses, as well as focusing on the specific needs of ethnic minority groups, is required.

INTRODUCTION

In palliative care the notion of a good death is based on patients being fully aware of their diagnosis and prognosis and able to engage in advance care planning. This does not, however, necessarily reflect different social, cultural, and spiritual beliefs and practices around death and dying.[1] We studied the care experiences of South Asian Sikh and Muslim patients with life limiting illness and of their families from the perspectives of the patient, family carer, and health professionals.

METHODS

We purposively recruited South Asian Sikh and Muslim patients with life limiting conditions with a prognosis of less than a year. Definitions for ethnicity, race, faiths, and languages of participants are on bmj.com. The researchers approached health professionals, community and religious leaders, and volunteer workers to identify eligible individuals. They then gave an information sheet about the project to the potential participant in English as well as in Gurumukhi or Urdu. The trilingual researcher (TI) explained the study and obtained written consent. Patients were asked to nominate a family carer and the health professional most involved in their care.

TI interviewed the patients and family carers, mainly at home, and professionals were also interviewed, mainly by telephone. Up to three in-depth, semistructured interviews (see bmj.com) were carried out with each participant over 18 months. If appropriate, interviews were carried out with family and professional carers 8-12 weeks after death. A researcher and a trilingual secretary recorded, transcribed, and translated the interviews when necessary; to ensure contextual accuracy translated transcripts were checked against recorded interviews.

Analysis was ongoing to allow emerging themes to be fed back into subsequent interviews. Constant comparison ensured that the thematic analysis approach represented all perspectives.[2 3] Each interview was analysed individually and compared with earlier or subsequent interviews to determine how needs and service use changed over time.

RESULTS

In all, 25 people with life limiting illness (seven Sikh patients and 18 Muslim patients), 18 carers, and 20 health professionals participated. Ninety two interviews took place. Eleven patients had cancer, 14 other long term illnesses. Participants were younger (mean age 59 (SD 14.7) years) than those typically recruited in end of life studies[4 5] and had younger families. Most lived in nuclear or extended families and three lived alone. Six patients died during the study. The family carers were predominantly women, along with four husbands and one son (see bmj.com). Four patients had no family carer and three carers declined to participate. Among the range of professionals nominated, most (n=13) were general practitioners (see bmj.com).

The experiences of the patients and their families were, in many respects, similar to those identified in other end of life studies in the general population (see bmj.com for overlapping themes).[4-7] The box summarises the experiences more evident in the participants in this study.

Accessing effective end of life care

Only two patients, both with cancer, accessed palliative care services. They died in a hospice, where the patients and their carers reported that staff showed exceptional willingness to learn about and meet their particular needs:

> "This hospice has been very good to us. They've said if there's anything you need, tell us. They've gone out and got halal meat. Anything we've wanted, they've gone and got." (Carer 20, wife of Muslim patient with cancer, stage 1 interview)

Two other patients who were not yet terminally ill reported coordinated and well managed palliative care (see bmj.com). Both were highly articulate, assertive, knowledgeable about services, and took a leading role in determining the course of their treatment and the services they received.

Barriers to effective end of life care

Many patients, particularly those with non-cancer illness, did not seem to receive care based on management of a long term condition or palliative care. It was evident from the responses of patients, carers, and professionals that the barriers to accessing end of life care arose from the perceptions and beliefs of ethnic minority communities about death and dying and end of life care, the inflexibility of services, and the attitudes of service providers.

Barriers among patients and families

Planning effective end of life care was difficult when there was a lack of open discussion about dying (see bmj.com for a list of barriers). Families sometimes controlled information, especially when acting as interpreters for health professionals. For example, a woman acting as interpreter for her husband did not want hospice staff to discuss his poor prognosis, whereas it was apparent from interviewing the patient that he had a clearer idea:

> "I said to them 'don't tell him how long,' but they said if he asks any questions, they'll have to tell him. He never asked." (Carer 20, wife of Muslim patient with cancer, stage 1 interview)

In a separate interview, the patient said:

> "Everything is finishing now, nothing works . . . [crying]. I don't know what to do. I've got five daughters, who is going to provide for them? I don't know what to do. What will they do? There is nothing else they [the hospice] can do—no cure." (Patient 20, Muslim man with cancer, stage 1 interview)

Other patients perceived the hospice as "somewhere to go to die." While not unusual in the general population, this view was widespread among patients and carers in our study, with the perception of cultural inappropriateness presenting an additional barrier.

