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Randomized clinical trial of comprehensive geriatric assessment and optimization in vascular surgery

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Background: Increasing numbers of older patients are undergoing vascular surgery. Inadequate preoperative assessment and optimization may contribute to increased postoperative morbidity and mortality.

Methods: Patients aged at least 65 years scheduled for elective aortic aneurysm repair or lower-limb arterial surgery were enrolled in an RCT of standard preoperative assessment or preoperative comprehensive geriatric assessment and optimization. Randomization was stratified by sex and surgical site (aorta/lower limb). Primary outcome was length of hospital stay. Secondary outcome measures included new medical co-morbidities, postoperative medical or surgical complications, discharge to a higher level of dependency and 30-day readmission rate.

Results: A total of 176 patients were included in the final analysis (control 91, intervention 85). Geometric mean length of stay was 5.53 days in the control group and 3.32 days in the intervention group (ratio of geometric means 0.60, 95 per cent c.i. 0.46 to 0.79; $P < 0.001$). There was a lower incidence of delirium (11 *versus* 24 per cent; $P = 0.018$), cardiac complications (8 *versus* 27 per cent; $P = 0.001$) and bladder/bowel complications (33 *versus* 55 per cent; $P = 0.003$) in the intervention group compared with the control group. Patients in the intervention group were less likely to require discharge to a higher level of dependency (4 of 85 *versus* 12 of 91; $P = 0.051$).

Conclusion: In this study of patients aged 65 years or older undergoing vascular surgery, preoperative comprehensive geriatric assessment was associated with a shorter length of hospital stay. Patients undergoing assessment and optimization had a lower incidence of complications and were less likely to be discharged to a higher level of dependency.

Registration number: ISRCTN23142588 (http://www.controlled-trials.com).

+A: Introduction

As the population ages the number of older people undergoing surgical procedures is increasing[1]. Despite improved mortality and symptomatic benefits of surgery for older people[2–4], there continues to be an excess of adverse postoperative outcomes in older patients[5–9]. This is likely to be explained by a combination of physiological changes, the cumulative effect of multiple morbidities and the presence of geriatric syndromes. Observational work within the older vascular surgical population has identified a significant burden of undiagnosed cognitive impairment, high incidence of delirium, considerable frailty and impaired functional status[10,11]. Vascular risk factors such as smoking, hypertension and hypercholesterolaemia, which are common in patients undergoing vascular surgery, are also independent risk factors for cognitive impairment, postoperative delirium and frailty[12–15]. Furthermore, vascular risk factors increase postoperative morbidity. Such postoperative complications can all contribute to increased mortality, poorer patient experience, prolonged hospital stay and greater financial costs[16,17].

Evidence is emerging to suggest that systematic structured preoperative assessment and clinical optimization of older surgical patients may improve postoperative outcomes[18,19]. Comprehensive geriatric assessment is an established and evidence-based method of evaluating and optimizing physical, psychological, functional and social issues in older patients[20,21]. The initial assessment prompts the development of an individualized care plan that includes investigation, treatment, rehabilitation support and long-term follow-up. For example, a patient may receive medical optimization of heart failure, assessment and management of newly identified cognitive impairment, and provision of mobility aids or referral to therapy-based exercise programmes. The use of comprehensive geriatric assessment in medical inpatients and community-dwelling older people has been shown to improve mortality at 36-month follow-up, increase the chance of living independently at home, and also to confer a positive effect on physical and cognitive function[20]. A recent Cochrane review and meta-analysis[21] of 22 trials showed that patients who underwent comprehensive geriatric assessment in acute geriatric wards were more likely to be alive and in their own homes at 12 months than patients receiving general medical care. Furthermore, fewer patients were institutionalized at hospital discharge and cognitive decline was less pronounced in the group that received comprehensive geriatric assessment.

Despite the evidence supporting the use of comprehensive geriatric assessment in the medical setting, this process remains relatively understudied in the surgical population. Where comprehensive geriatric assessment differs from other preoperative risk assessment tools is in the individualized multidomain optimization that is prompted by the assessment process. It is this optimization that will potentially modify perioperative risk and improve postoperative outcomes. A systematic review and narrative synthesis[19] concluded that preoperative comprehensive geriatric assessment is likely to have a positive impact on postoperative outcomes in older patients undergoing elective surgery, but recommended further research to investigate the optimal approaches and its effectiveness in this setting.

