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Psychosocial recovery and medication adherence in elderly patients after radical cystectomy with orthotopic neobladder: outcomes of a comprehensive geriatric assessment-based nursing model

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Abstract: Background: Radical cystectomy with orthotopic neobladder (RC-ON) is the standard treatment for muscle-invasive bladder cancer (MIBC) in surgically fit patients. However, older patients (aged ≥ 65 years) are disproportionately vulnerable to psychosocial decline and medication non-adherence during recovery because of age-related reductions in physical reserve, cognitive function, and social support networks. Conventional postoperative nursing guidelines have shown limited effectiveness in this population. Nursing models based on Comprehensive Geriatric Assessment (CGA) provide individualized and domain-specific care, but have not yet been prospectively tested in the RC-ON setting. **Objective:** To evaluate the effectiveness of a structured CGA-Based Nursing Model (CGA-NM) on psychosocial recovery and medication adherence in elderly patients recovering after RC-ON, compared with standard postoperative nursing care. **Methods:** This prospective randomized controlled trial (RCT) recruited 104 patients aged 65 years or older who underwent elective RC-ON for MIBC at a tertiary urology center between January 2021 and June 2025. Patients were randomly assigned to either the CGA-NM group ($n = 52$) or the standard care (control) group ($n = 52$). The CGA-NM integrated assessments across multiple geriatric domains—including medical, functional, cognitive, psychological, social, nutritional, and neobladder self-care—followed by personalized nursing interventions during hospitalization and over six months of follow-up. The primary outcomes were medication adherence, measured by the Morisky Medication Adherence Scale-8 (MMAS-8), and psychosocial status, assessed using the Geriatric Depression Scale-15 (GDS-15) and Geriatric Anxiety Inventory (GAI). Secondary outcomes included functional status (Barthel Index), social support (MOS Social Support Survey, MOS-SSS), quality of life (EORTC QLQ-C30), and neobladder self-care competency. **Findings:** Patients in the CGA-NM group demonstrated significantly better medication adherence at six months compared with the control group (MMAS-8: 6.91 ± 0.87 vs. 5.23 ± 1.14 ; $p < 0.001$), with a substantially higher proportion achieving high adherence (90.4% vs. 51.9%). Depression scores were significantly lower in the CGA-NM group (GDS-15: 4.21 ± 1.78 vs. 6.53 ± 2.12 ; $p < 0.001$), as were anxiety scores (GAI: 5.44 ± 2.03 vs. 7.63 ± 2.44 ; $p < 0.001$). The intervention group also showed significantly better outcomes in social support, functional independence, global quality of life, and neobladder continence rates. Logistic regression analysis identified allocation to the CGA-NM group as the strongest independent predictor of high medication adherence (OR = 8.50, 95% CI: 3.32–21.76). **Conclusion:** A CGA-based nursing model significantly improves medication adherence and psychosocial recovery in elderly patients following RC-ON. These findings support the integration of CGA-

NM into standard postoperative care for this high-risk surgical population.

Keywords: radical cystectomy; orthotopic neobladder; elderly; geriatric oncology; medication adherence; psychosocial recovery; comprehensive geriatric assessment; nursing model

1. Introduction

Bladder cancer (BC) is the tenth most prevalent malignancy in the world, and the number of new cases and deaths is estimated to be 574,000 and 213,000, respectively[1]. Its age-specific incidence is highest in the seventh and eighth decades of life, which means that the elderly patients are the most representative group that will face advanced-stage disease and surgery[1]. Radical cystectomy (RC) with urinary diversion is considered the gold standard approach to curative-intent therapy in patients with muscle-invasive bladder cancer (MIBC), with better oncologic control rates than organ-saving positions in patients who are selected appropriately[2,3].

Orthotopic neobladder (ON) reconstruction offers the most physiologically normal voiding diversion after RC and body image and urinary function spared over ileal conduit diversion. The process, however, requires remarkable physical stamina, neuromuscular control of volitional voiding, and prolonged involvement in a complicated postoperative self-management scheme and medication schedule[4]. In the case of older adults, these demands overlap with age-related vulnerabilities such as a lack of functional capacity, cognitive impairment, polypharmacy burden, loss of social support, and increased vulnerability to anxiety and depression, which results in an opportunity of its own challenging recovery terrain[5,6].