A few patients found it challenging to accept personal care from non-Asian caregivers; concerns were expressed about privacy and cultural misunderstandings. Prejudices about standards of behaviour and cleanliness of white people were also apparent:

> "I will never allow them to do my cooking . . . We don't even know what they've eaten before they came to see me, or even if they've washed their hands after they use the toilet . . . how can we rely on them?" (Patient 18, Muslim woman with non-malignant illness, stage 1 interview)

Patients and families sometimes perceived prejudice from service providers:

> "The nurses get angry at me . . . I don't know whether they treat our people that way or if it's everyone." (Carer 8, daughter of Muslim man with non-malignant illness, stage 2 interview)

Perceived discrimination by service providers and concern about what others in their own community would say contributed to reluctance to seek help.

Inability to speak English was perceived as a major disadvantage in accessing services, forming relationships with professionals, and negotiating care options. It also meant that bereavement could be a particularly isolating experience for carers.

Barriers among professionals

The barriers among professionals are listed on bmj.com. The low number of patients from ethnic minority groups accessing palliative care was recognised but not well understood:

> "I would like to see them [Asian patients] being referred to us more often and I don't understand why they are not. There must be many more patients out there." (Patient 1, health professional interview)

Most professionals expressed good intentions in striving to provide equitable care but were concerned by their lack of cultural understanding and uncertain about how to adapt their usual care. Other professionals were anxious about making a cultural blunder. A lack of understanding and awareness of cultural needs was acknowledged:

> "Not knowing much about the religion . . . that is sometimes difficult because you don't really know what you are talking about . . . maybe if I had known more about that then I could have been more help to him." (Carer 20, interview with professional after death)

Many professionals interviewed were unaware of any training in diversity and cultural awareness, and others suggested that existing approaches were ineffective in changing services and attitudes:

> "There are things that are supposed to be happening in relation to Fair for All, equality and diversity, all these fine words, but you do begin to wonder, it is fine rhetoric and nobody is disagreeing with it, but on the shop floor it is not making a huge amount of difference." (Patient 6, interview with professional)

Institutional discrimination also created a barrier. Services often had difficulty managing basic needs such as communication with non-English speakers, diet, and hygiene. At times care was clearly culturally insensitive:

> "There were only two males in the department so what do you do then? [sounding anxious] I had to get help but they said 'we won't look' but look is not everything, you can feel as well. What organs is where, what part of your body, he just has to visualise it, don't have to look." (Patient 4, Muslim woman with non-malignant illness, stage 2 interview)

Trying to organise interpreters at short notice was seen by service providers as impossible. In some cases the patient was required to be the translator.

Services were often reactive rather than based on needs, with little flexibility about timing or roles. They therefore struggled to meet complex or variable needs. Constraints on resources were obvious, and reliance on family carers was acknowledged.

Overcoming barriers: an illustration of discrimination and effective advocacy

A Sikh patient with long term conditions, who was homeless and an asylum seeker, complained of hostility from staff, neglect of his needs, inappropriate food, and feeling humiliated if he complained about the food or asked about his treatment:

> "One of the nurses said to me that 'I will paint a horrible picture of you and report you to the immigration and they will deport you,' that's how they treat me." (Patient 6, Sikh man with non-malignant illness, stage 1 interview)

The professional interviewed confirmed that his care had been poor:

> "It did appear to me that some of the clinicians and managers who had a clinical background, in my view probably should have known better, seemed to be suggesting that they send him back to [own country] as soon as they possibly could, apparently without any notion of the consequences." (Patient 6, interview with professional]

The professional adopted an advocacy role for the patient's needs, addressed his diet, helped him access benefits, and liaised with staff on his behalf. His care was taken over by a different clinical team, with whom he had good relationships.

Vulnerability

It was apparent that the most assertive patients and families, articulate in English, and those with a good advocate were able to access services more effectively than those who were less able to assert their needs. In contrast we found that recent migrants and those with poor English, no family advocate, and dying of non-malignant diseases were less able to articulate their needs and negotiate care.