+A: Methods

A single-centre RCT was performed within an inner city teaching hospital with a tertiary referral practice for vascular arterial surgery (ISRCTN23142588, UKCRN 13260). Eligible and consenting patients were randomized to receive either comprehensive geriatric assessment and optimization, or usual care. Ethics approval was given by South East London Research Ethics Committee (12/LO/0655). Eligibility criteria were patients aged at least 65 years scheduled for elective endovascular/open aortic aneurysm repair or lower-limb arterial bypass surgery. Patients were not eligible if they were admitted directly to the ward from the surgical clinic or emergency department for emergency or very urgent surgery, which precluded the opportunity for outpatient preoperative assessment and optimization.

Patients and carers were involved in the design of this study including the initial development of the research question. Participants from an observational study that preceded this trial advised on recruitment, randomization and follow-up. This involved discussion about the burden of the intervention, which was felt to be minimal by the patients consulted. All study participants will be offered a written summary of the study results.

+B: Recruitment, consent and randomization

Patients were approached by a research nurse or fellow in the vascular surgery outpatient clinic once listed for surgery. Those satisfying the inclusion criteria were assessed for capacity to consent to study participation. Patients lacking capacity to consent were recruited under sections 30–34 of the Mental Capacity Act[22]. Written consent was obtained (either from patients or consultees). Patients were approached, assessed for eligibility and consented at the first meeting after they had read the patient information sheet.

Randomization was internet-based and was carried out independently by the King's Clinical Trials Unit (www.ctu.co.uk) using a 1 : 1 allocation, and was stratified according to sex and site of surgical procedure (aorta, lower limb). According to randomized group allocation, participants were given appointments to attend either a standard preassessment clinic (routine care within the hospital) or to the study intervention, a comprehensive geriatric assessment and optimization clinic.

+B: Clinical care

+C: Intervention group

Patients in the intervention group received comprehensive geriatric assessment and optimization in an outpatient clinic setting. A geographically separate clinic on a different hospital site with entirely different clinic staff was used to minimize contamination bias between the two groups in the single centre. Patients were assessed and optimized according to peer-reviewed protocols based on current evidence, national and hospital guidelines, and expert opinion (examples can be found in Figs *S1–S3* and *Tables S1* and *S2*, supporting information). The comprehensive geriatric assessment was delivered by a multidisciplinary team (geriatrician, clinical nurse specialist, social worker, occupational therapist) according to individual patient need. The intervention was documented in an individualized care plan available to all healthcare professionals on the electronic patient record. This care plan provided advice regarding the prevention and management of anticipated postoperative complications, but did not refer to the patient's involvement in the study.

+C: Control group

The control group received standard preoperative care. Within the participating centre this consisted of a nurse-led preoperative assessment clinic where a protocolized appraisal of anaesthetic and medical issues was conducted. This process tended to focus on the binary labelling of 'fit' or 'unfit' for anaesthesia/surgery, and was not designed to optimize patients' fitness. If issues that may affect surgery were identified, a more detailed specialist medical or anaesthetic evaluation was requested, or patients were referred back to their general practitioner.

+C: Postoperative care

In both groups, postoperative care was delivered by surgical teams who were unaware of the patient's involvement in the study. This routine care involved junior surgical staff and clinical nurse specialists utilizing all electronic clinical documents (including the individualized care plans generated following comprehensive geriatric assessment in the intervention group).

+B: Outcome measures

The primary outcome measure was duration of hospital stay; this was recorded routinely by hospital administrative staff who were unaware of the study, and extracted from hospital electronic patient record by an unblinded research nurse. Use of length of stay as the primary outcome measure was based on *a priori* consultation with patients and carers, as it was considered to encapsulate both the overall 'success' of the hospital stay and the patient experience. It is also a major determinant of hospital costs per episode of care.

Secondary outcome measures were: new co-morbid diagnoses made, such as cognitive impairment (yes/no), postoperative medical and surgical complications, including delirium (yes/no), discharge to a higher level of care dependency (new care package or reablement at discharge, discharge to rehabilitation facility or other hospital, and new care home placement) and readmission to hospital within 30 days. These were recorded by an unblinded research nurse using predefined criteria for the presence or absence of complications according to the clinical record, medication record and results of investigations. The data were taken from the clinical records made by usual care teams that were unaware of the study.

To explore potential clinical explanations for any difference observed in length of stay, all new diagnoses, investigations, discussions, referrals and medication changes made at preoperative assessments were recorded as secondary outcomes.