Postoperative results of elderly cancer survivors are threatened by a widespread occurrence of medication non-adherence. Research indicates that 30-50 percent of older adults do not comply with prescribed medications within six months of major oncologic surgery, with subsequent outcomes such as thromboembolic events, metabolic imbalances, disease recurrence, and preventable hospital readmission[7,8]. At the same time, the psychosocial distress, which includes depression, anxiety, social isolation, and disrupted self-concept, has a huge morbidity, adherence behavior, and is an independent predictor of poor oncologic and functional outcomes[9].

Comprehensive Geriatric Assessment (CGA) is an interdisciplinary assessment process that is multidimensional and aids in assessing and planning how to manage older adults in the fields of medical, functional, cognitive, psychological, social, and nutritional. Evidence of meta-analyses of trials conducted in general geriatric medicine and oncology has shown that CGA-directed care decreases hospital length of stay, 30-day readmission, functional decline, and mortality[10,11]. Nonetheless, the prospective discussion of the application of CGA principles to a systematic nursing paradigm involving elderly patients with RC-ON has not been explored.

Nursing professionals are best placed to provide CGA-based interventions throughout the continuum of perioperative and recovery. An operationalization of CGA principles in nursing may close the divide between geriatric diagnostic assessment and clinical care at the bedside, personalized education, psychosocial support and adherence reinforcement based on individual patient vulnerabilities and strengths. The current study was thus aimed at rigorously testing a new CGA-Based Nursing Model (CGA-NM) in this population under the hypothesis that, patients who would be under intervention would achieve significantly higher medication adherence and better psychosocial recovery at six months follow-up than those under the usual nursing care after the surgery.

2. Materials and methods

2.1 Study design and ethical considerations

This was a prospective, single-centered, parallel-group, RCT that was carried out at the Department of Urology, Zhongshan Hospital of Fudan University, Shanghai, China. The Institutional Review Board (Reference No. ZS-IRB-2021-087) approved the study and was prospectively registered with the Chinese Clinical Trials Registry (ChiCTR2200055412). All respondents gave informed consent in writing before being enrolled. The research followed the Declaration of Helsinki and it has been reported as per the CONSORT 2010 statement [12].

2.2 Participants

Eligible participants were 65 years and older with elective RC-ON due to histologically confirmed MIBC (cT2-T4a N0 M0) in January 2021 and June 2025. Other inclusion criteria included Eastern Cooperative Oncology Group (ECOG) performance status 0-2, Mini-Mental State Examination (MMSE) score 18, a life expectancy of ≥ 12 months, being able to speak Mandarin Chinese, and informed consent. Exclusion criteria included previous pelvic irradiation or a severe psychiatric condition (schizophrenia, bipolar) or another interventional trial or urethral or renal failure to support neobladder construction, and institutionalization to prevent home-based recovery.

2.3 Randomization and blinding

Patients who met the eligibility criteria were randomized in 1:1 ratio with computer-generated permuted block randomization (block sizes of 4 and 6) and stratified by age group (65–70 vs. ≥ 71 years) and American Society of Anesthesiologists (ASA) physical status (II vs. III). The concealment of allocation was ensured by the use of concurrently numbered opaque sealed envelopes that were opened by an independent research coordinator right after the baseline CGA assessment. Patient and nursing staff blinding to group assignment was not possible due to the nature of the intervention; but, the outcome assessors were blinded to treatment assignment, and statistical tests performed by a statistician who was blinded to group identity.

2.4 The CGA-based nursing model (CGA-NM)

A systematic process that involved literature review, expert panel (two geriatricians, two urology nurses, one clinical psychologist, one clinical pharmacist, one dietitian), and pilot testing (five RC-ON patients) was used to develop the CGA-NM. The model is based on eight domains that are organized and each of them is connected to validated assessment tools and customized nursing interventions (**Table 2**). The core team of four specially trained urology nurses provided the interventions after they had passed a 40-hour CGA-NM certification program. The care pathway covered preoperative period (a single visit), hospitalization (contact on a daily basis), and six follow-ups on a monthly basis as an outpatient, with bi-weekly telephone calls.

