"Daily medical liaison is associated with reduced length of stay in a regional vascular surgery service: a before-and-after study."

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Abstract

Objective: To determine the impact of the introduction and establishment of a daily medical liaison service provided to patients aged 65 years and older attending a regional vascular surgery centre. Methods and Analysis: Descriptive before-and-after study concerning 375 patients (pre-intervention n=171, post-intervention n=204). Retrospective case-note analysis during two three-month periods (January-March, 2017 and 2018). Intervention comprised daily senior-led medical liaison review. Primary outcome measure was length of stay (LOS). Results were analysed using SPSS Statistics 23. Descriptive analyses were performed in addition to correlation and regression analyses to identify key predictors of postoperative outcome. Results: There was a trend reduction in LOS from 10.75 to 7.95 days (p=0.635, 95% CI 0 – 1 day) with a significant reduction in mean LOS for patients admitted for longer than seven days (7.84 days, p=0.025, 95% CI for mean difference, 1.5 to 14 days). This group also benefited reduced 30-day readmission rates (12/60 to 8/72, p=0.156, 95% CI -3% to 21%). Trend reduction in the number of postoperative complications was seen (1.09 to 0.86 per person, p=0.181, 95% CI -0.11 to 0.56), which reached statistical significance in emergency vascular admissions (1.81 to 0.97 per person, p=0.01, mean difference = 0.84, 95% CI 0.21 – 1.46). Conclusion: This study has demonstrated reduced LOS and complications associated with daily medical liaison in selected older patients admitted under vascular surgery. The greatest benefit appears to be in patients admitted for more than seven days or in emergency admissions. These data are amongst the first to reproduce randomised control trial findings in a non-trial setting. They indicate which patient groups may benefit most from collaborative models of care where resources are finite.

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Methods:

Descriptive before-and-after study concerning 375 patients (pre-intervention n=171, post-intervention n=204). Retrospective case-note analysis during two three-month periods (January-March, 2017 and 2018). Intervention comprised daily senior-led medical liaison review. Primary outcome measure was length of stay (LOS).

Results:

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Conclusion:

This study has demonstrated reduced LOS and complications associated with daily medical liaison in selected older patients admitted under vascular surgery. The greatest benefit appears to be in patients admitted for more than seven days or in emergency admissions. These data are amongst the first to reproduce randomised control trial findings in a non-trial setting. They indicate which patient groups may benefit most from collaborative models of care where resources are finite.

What is already known about this topic?

The volumes of older, multimorbid adults undergoing surgery is rapidly increasing. Delivering high quality, coordinated and multidisciplinary care to this vulnerable group is important in improving patient outcomes, such as postoperative complications. Perioperative Comprehensive Geriatric Assessment utilised in the context of older patients undergoing vascular surgery has been shown to reduce length of stay.

What does this article add?

This study has highlighted that existing randomised control trial results demonstrating the benefits of proactive medical liaison for complex older patients undergoing vascular surgery may be reproduced in a service development setting, with beneficial effects seen in reducing length of stay and complication frequency in selected patients.

MAIN TEXT

Introduction

The proportion of older people undergoing surgery is increasing faster than the rate of population ageing[1-2]. This is representative of advances in surgical and anaesthetic techniques. However, it is well established that this patient group are more susceptible to adverse outcomes[2-3]. Complications in the perioperative period are typically medical and are closely linked to geriatric syndromes including frailty, sarcopenia and cognitive deficits. Collaborative, multidisciplinary models of care including proactive identification of the most pertinent risk factors may allow targeted intervention to minimise perioperative morbidity and mortality.

Older people undergoing vascular surgery are a particularly vulnerable, high-risk group. This frequently reflects the presence of multiple comorbidities including hypertension, diabetes, ischaemic heart disease and additional lifestyle risk factors such as smoking. In particular, the incidence and prevalence of peripheral vascular disease increases with age; complex bypass surgery therefore forms a significant proportion of work in arterial centres[4].