+B: Statistical analysis

Mean(s.d.) length of hospital stay in the control group was expected to be 6.5(4.0) days, based on previous routine activity data in this surgical unit. A reduction of 25 per cent (1.6 days) was judged to be clinically and financially important. Assuming 80 per cent power and a two-sided significance level of 5 per cent, a total sample size of 198 patients was required (99 per group). Attrition rates were expected to be negligible from previous observational work that showed no drop-outs[10]; the target sample size was inflated (by 5 per cent) to 208.

Baseline data are presented as mean(s.d.) (continuous data), or frequencies and percentages (categorical data). The primary analysis was by intention to treat. The primary outcome, length of hospital stay, was positively skewed and so was log-transformed for

analysis, and then back-transformed to give the ratio of geometric means with a 95 per cent confidence interval. This provided an estimate of the relative change in length of stay in the intervention group compared with the control group. The difference in outcome between the two randomized groups was analysed using multiple regression that included the stratification factors sex and surgical site as co-variables. Where there was observed imbalance in baseline variables, a sensitivity analysis was performed to adjust the primary outcome analysis for these factors and test the robustness of the findings.

Binary outcomes were compared by allocated group using the χ^2 test (or Fisher's exact test where the frequencies were small). Wherever possible, all differences between the trial arms are given with 95 per cent confidence intervals, calculated using Wilson's method in Confidence Interval Analysis (CIA) software (www.som.soton.ac.uk/cia/). It was not possible to adjust for the stratification factors using logistic regression for the majority of secondary outcomes owing to small numbers of events.

The analysis was conducted unblinded by a biostatistician who had contributed to the protocol and plan of analysis, but was not part of the clinical trial team.

+A: Results

A total of 209 patients were recruited between November 2012 and February 2014, of whom 105 were assigned randomly to the control arm and 104 to the intervention arm (*Fig. 1*). No patient withdrew consent to participate in the study and none were lost to follow-up. The primary outcome (length of hospital stay in days) was available for 176 patients (91 control, 85 intervention) but not for 33 patients (14 control, 19 intervention) ((*Fig. 1*).

+B: Baseline characteristics

There were some differences between the randomized groups in terms of baseline characteristics (*Table 1*).

+B: Primary outcome

Mean length of stay in the intervention group was reduced by 40 per cent compared with that in the control group (ratio of geometric means 0.60, 95 per cent c.i. 0.46 to 0.79; $P < 0.001$). This reduction equated to a mean reduction of just over 2 days (*Table 2*). The difference was

virtually unchanged after adjusting for the observed baseline imbalance in history of cerebrovascular disease, falls and smoking (ratio of geometric means 0.62, 0.46 to 0.83; *P* = 0.002).

+B: Secondary outcomes

There were significantly lower proportions of patients with postoperative delirium, cardiac complications and bladder/bowel issues, with a trend towards fewer infective episodes and fewer units of blood transfused in the intervention compared with the control group (*Table 2*).

Sensitivity analyses for the proportions with delirium were conducted to adjust for differences in potential confounders between the two groups (history of cerebrovascular disease, falls and smoking), but these did not affect the size of difference observed. Furthermore, patients in the intervention group were less likely to have care or rehabilitation needs necessitating a change in discharge destination or new provision of rehabilitation and/or care; this was close to statistical significance (*P* = 0.051) (*Fig. 2*).

+B: Assessment and optimization according to comprehensive geriatric assessment

Comprehensive geriatric assessment recognized previously undiagnosed issues across multiple domains. Cognitive disorders, delirium risk, frailty and medical morbidity were identified more frequently in the intervention group than the control group (*Table 3*). In accordance with the objectives of comprehensive geriatric assessment, the recognition of these issues prompted both preoperative management (such as medication changes), longer-term follow-up (for example by primary care), and proactive discussion with patients and families (for example about cognitive issues) (*Table 4*).

+A: Discussion

In this RCT, preoperative comprehensive geriatric assessment was associated with a shorter hospital stay for older patients undergoing elective vascular surgery, without an increase in 30-day readmission rate. The observed reduction in length of stay in those receiving comprehensive geriatric assessment probably resulted from fewer postoperative medical complications, anticipation and modification of potential functional and discharge issues, and streamlining of the patient pathway.