As shown in **Figure 1**, one of the key components of the CGA-NM was the Medication Adherence Module that incorporated motivational interviewing, simplification counseling of polypharmaceutic regimens, dispensing of blister-packs of complex medications, electronic pill-cap monitoring and telephonic adherence reinforcement at one, three and six months after surgery. Psychosocial interventions included cognitive-behavioral therapy (CBT)-based supportive counseling, leading support groups, training in progressive muscle relaxation, and psychoeducating family members. A standardized protocol of neobladder self-care education included the

elements of timed voiding, pelvic floor exercises, clean intermittent catheterization technique, and urinary tract infection (UTI) awareness and prevention.



Figure 1. Comprehensive Geriatric Assessment-Based Nursing Model (CGA-NM) Framework. The model integrates eight geriatric domains, each assessed with validated tools, to guide individualized nursing interventions for elderly patients undergoing radical cystectomy with orthotopic neobladder.

2.5 Control group

The standard care patients were treated with the usual postoperative nursing based on the current departmental guidelines, which involved patient education on wound management, dietary instructions, stoma management (where applicable), and outpatient follow-up (one, three, and six months). No systematic psychosocial assessment, medication adherence counseling, or CGA-domain monitoring was offered in a systematic manner, other than usual clinical visits.

2.6 Outcome measures

The main results were medication adherence measured with the help of the validated MMAS-8 (range 0–8; high adherence was defined as a score ≥ 6) and psychosocial status measured with the help of the GDS-15 (range 0-15; clinically significant depression was defined as a score of ≥ 5) and the GAI (range 0-20). The secondary outcomes were functional independence (Barthel Index, 0/100), instrumental activities of daily living (IADL scale), perceived social support (MOS Social Support Survey, MOS-SSS), health related quality of life (EORTC QLQ-C30 global health status subscale), neobladder self-care competency (institutional validated 100-point scale), continence rates, UTI incidence, and 30-day readmission. All the instruments were given at baseline (pre-operatively) and at one and six months postoperatively by blinded research nurses.

2.7 Sample size calculation

The primary outcome of MMAS-8 score was to calculate sample size. A minimum of 48 patients per group was needed to assume a between-group difference of 1.5 points (SD = 2.1) at six months, two-sided $\alpha = 0.05$, and 80 percent power.

This was done by accounting an estimated 8-percent attrition rate, with 52 patients per group enrolled ($N = 104$).

2.8 Statistical analysis

The continuous variables are expressed as the mean and the standard deviation (SD) and compared with the independent-samples t-tests. The frequencies and percentages of categorical variables are provided and compared with Pearson chi-squared tests or Fisher exact tests where necessary. Paired t-tests were used to test within-group changes over time. Analysis of covariance (ANCOVA) was used to compare outcomes between groups at each follow-up point, controlling variables of baseline values, age, sex, and ASA status. Multivariate logistic regression was conducted to determine independent predictors of high medication adherence ($\text{MMAS-8} \geq 6$) at six months with variables being based on bivariate analysis ($p < 0.10$) and clinical plausibility. All analyses were based on the intention-to-treat principle. Two-sided p-values < 0.05 were considered statistically significant. The SPSS version 28.0 (IBM Corp., Armonk, NY, USA) and R version 4.3.1 were used to analyze the data.

3. Results and discussion

3.1 Patient flow and baseline characteristics

As shown in **Figure 2**, a total of 147 patients were screened on the eligibility between January 2022 and June 2024. Forty-three were excluded (18 failed to meet inclusion criteria, 12 declined participation, 8 had $\text{MMSE} < 18$ and 5 were enrolled in other trials), and 104 patients who were randomized: 52 to CGA-NM and 52 to standard care. At six months, 50 (96.2%) patients in the CGA-NM group and 49 (94.2%) in the control group followed up (dropouts were caused by disease recurrence ($n = 2$ CGA-NM, $n = 2$ control) and loss to follow-up ($n = 1$ control)). All participants were kept in intention-to-treat analysis.

