

Geriatric Perioperative Service Improves Healthcare outcomes

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Introduction

Perioperative geriatric medicine is a sub-specialty of geriatric medicine which refers to the management of older adults before, during, and after surgery. Cognitively impaired older persons are at increased risk of delirium and adverse healthcare outcomes, yet cognitive impairment is often unrecognized and not routinely assessed preoperatively in older surgical patients. Delirium, which is an acute confusional state secondary to an ongoing stressor, is an often-seen complication and together with underlying cognitive impairment, lead to adverse healthcare outcomes, including readmissions, increased length of stay, morbidity, and mortality^{1,2}.

Objective: To determine if a **geriatric perioperative service (GPS)** targeting the geriatric syndrome of cognitive impairment in the older perioperative population will improve 30day non-elective readmissions, 90day postoperative mortality and other healthcare outcomes.

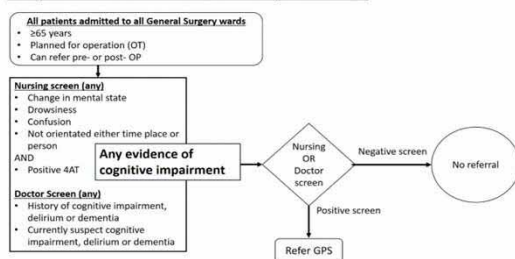
Methods

Design: A pragmatic before-after study of 50 patients from Apr 2023 until Dec 2024 with use of 75 historical controls obtained from a period just preceding the intervention from July 2022 to March 2023.

Inclusion/ Service criteria: Participants and controls need to fulfil 3 criteria (1) Patients aged 65 years and above, (2) undergoing major operating theatre surgery and (3) have diagnoses of either delirium, mild cognitive impairment, or dementia. Patients were referred via blue letter. (See Figure below, left).

Intervention: Patients fulfilling the criteria during the intervention period underwent two separate interventions simultaneously (1) geriatric consultation for consolidation of medical management; and (2) proactive geriatric and delirium-centered nursing management within the surgical wards using a delirium care bundle (Figure below, right).

How patients are referred to the Geriatric Perioperative Service.



Sengkang Hospital Delirium Care Bundle.

Cognitive stimulation	Reality orientation Therapeutic activities Minimise restraint use
Early Mobilisation	Review / prompt doctor to review unnecessary tubes and lines Sit out of bed if appropriate Supervised ambulation (to toilet whenever possible) Refer to Physiotherapist (if appropriate)
Addressing Sensory Impairment	Help patient to put on glasses (if available) Help patient to put on hearing aid (if available) Use amplifier if without hearing aid Maintain oral hygiene
Encouraging oral intake	Keep dentures clean & assist to put on for meals Assistance for those with poor oral intake, aspiration risk or unable to feed independently Refer to Speech Therapist (if appropriate) Refer to Dietitian (if appropriate)
Bladder and Bowel Care	Monitor Bowel Open, urine or if No Bowel Open > 2 days Timed toileting / voiding every 3-4 hours if continent Do bladder scan if No-pass-urine > 8 hours Aim to wear off diaper if not indicated
Ensure Safety	Falls precaution with bed exit alarm activated

Results and Discussion

Baseline characteristics: The intervention and historical controls had similar baseline characteristics. They had high comorbidity burden (CCI>7), had delirium and had cardiovascular comorbidities. Patients recruited into GPS were found to be frail (Average CFS 5.5 (1.1)) and referred postoperatively (N=39 (78.0%)). (Table 1)

Improved Healthcare outcomes: GPS led to reductions in 30day readmission, 90day postoperative mortality, acute coronary syndrome, arrhythmia & urinary tract infections (p<0.05). Length of stay improved by 4.5days. (Table 2)

Improved care process outcomes: We postulated that GPS led to improvement in care leading to healthcare outcomes. GPS is associated with markers of improved perioperative care such as earlier feeding, urinary catheter removals, with decreased dehydration episodes, inpatient general medicine consultations and reduction in Anticholinergic burden (ACB³) (p<0.05). (Table 3)