DISCUSSION

This study has found that end of life care remains substandard for many South Asian Sikh and Muslim

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Main themes more evident in the South Asian population than general population

Faith and coping

- Illness and suffering viewed as God's will and a test of faith
- Struggle to reconcile present suffering with the promise of a good afterlife
- God's approval sought through positive thinking and actions
- Despair and anger seen as spiritual deficits and therefore emotional problems difficult to acknowledge openly

Death and dying

- Less open discussion of death and dying within families, even among patients with cancer
- Hospices perceived as culturally inappropriate for South Asian people

Service provision

- Basic needs, such as culturally acceptable food and culturally sensitive personal care, not always met by services
- Institutional or overt personal racism sometimes apparent in patients' and carers' interactions with services
- Poor service provision sometimes perceived as racially-motivated where there was little evidence that this was the case
- Some patients and families were reluctant to seek help from services they perceived as racist, or because they had poor experience of services, or were concerned about criticism from own community
- Inadequate professional training in diversity and concern about causing offence through lack of cultural understanding
- Some staff awareness of the needs of Sikh and Muslim patients but uncertainties about how to adapt usual care to a different cultural context
- Professionals uncertain about accurate, complete, and effective communication when patients or family members acted as interpreters
- Specialist palliative care accessed by few patients, even those with cancer
- Exceptional willingness and adaptability of hospice staff to meet the needs of Sikh and Muslim patients

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patients, particularly the most vulnerable. Exploring the end of life needs of ethnic minority and faith communities qualitatively over time from patient, family carer, and professional perspectives offers important new insights. Previous studies have found that palliative care services are not culturally sensitive.[8][9] The risk of cultural misunderstandings around end of life care may grow with increasing heterogeneity of ethnic and religious groups.[10]

Feelings of exclusion from mainstream society and services are an additional previously unrecognised barrier to access.[11] Services were often inflexible and unable to respond effectively when faced with "atypical" needs. This resulted in patients and carers perceiving themselves as being discriminated against and treated with a lack of respect and dignity. The recent Darzi report emphasised the core requirement for high quality, personalised services, with particular care needed for those least likely to seek help because they feel discriminated against.[12] Our study showed that it is possible for existing services to provide good end of life care for such patients and families—this was particularly evident in hospices and some primary care services where the key component was an individualised approach to end of life care.

The barriers to accessing the best quality care were complex and apparent in the cultural perceptions of patients and families as well as constraints on services. These could, however, be overcome by effective advocacy from service providers. Although a hospice was perceived by some South Asian people in our study as a potentially alienating experience, the care received by two patients suggests that hospices can provide culturally sensitive care. Responsibilities also lie with South Asian communities being open to accepting help.

Equitable access to culturally competent services for all ethnic groups is a Scottish health policy requirement[13] that has resulted in increased awareness among service providers of the needs of ethnic minorities. Our study shows that this has not necessarily led to development of the structures or skills that will enable professionals to deliver culturally appropriate end of life care. Effective practice can be hampered by uncertainty, hesitancy, and inertia in the face of worries about cultural competence, possibly contributing to institutional racism.[14] Health professionals can be distressed by their (perceived or actual) inability to provide good care for people from ethnic minority groups.[15] Professionals in our study stressed their desire to deliver culturally competent care, but also expressed uncertainties about cultural aspects of complex end of life care. Our experiences suggest that "real time" advice on appropriate responses, where professionals could discuss an individual patient at the time they are providing care, would be helpful in building the skills and confidence to deliver culturally sensitive palliative care.

Equitable access to appropriate end of life care is not merely an issue for people from ethnic minority groups and different faith backgrounds. People from ethnic

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WHAT IS ALREADY KNOWN ON THIS TOPIC

People from ethnic minority groups are less likely to access palliative care services than the majority population

Barriers to access include attitudes of the patient, family, and professionals

End of life needs in minority groups are poorly understood

WHAT THIS STUDY ADDS

Within ethnic minority groups the most vulnerable people, such as recent migrants, have the poorest access to services

Active case management of high risk patients should help to overcome many of these barriers

Professionals need ready access to information and support specific to an individual patient and family

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minority groups may perceive inadequacies in services as based on racism when the problem is a generally poor service. Improving access to palliative care for all—particularly those with non-malignant illnesses—and focusing on the specific needs of ethnic minority groups is therefore required.