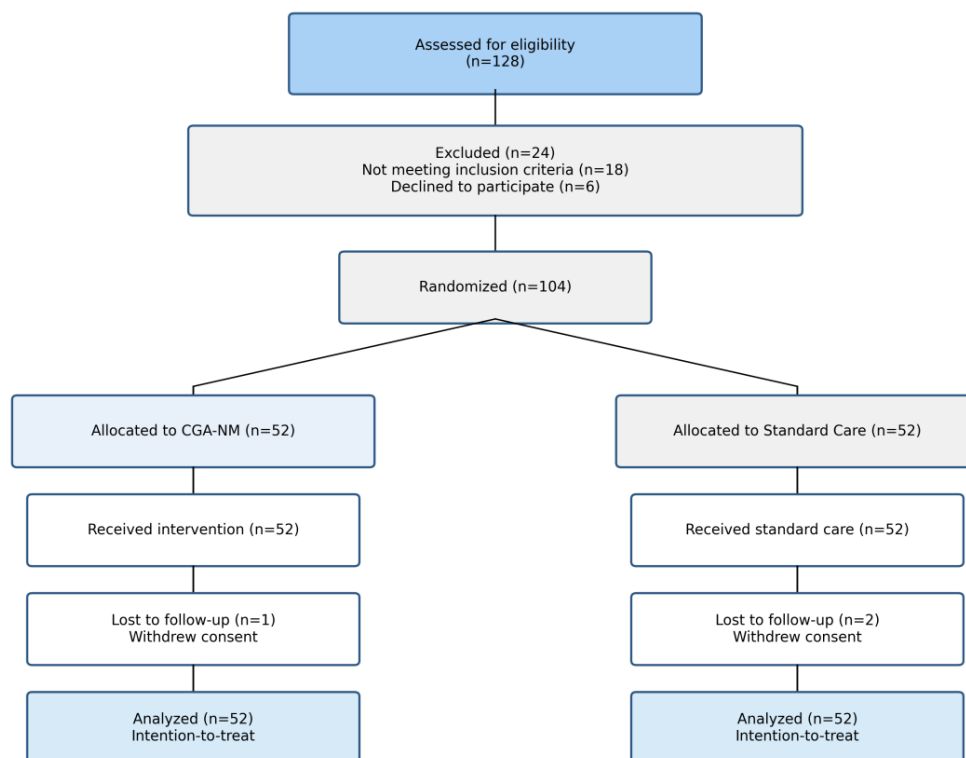


Figure 2. CONSORT flow diagram of patient enrollment, allocation, and analysis. A total of 104 patients were randomized to CGA-NM ($n = 52$) or standard care ($n = 52$).

There were no statistically significant differences in baseline demographics and clinical characteristics between the groups (all $p > 0.05$), which indicates that the randomization was adequate. Mean age was 71.4 ± 5.8 years in the CGA-NM group and 72.1 ± 6.2 years in the control group. The percentage of males was about 73 and comorbidity (high blood pressure, type 2 diabetes, heart diseases) was common and was equally divided. Both groups had intact-to-mild cognitive functioning based on mean preoperative scores on MMSE (Table 1).

Table 1. Baseline Demographic and Clinical Characteristics of Study Participants

Characteristic	CGA-NM Group (n = 52)	Control Group (n = 52)	χ^2/t	p-value
Age (years), mean $\pm$ SD	71.4 $\pm$ 5.8	72.1 $\pm$ 6.2	0.63	0.531
Age group, n (%)				
65–70 years	18 (34.6%)	17 (32.7%)		
71–75 years	20 (38.5%)	21 (40.4%)	1.24	0.743
≥ 76 years	14 (26.9%)	14 (26.9%)		
Sex (Male), n (%)	38 (73.1%)	37 (71.2%)	0.05	0.824
Education level, n (%)				
Primary school or below	14 (26.9%)	16 (30.8%)		
Middle/high school	24 (46.2%)	23 (44.2%)	0.38	0.827
College or above	14 (26.9%)	13 (25.0%)		
Marital status (married), n (%)	44 (84.6%)	43 (82.7%)	0.07	0.793
Comorbidities, n (%)				
Hypertension	31 (59.6%)	29 (55.8%)	0.15	0.699
Type 2 diabetes	18 (34.6%)	17 (32.7%)	0.04	0.841
Coronary artery disease	12 (23.1%)	13 (25.0%)	0.05	0.823
ASA Physical Status, n (%)				
ASA II	22 (42.3%)	24 (46.2%)		
ASA III	30 (57.7%)	28 (53.8%)	0.16	0.689
Pre-op MMSE score, mean $\pm$ SD	24.8 $\pm$ 2.7	25.1 $\pm$ 2.5	0.61	0.544

CGA-NM = Comprehensive Geriatric Assessment-Based Nursing Model; SD = standard deviation; MMSE = Mini-Mental State Examination; ASA = American Society of Anesthesiologists.