Table 1: Baseline Characteristics

Clinical Parameter	Before	GPS	P value
N	75	50	-
Mean age, yrs (SD)	77.3 (7.3)	79.0 (7.0)	.20
Male (%)	44 (58.7%)	33 (66.0%)	.41
Delirium (%)	36 (48.0%)	30 (60.0%)	.19
Abdominal surgery (%)	66 (88.0%)	40 (80.0%)	.20
Charlson Comorbidity Index (CCI)			
CCI >7 (%)	28 (37.3%)	26 (52.0%)	.10
Medical history			
Hypertension (%)	48 (64.0%)	39 (78.0%)	.09
Hyperlipidemia (%)	42 (56.0%)	34 (68.0%)	.18
Ischaemic heart disease (%)	21 (28.0%)	11 (22.0%)	.55
Polypharmacy (%)	61 (81.3%)	46 (92.0%)	.10

Table 2: Healthcare outcomes

Outcome, N (%)	Before	GPS	P value	Absolute risk difference	95% CI
30d non-elective readmission	22 (33.3%)	6 (14.0%)	.02	-18.7%	-34.8%, -4.0%
90day postoperative mortality	17 (22.7%)	4 (8.0%)	.05	-14.7%	-26.8%, -2.6%
Acute coronary syndrome (%)	17 (22.7%)	3 (6.0%)	.01	-16.7%	-23.2%, -5.1%
Arrhythmia (%)	20 (26.7%)	6 (12.0%)	.04	-14.7%	-28.1%, -1.2%
Congestive cardiac failure (%)	12 (16.0%)	2 (4.0%)	.04	-12.0%	-21.9%, -2.1%
Urinary tract infection (%)	13 (17.3%)	2 (4.0%)	.03	-13.3%	-23.5%, -3.2%
Non-elective Intensive Care Unit admissions (%)	21 (28.0%)	8 (16.0%)	.12	-12.0%	-26.4%, 2.4%
Median Length of stay, days (Interquartile range)	17.0 days (10 to 32.5)	12.5 days (6 to 22.8)	.10	-	-

Table 3: Process outcomes

Outcome, N (%)	Before	GPS	P value	Absolute risk difference	95% CI
Dehydration (%)	30 (40.0%)	7 (14.0%)	.002	-26.0	-40.7%, -11.3%
Nil by mouth for >72 hours (%)	32 (42.7%)	8 (16.0%)	.002	-26.7	-41.8%, -11.6%
Indwelling urinary catheter >72 hours (%)	50 (66.7%)	21 (42.0%)	.01	-24.7	-42.0%, -7.3%
Acute retention of urine (%)	6 (8.0%)	6 (12.0%)	.46	4.0	-6.9%, 14.4%
Bedridden for more than 48 hours (%)	31 (41.3%)	14 (28.0%)	.13	-13.3	-30.0%, 3.4%
Inpatient consultations, mean (SD) *	1.3 (1.6)	0.6 (0.9)	.01	-0.7	-1.14, -0.26
Reduction in ACB ±1 (%)#	14 (20.9)	22 (46.8)	.003	25.9%	8.6%, 43.2%

* Referrals excluding all Surgical Specialties, Anesthesiology, Interventional Radiology, Cardiology and Geriatrics.

30-day readmissions excludes inpatient mortalities, patients with elective readmissions and at-own-risk discharges.

Conclusion

In conclusion, our Geriatric Perioperative Service showed that it was effective in improving healthcare outcomes and demonstrated the improved care processes that led to these outcomes.

References

- Hewitt J, et al., The prevalence of cognitive impairment in emergency general surgery. Int J Surg. 2014 Oct;12(10):1031-5. doi: 10.1016/j.ijsu.2014.07.020. Epub 2014 Aug 14. PMID: 25128866.
- Chen L et al., Postoperative outcomes in older surgical patients with preoperative cognitive impairment: A systematic review and meta-analysis. J Clin Anesth. 2022 Sep;80:110883. doi: 10.1016/j.jclinane.2022.110883. Epub 2022 May 24. PMID: 35623265.
- Holler E, et al., Perioperative Anticholinergic Medication Use and Incident Dementia among Older Surgical Patients: a Retrospective Cohort Study using Real-World Data. Drugs Aging. 2025 Mar;42(3):235-243. doi: 10.1007/s40268-025-01185-6. Epub 2025 Feb 4. PMID: 39903336; PMCID: PMC11930629.