Decision-making with regards to patient selection for surgical intervention is challenging. Advances in endovascular surgery in the modern era have rendered some types of surgery less physiologically challenging. Societal attitudes and expectations have also evolved. Determining which patients are likely to benefit most from intervention, and in whom the elevated risk profile is acceptable is complex. Decisions have historically been made on the basis of age alone as a proxy for frailty and comorbidity[5]. Despite an elevated risk profile, older patients can have good outcomes from vascular surgery. However, limited data have been reported describing outcomes for matched patients not undergoing surgery. The natural history of vascular disease at advanced age is therefore somewhat less clear[6]. Recognition of patients nearing the end of their life and utilising effective palliative care is important in these scenarios, although in many cases surgery has an important palliative symptomatic role[7-8]. Nonetheless, the postoperative period is often protracted in older patients and syndromes such as delirium commonly lead to functional decline and increased dependency. The provision of proactive multidisciplinary team working ensures that surgical intervention can be provided to those for whom quality of life and independence can be restored, whilst balancing the risks and benefits of surgery and ensuring an opportunity for risk factor modification and optimisation.

Perioperative Comprehensive Geriatric Assessment (CGA) utilised in the context of older patients undergoing vascular surgery has been shown to reduce length of stay (LOS)[9-10]. Replicating aspects of the CGA service evaluated in the randomised control trial conducted (RCT) by Partridge et al, we aimed to assess the impact of daily provision of senior-led medical liaison provided for patients aged 65 years and older admitted to our regional tertiary vascular centre. Prior to the introduction of this service development, *ad hoc* reactive review was provided on demand by the duty medical registrar. Our primary outcome measure was reduction in LOS. Our secondary outcome measure was reduction in the number of postoperative complications. We also aimed to determine the impact of age on our primary and secondary outcome measures.

Materials and Methods

The study was conducted at an 800-bedded hospital providing tertiary-level care for vascular surgery patients. This was a single-centre, non-randomised descriptive between subjects, before-and-after design comparing pre-existing practice with a model of care previously shown to be effective in other surgical settings[11]. This comprised daily senior-led (registrar/consultant) medical liaison review provided by geriatric medicine physicians. This service was provided within normal working hours (0800-1700, Monday to Friday). Patient identification was triggered through direct liaison with the vascular surgery team and daily attendance to the vascular surgery ward to case-find.

Electronic records and patient case notes were analysed for all patients aged 65 years and older admitted for one or more nights. Notes were analysed retrospectively during two three-month periods across two consecutive years (January-March 2017 and 2018) to allow pre- and post-intervention analysis.

Data collection was conducted by a team of doctors and one medical student working within the Department of Medicine for Older People. Notes were requested from business intelligence services. Patient demographics were recorded including sex, age, admission type (emergency/elective), source of admission (home/other hospital/care home), operation type, comorbidities and frailty scores. Comorbidities were recorded using the Charlson comorbidity index[12]. Frailty was recorded using the Clinical Frailty Scale[13]. Outcome variables included LOS and for patients undergoing surgery, the number of complications suffered. Complications were recorded according to actual number and using guidance from The Clavien-Dindo system[14]. Other information recorded included admission to intensive care, 30-day readmission rates and inpatient mortality.

Statistical analysis was performed using SPSS Statistics 23. Between-group differences were analysed using correlation analysis, chi-square test of association, odds ratios, two-sample independent tests, and Kaplan-Meier analysis as appropriate. Multiple regression analyses were used to determine whether putative risk factors were relevant in their impact on LOS.

Results

In the pre-intervention group, 171 patient case-notes were reviewed with 205 in the post-intervention group. Average age was 76 (range 65-95) pre- and 77 (range 65-97) post-intervention (mean difference = -0.4, p=0.607, 95% confidence interval [CI] -1.4 to 1.8). The frequency of admission to intensive care remained stable at 20% following intervention (34/171 pre and 41/204 post-intervention, 95% CI -8.3% to 7.9%), and 30-day readmission rates remained unchanged (22/171 versus 24/204, p=0.746, 95% CI -5.6% to 7.8%). Mortality showed a trend reduction of 1.4% (9/171 to 8/204, p=0.534, 95% CI -2.9% to 5.6%). See Table 1 for further patient demographic details.

Following implementation of our medical liaison service, overall mean LOS showed a trend reduction from 10.75 to 7.95 days (p=0.635, CI 0 to 1 day). When comparing the impact of our intervention on LOS for patients admitted either acutely or electively, there was no significant reduction seen (p=0.103, 95% CI 0 to 5 days and p=0.890, 95% CI -1 to 0 days respectively).