This finding is in keeping with existing literature on comprehensive geriatric assessment in other settings[20,21] where the multidomain assessment and optimization of older patients is thought to improve both physical and cognitive function. In the present study, the recognition of previously undiagnosed pathology facilitated optimization through both medical management (higher rates of medication changes made in intervention group) and multidisciplinary intervention (higher rates of preoperative therapy and social work referrals). This prompted standardized management of anticipated postoperative complications through clear communication with ward teams and other health professionals. Furthermore, communication with patients and their families was more commonly undertaken in the intervention arm, allowing anticipation of information regarding risk of postoperative complications such as delirium, expected length of stay and expectations around discharge planning. This fuller preoperative assessment and optimization of medical morbidity, anticipation and mitigation of potential social issues at discharge, and advice on standardized management of postoperative complications is postulated to be responsible for the observed reduction in length of stay.

The number of patients who did not undergo surgery was larger in the intervention arm than the control arm. The comprehensive assessment undertaken in the intervention group was shown to significantly increase the number of new diagnoses made. These included chronic obstructive pulmonary disease, chronic kidney disease (stage 3 or worse) and cognitive impairment, with a trend towards larger numbers of new diagnoses of ischaemic heart disease and cardiac failure. It is possible that this fuller assessment of perioperative risk resulted in the greater number of decisions to manage patients conservatively in the intervention group. Although the effect of the comprehensive intervention on patient selection may have influenced length of stay, the numbers are such that this would not account for the marked change observed. The impact of comprehensive geriatric assessment on patient selection for surgery in this study has important implications for clinical practice.

There are limitations to the study. The primary outcome measure was documented in the electronic patient record by hospital administrative staff who were unaware of the study. The length of stay was then recorded by an unblinded research nurse, but the objective method of collecting the measure eliminated the risk of bias. Secondary outcomes were recorded by the research nurse using predefined criteria for the presence or absence of complications according to the clinical record, medication records and results of investigations. These data were taken from the clinical records made by usual care teams, including a succession of junior medical staff on rotation who were unaware of the patient's enrolment in the study, making it unlikely that there was a systematic tendency for any difference in their record keeping. The predefined criteria for the secondary outcomes provided minimal scope for interpretation of their presence or absence by the research nurse.

Randomization ensured a similar distribution of baseline characteristics between the two groups; however, there was a higher rate of previous stroke in the control group, and higher reported rates of previous falls and current smoking in the intervention group. It is possible that these differences could be explained by a fuller assessment in the intervention group, where events reported by patients as strokes were discounted after assessment and more accurate details on falls and smoking were obtained. Whether or not these findings were true differences or reporting differences, adjustment using sensitivity analysis showed no impact on the observed difference in length of stay between the two groups.

There is potential contamination between the groups as the study was conducted within a single surgical service in one hospital Trust. Steps undertaken to minimize this bias included use of clinics in different geographical locations employing different staff for preoperative care in each trial arm, ensuring that staff from one clinic could not directly observe actions taken in the other clinic. Any contamination that did occurred would have been expected to reduce differences in outcomes.

The results of this study have potential significance for other centres offering elective vascular surgery to older patients. Although patients in the present study were undergoing vascular surgery, the findings build on literature examining similar multiple-

component interventions in other older surgical populations, such as those following hip fracture[23] or undergoing elective orthopaedic surgery[24]. Such significant findings suggest that the application of preoperative comprehensive geriatric assessment may be relevant to older patients undergoing elective and emergency surgery across other surgical subspecialties, including cancer surgery.

Future work in this area could include economic evaluation of the intervention, better understanding of the mechanisms underlying the observed improvement in length of stay and larger-scale evaluation of the intervention. The translation of study findings into routine clinical practice should be further explored using implementation science.

+A: Acknowledgements

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Disclosure: The authors declare no conflict of interest.