Strengths and limitations

Our theoretically informed approach, enhanced by interviewing patients, carers, and key professionals, enabled us to gain insights that would have been unavailable through single interviews—for example, the experiences of the Sikh man whose care was improved by a professional adopting an advocacy role. The methodological approach also enabled us to identify the direct, rather than perceived, discrimination this case exemplifies, by interviewing the key professional. Additional strengths include the high proportion of participants that agreed to participate (96%) and the high retention rate, with most attrition occurring because of death.

Recognising vulnerability

The premise that ethnic minority groups have the same needs as the rest of the population is too simplistic. Vulnerability leads to greater risk of poor health and poorer access to services. Prioritising the needs of the most vulnerable patients and carers might be a particularly effective way of reducing inequalities. Our data suggest that trigger factors for recognising vulnerability in patients with advanced illness include social deprivation, insufficient English, non-cancer illness, multiple comorbidities, lack of support from the family and community, and new migrants and those with uncertain legal status, such as asylum seekers.

Implications for policy, practice, and research

Improving care for ethnic minority groups involves partnership working where professionals are able to recognise their lack of knowledge and expertise in cultural practices and take advice from patients,

families, and community groups. Active outreach and community development with South Asian communities should help to raise awareness and overcome misconceptions of palliative and hospice care.

Involving patients and members of communities in the delivery, evaluation, and support of professional training is important. In UK primary care, points from the quality outcomes framework (and hence reimbursement) are now available for significant event analysis,[16] where care teams are encouraged to reflect on real cases and to identify strengths and weaknesses in care provided. This could be adapted to diversity training. Resources are available to support clinicians and educators in developing cultural competence (www.library.nhs.uk/ethnicity).[19 17 18]

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p i c o

Relation of study quality, concordance, take home message, funding, and impact in studies of influenza vaccines: systematic review

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STUDY QUESTION What is the relation between study concordance, take home message, funding, and citation (as a proxy for dissemination) in 274 studies on influenza vaccines?

SUMMARY ANSWER Influenza vaccines studies have poor methodological quality. There are discrepancies between results and conclusions, but these are overwhelmingly favourable. Publication in prestigious journals and higher citation is associated with partial or total industry funding, but this is not due to study quality or size.

Selection criteria for studies
We searched the Cochrane Library, PubMed, Embase, and the internet, without language restriction, for any studies comparing the population effects of influenza vaccines against placebo or no intervention.

Primary outcome(s)
Methodological quality, concordance (agreement between data presented and conclusions), impact, and citation of included studies in relation to funding.

Main results and role of chance
Higher quality studies were significantly more likely to show concordance between data presented and conclusions (odds ratio 16.35, 95% confidence interval 4.24 to 63.04) and less likely to favour effectiveness of vaccines (0.04, 0.02 to 0.09). Government funded studies were less likely to have conclusions favouring the vaccines (0.45, 0.26 to 0.90). A higher mean journal impact factor was associated with complete or partial industry funding compared with government or private funding and no funding (differences between

RELATION OF STUDY QUALITY, FUNDING, AND PUBLICATION IMPACT

Question: Is there a relation between	Answer	Interpretation
Methodological quality and journal impact factor?	No	The impact factor of the journal is not an indicator of quality of the influenza vaccines study published in it
Methodological quality and citation factor index?	No	The number of subsequent citations of the influenza vaccine study has nothing to do with its quality
Methodological quality and comparator sample size?	No	Just because an influenza vaccine study is powerful it does not mean it is sound
Funding source and journal impact factor?	Yes	If your influenza vaccine study is funded by industry then you have a higher chance of getting it published in a journal with high impact factor than your competitors
Funding source and citation factor index?	Yes	If your influenza vaccine study is funded by industry then it will probably be cited more than other similar studies

means 5.04). Study size was not associated with concordance, content of take home message, funding, or study quality. Higher citation index factor was associated with partial or complete industry funding.

Bias, confounding, and other reasons for caution
The association between higher citation index factor and funder was sensitive to the exclusion from the analysis of studies with undeclared funding. These comprised 23% of the population (64/274).

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Several authors have already joined us in this pilot, helping us to develop BMJ pico. For instance, Jefferson and his fellow "piconeers," inspired by their production of the above pico, summed up the highlights of their study in a PowerPoint presentation (a "Powerpico") for bmj.com (www.bmj.com/cgi/content/full/338/feb12_2/b354/DC3). Going forward, we will be pleased to consider other authors' proposals for such enhancements and improved pico templates.

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