However, a Kaplan-Meier analysis (Figure 1) and a comparison of means showed a significant reduction from 25.12 to 17.28 days in mean LOS for patients admitted for more than seven days (p=0.025, 95% CI for mean difference 1.5 to 14 days). This time period was considered intuitive given the mix of durations of length of stay for these patient groups. Post hoc analyses using other potential thresholds (e.g. longer than 10-days)

did not maximise the difference in length of stay between the two groups. Moreover, on further enquiry, demographic data for those with a prolonged stay does not differ between the two cohorts. Specifically, there are no differences in patient sex (p=0.774), age (p=0.923), type of surgery (elective/acute) (p=0.710) or rates of intensive care admission (p=0.696). Lastly, for patients admitted for longer than seven days, 30-day readmission rates reduced from 12/50 (20.0%) to 8/72 (11.1%), (p=0.156, 95% CI -3% to 21%).

The total number of postoperative complications suffered per person demonstrated a trend reduction following service implementation (1.09 to 0.86 per person, p=0.181, CI -0.11 to 0.56). Complications suffered by patients admitted acutely were more frequent compared to those admitted electively (1.35 versus 0.71 per person, p<0.001, mean difference = 0.64, 95% CI 0.29 to 0.98). When evaluating complication frequency following service implementation in the elective patients, there was no significant reduction (0.63 to 0.79 per person, p=0.373, mean difference -0.16, 95% CI -0.60 to 0.19). However, when evaluating complication frequency in the acute patients following service implementation, there was a significant reduction (1.81 to 0.97 per person, p=0.01, mean difference = 0.84, 95% CI 0.21 to 1.46).

Utilising correlation analysis, age did not significantly correlate with LOS either pre-intervention (r= -0.11, p=0.171) nor post-intervention (r= -0.127, p=0.064). Likewise, age did not significantly correlate with frequency of complications either pre-intervention (r= -0.069, p=0.405) nor post-intervention (r= -0.120, p=0.122).

Discussion

This study has demonstrated beneficial effects resulting from routine, proactive, senior-led medical liaison to older multimorbid patients admitted under vascular surgery. Firstly, there was an overall trend reduction in LOS of 2.8 days with a significant reduction (7.84 days) in LOS for patients admitted for more than seven days. For patients admitted longer than seven days, 30-day readmission rates reduced by 8.9%. Secondly, there was a trend reduction in complication frequency following service implementation with significant reductions seen for patients admitted acutely. This may indicate that patients who gain most from such a service are those admittedly acutely, and those who sustain a long length of stay. Long length of stay is typically associated with complexity and complications, and it therefore plausible that medical liaison may be of most value in this patient group.

These findings, also mirrored in similar studies assessing the impact of geriatric liaison in orthopaedic, urological and gastrointestinal surgery, may reflect prompt recognition and management of postoperative complications and a proactive approach to postoperative goal-setting and discharge planning[9,11,15]. As Partridge et al established in their randomised control trial concerning patients scheduled for vascular surgery, CGA can provide an opportunity to recognise previously undiagnosed pathology across several domains including delirium and comorbidity[10].

This study included all patients aged 65 years and older admitted for one or more nights; this enhances the generalisability of our results. Few demographic differences were seen between the pre-intervention and post-intervention groups and none reached statistical significance. Notably, the potential benefits of length of stay reduction were not offset by increased readmission rates.

However, there are important limitations. These include the study design being retrospective and single centre with a focus on service development where there was reliance on the quality of clinical records to capture clinical details. To minimise this latter point, electronic records such as discharge letters were cross-referenced with the clinical notes to enhance accuracy. It was noted that discharge letters did not often comprehensively summarise key medical issues. Another limitation was that the service was delivered during normal working hours (0800-1700, Monday to Friday) and therefore results must be interpreted with the understanding that outside of these hours, a reactive method was adopted which was reliant on acute services such as the medical registrar.

In conclusion, these data indicate that existing RCT results demonstrating the benefits of proactive medical liaison for complex older patients undergoing vascular surgery may be reproduced in a service development

setting and can generate reductions in length of stay, complication frequency and readmission rates in selected patients. These effects reached statistical significance in patients admitted acutely and in those with longer lengths of stay. These clinical and economic advantages, which have previously been described in other surgical settings, indicate that long-term investment in medical liaison for complex patients admitted under vascular surgery may be justified[11]. This study has informed sustainability of the service and a model to be translated to other surgical specialities (recognising capacity-building as a priority). Further research to establish the wider-reaching effects such as provision of educational support to junior surgical doctors and the benefits of tri-directional learning amongst surgeons, anaesthetists and physicians would be useful to enable further care processes and services to evolve.