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Supporting information
Additional supporting information may be found in the online version of this article:

Fig. S1 Cognition protocol (Word document)
Fig. S2 Anaemia protocol (Word document)
Fig. S3 Cardiac evaluation (Word document)
Table S1 Frailty domains (Word document)
Table S2 Antiplatelet management (Word document)

Fig. 1 CONSORT diagram for the trial. *Included in accordance with intention-to-treat analysis

Fig. 2 Percentage of patients with complications and delayed discharge by trial arm. *P = 0.002, †P = 0.042, ‡P = 0.051 *versus* control (χ^2 test)

Table 1 Baseline variables in control and intervention groups

	Control (n = 105)	Intervention (n = 104)
Age (years)*	75.5(6.3)	75.5(6.6)
Sex ratio (M : F)	79 : 26	80 : 24
Current or ex-smoker	68 of 89 (76.4)	94 of 102 (92.2)
Alcohol consumption (units/week)*	6.6(14.1)	10.3(17.5)
Ischaemic heart disease	37 of 100 (37.0)	39 (37.5)
Cardiac failure	6 (5.7)	8 (7.7)
Atrial fibrillation	17 of 100 (17.0)	15 of 100 (15.0)
COPD	25 of 100 (25.0)	25 of 100 (25.0)
Diabetes	25 of 100 (25.0)	26 of 100 (26.0)
Cerebrovascular disease	21 of 100 (21.0)	10 (9.6)
Cancer	15 of 100 (15.0)	17 of 100 (17.0)
Hypertension	81 of 101 (80.2)	78 of 101 (77.2)
Dementia	5 (4.8)	2 (1.9)
Falls	10 (9.5)	26 of 100 (26.0)
Peripheral arterial disease	40 of 100 (40.0)	46 of 102 (45.1)

Multiple-site vascular disease	22 of 100 (22.0)	27 of 100 (27.0)
End-stage renal failure	2 (1.9)	0 (0)
No. of medications*	6.1(3.0)	6.4(3.3)
Haemoglobin (g/l)*	133(17)	129(16)
Creatinine (μmol/l)*	106(54)	101(44)
eGFR (ml/min)*	66(25)	69(26)
Self-reported exercise tolerance†	24 of 73 (32.9)	38 of 100 (38.0)
Surgical procedure (aortic)	64 (61.0)	64 (61.5)

Values in parentheses are percentages unless indicated otherwise; *values are mean(s.d.).

†Unable to manage one flight of stairs. COPD, chronic obstructive pulmonary disease; eGFR, estimated glomerular filtration rate.

Note: the denominator varies according to missing data (predominantly in the control group) and due to patients who did not receive the allocated intervention according to randomisation (see figure 1) but who were analysed using an intention to treat approach.

Table 2 Primary and secondary outcomes of participants who progressed to surgery, according to allocated study arm

	Control (*n* = 91)	Intervention (*n* = 85)	Difference (intervention – control)‡	*P*
Primary outcome				
Length of hospital stay (days)*	5.53	3.32	0.60 (0.46, 0.79)§§	< 0.001
Secondary outcomes				
Postoperative delirium	22 (24.2)	9 (10.6)	–14 (–25, –2)	0.018
Acute coronary syndrome	4 (4.4)	0 (0)	–4 (–11, 1)	0.051
Cardiac failure	5 (5.5)	1 (1.2)	–4 (–11, 2)	0.212
Tachyarrhythmia	17 (18.7)	3 (3.5)	–15 (–25, –6)	0.002
Bradyarrhythmia	7 (7.7)	4 (4.7)	–3 (–11, 5)	0.413
Pneumonia	12 (13.2)	8 (9.4)	–4 (–13, 6)	0.430
Wound infection	13 (14.3)	4 (4.7)	–10 (–19, 0)	0.032
Urinary tract infection	9 (9.9)	4 (4.7)	–5 (14, 3)	0.196
Constipation	40 (44.0)	24 (28.2)	–16 (–29, –2)	0.026
Faecal incontinence	9 (9.9)	1 (1.2)	–9 (–17, –2)	0.019
Catheter issue	7 (7.7)	4 (4.7)	–3 (–11, 5)	0.413
Fall	7 (7.7)	2 (2.4)	–5 (–13, 2)	0.171
Postoperative cardiac complication§	25 (27.5)	7 (8.2)	–19 (–30, –8)	0.001
Postoperative pulmonary complication¶	13 (14.3)	8 (9.4)	–5 (–15, 5)	0.319
Postoperative infective complication#	25 (27.5)	14 (16.5)	–11 (–23, 1)	0.086

Postoperative bowel and bladder complications**	50 (54.9)	28 (32.9)	–22 (–35, –7)	0.003
Postoperative vascular surgery-related issues††	10 (11.0)	6 (7.1)	–4 (–13, 5)	0.365
Discharge timed get up and go (s)†	20.1(11.6)	18.9(1.8)	–1.2 (–4.7, 2.3)	0.584
Discharge gait speed (m/s)†	0.7(0.2)	0.7(0.3)	0.0 (–0.1, 0.1)	0.696
Postoperative haemoglobin (g/l)†	104(84)	100(21)	–4 (–23, 15)	0.657
Postoperative blood transfusion (units infused)†	1.0(3.7)	0.3(0.7)	–0.7 (–1.5, 0.1)	0.065
Postoperative creatinine (μmol/l)†	134(120)	108(52)	–26 (–54, 2)	0.070
Unplanned 30-day readmission	10 (11.0)	15 (17.6)	7 (–4, 17)	0.193
Composite measure of complicated discharge‡‡	12 (13.2)	4 (4.7)	9 (–17, 0)	0.051
Level 2/3 care used immediately after surgery	39 (42.9)	26 (30.6)	–12 (–26, 2)	0.082

Values in parentheses are percentages unless indicated otherwise; values are *geometric mean, †mean(s.d.) and ‡values in parentheses are 95 per cent confidence intervals. §Acute coronary syndrome, heart failure, tachyarrhythmia or bradyarrhythmia; ¶pneumonia, infective exacerbation of chronic obstructive pulmonary disease (COPD); #pneumonia, infective exacerbation of COPD, wound infection, urinary tract infection; **urinary tract infection, catheter-related issue, constipation, faecal incontinence; ††bleed, vessel rupture, occlusion, paraplegia; ‡‡new care package, reablement, discharge to bed-based rehabilitation, other hospital, new care home placement. §§Difference expressed as the ratio of geometric means (intervention/control); the analysis was adjusted for stratification factors sex and site of surgery.

Table 3 Identification of previously unrecognized issues across multiple domains using comprehensive geriatric assessment according to allocated study arm

	Control (n = 100)	Intervention (n = 101)	P*
Delirium risk assessment undertaken	0 (0)	99 (98.0)	< 0.001
New diagnosis made at preoperative assessment			
Ischaemic heart disease	0 (0)	5 (5.0)	0.059
Cardiac failure	0 (0)	5 (5.0)	0.059
Atrial fibrillation	1 (1.0)	3 (3.0)	0.621
COPD	0 (0)	15 (14.9)	< 0.001
Diabetes	0 (0)	2 (2.0)	0.498
Cerebrovascular disease	0 (0)	1 (1.0)	1.000
Cancer	0 (0)	2 (2.0)	0.498
Cognitive impairment	1 (1.0)	47 (46.5)	< 0.001
Chronic kidney disease (stage ≥ 3)	0 (0)	26 (25.7)	< 0.001
Valve lesion	3 (3.0)	9 (8.9)	0.134
Tachyarrhythmia or bradyarrhythmia	0 (0)	2 (2.0)	0.498
Parkinson's disease	0 (0)	1 (1.0)	1.000
Composite measure of new diagnosis made at preoperative assessment	5 (5.0)	64 (63.4)	< 0.001

Values in parentheses are percentages. COPD, chronic obstructive pulmonary disease. *χ^2 test.

Table 4 Preoperative optimization using short-term and longer-term modifications and planning through comprehensive geriatric assessment according to allocated study arm

	Control (n = 100)	Intervention (n = 101)	P*
GP informed about cognitive issues	0 (0)	99 (98.0)	< 0.001
Memory clinic referral suggested to GP	0 (0)	54 (53.5)	< 0.001
Discussion with patient and family about cognitive issues	0 (0)	98 (97.0)	< 0.001
Multicomponent optimization to modify delirium risk undertaken	0 (0)	60 (59.4)	< 0.001
Multicomponent optimization to modify risk of functional deterioration undertaken	0 (0)	29 (28.7)	< 0.001
Physiotherapy referral	0 (0)	3 (3.0)	0.246
Occupational therapy referral	0 (0)	26 (25.7)	< 0.001

Social work referral	0 (0)	35 (34.7)	< 0.001
Medications changed before surgery	4 (4.0)	87 (86.1)	< 0.001
Level 2/3 care advised	26 of 90 (28.9)	25 of 83 (30.1)	0.902
Onward referral to other specialty for long-term (non-preoperative) management suggested	1 (1.0)	36 (35.6)	< 0.001
Advice to ward teams given	0 (0)	93 (92.1)	< 0.001
Longer-term GP follow up suggested	2 (2.0)	85 (84.2)	< 0.001

Values in parentheses are percentages. GP, general practitioner. *χ^2 test.