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Tables

Table 1. Demographics of adults aged 65 years and older admitted under vascular surgery in the pre- and post-intervention study groups. *Numbers presented are percentages with raw values in parentheses unless otherwise stated.*

	Pre-Intervention (n=171)	Pre-Intervention (n=171)	Post-Intervention (n=204)	Post-Intervention (n=204)	p value
Sex Male Female	Sex Male Female	64%(109) 36%(62)	64%(109) 36%(62)	66%(135) 34%(69)	0.622
Admission Type Emergency Elective	Admission Type Emergency Elective	47%(81) 53%(90)	47%(81) 53%(90)	50%(102) 50%(102)	0.612
Source of Admission Home Other Hospital Care Home	Source of Admission Home Other Hospital Care Home	79%(135) 16%(27) 5%(9)	79%(135) 16%(27) 5%(9)	79%(162) 18%(36) 3%(6)	0.422
Operation Type Carotid Endarterectomy Angiography/Embolectomy Bypass Amputation of Limb Endovascular AAA+ Open AAA Conservative Management Other	Operation Type Carotid Endarterectomy Angiography/Embolectomy Bypass Amputation of Limb Endovascular AAA+ Open AAA Conservative Management Other	11%(18) 25%(42) 16%(28) 11%(18) 13%(22) 4%(7) 13%(23) 7%(13)	11%(18) 25%(42) 16%(28) 11%(18) 13%(22) 4%(7) 13%(23) 7%(13)	9%(19) 30%(61) 10%(20) 9%(19) 13%(26) 6%(11) 16%(33) 7%(15)	0.638
Charlson Comorbidity Index Average Score	Charlson Comorbidity Index Average Score	6.16	6.16	6.29	0.684
Clinical Frailty Score Average Score	Clinical Frailty Score Average Score	4.08	4.08	4.27	0.058

Figure Legends

Figure 1. Kaplan-Meier Survival Curve. Reduction in length of stay (LOS) seen for patients admitted for longer than seven days (p=0.025, 95% CI for mean difference, 1.5-4 days).

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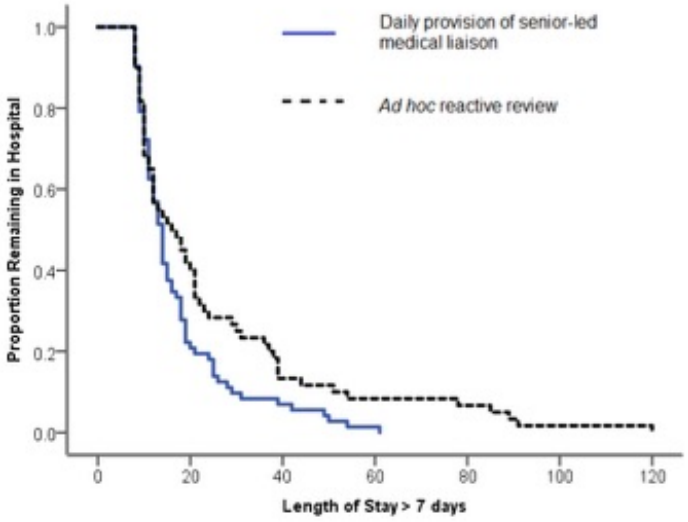

Life Table				
	Number in Hospital		Percentage in Hospital	
Day Number	Pre	Post	Pre	Post
7	60	72	100.0	100.0
16	54	65	90.0	90.3
17	49	57	81.7	79.2
18	41	52	68.3	72.2
19	39	45	65.0	62.5
20	34	41	56.7	56.9
21	33	37	55.0	51.4
22	32	30	53.3	41.7
23	31	27	51.7	37.5
24	30	25	50.0	34.7
25	29	24	48.3	33.3
26	27	20	45.0	27.8
27	25	16	41.7	22.2
28	24	15	40.0	20.8
29	20	14	33.3	19.4
30	19	14	31.7	19.4
31	18	14	30.0	19.4
32	17	13	28.3	18.1
33	17	10	28.3	13.9
34	17	9	28.3	12.5
36	17	8	28.3	11.1

Figure 1: *Kaplan-Meier Survival Curve. Reduction in LOS seen for patients admitted for >7 days (p=0.025, 95% CI for mean difference, 1.5-4 days)*