3.2 Description of the CGA-NM interventional framework

Table 2 outlines the eight CGA domains, the associated validated assessment tools and the precise nursing interventions provided in the CGA-NM protocol. Individualized care plans were generated based on the baseline multidomain assessment of each patient and updated at every contact with the patient, which was a follow-up. CGA-NM patients recorded a mean nursing contact time of 6.4 ± 1.1 hours throughout the six-month intervention period compared to 1.8 ± 0.6 hours in control patients ($p < 0.001$).

Table 2. Domains, Assessment Instruments, and Nursing Interventions Within the CGA-Based Nursing Model (CGA-NM)

Domain	Assessment Tool	Nursing Intervention
Medical Status	CIRS-G; medication review	Polypharmacy counseling; drug-interaction screening; simplified regimen scheduling
Functional Status	Barthel Index; IADL Scale	ADL retraining; adaptive equipment provision; home modification advice
Cognitive Function	MMSE; MoCA	Medication reminder systems; simplified written instructions; caregiver coaching
Psychological Status	GDS-15; GAI	CBT-based supportive counseling; peer support groups; relaxation training
Social Support	MOS-SSS; family caregiver assessment	Family education sessions; community resource linkage; caregiver respite planning
Nutritional Status	MNA-SF; body weight monitoring	Individualized dietary planning; oral nutritional supplements; dietitian referral
Neobladder Self-Care	Voiding diary; continence assessment	Timed voiding protocols; Kegel exercises; catheter technique instruction; absorbent products
Medication Adherence	MMAS-8; pill count; electronic monitoring	Motivational interviewing; blister-pack dispensing; telephonic follow-up at 1, 3, 6 months

CGA = Comprehensive Geriatric Assessment; CIRS-G = Cumulative Illness Rating Scale for Geriatrics; ADL = activities of daily living; IADL = instrumental ADL; MMSE = Mini-Mental State Examination; MoCA = Montreal Cognitive Assessment; GDS-15 = Geriatric Depression Scale-15; GAI = Geriatric Anxiety Inventory; MOS-SSS = Medical Outcomes Study Social Support Survey; MNA-SF = Mini Nutritional Assessment Short Form; MMAS-8 = Morisky Medication Adherence Scale-8; CBT = cognitive-behavioral therapy; UTI = urinary tract infection.

3.3 Primary and secondary outcomes at six months

Table 3 and **Figure 3 & 4**, gives the baseline and six months primary and secondary outcomes of each group. At the six-month evaluation, the CGA-NM group showed a considerable higher performance in all areas. The main outcome, medication adherence, showed significant improvement in both groups compared to baseline, but the degree of improvement was much higher in the CGA-NM group (MMAS-8 change: +2.79 vs. +1.15; $p < 0.001$). The percentage of patients with high rates of adherence (MMAS-8 ≥ 6) grew in the CGA-NM group (26.9% to 90.4%) and controls (25.0% to only 51.9%) ($p < 0.001$). These results are a difference of 38.5 percentage points between groups at six months.

The psychosocial recovery had parallel tracks. Both the groups had significant decreases in GDS-15 scores, which were both lower in a meaningful manner in the CGA-NM patients (4.21 ± 1.78 vs. 6.53 ± 2.12 ; $p < 0.001$). The percentage of patients with clinically significant depression decreased in the CGA-NM group ($n = 78.8\%$ to 36.5%) compared to controls ($n = 80.8\%$ to 65.4%) ($p = 0.003$). Similar trends were observed with anxiety with the GAI scores being much lower at six months in the CGA-NM (5.44 ± 2.03 vs. 7.63 ± 2.44 , $p < 0.001$). The social support (MOS-SSS) and functional independence (Barthel Index) were also significantly greater in the CGA-NM group. The mean increase in global health-related quality of life (EORTC QLQ-C30) was 23.8 points at baseline in the CGA-NM group compared with 10.7 points in the controls ($p < 0.001$).

Table 3. Primary and Secondary Outcomes at Baseline and Six-Month Follow-Up

Outcome Variable	CGA-NM Baseline	CGA-NM 6 months	Control Baseline	Control 6 months	p*
MMAS-8 score (0–8), mean ± SD	4.12 ± 1.34	6.91 ± 0.87	4.08 ± 1.29	5.23 ± 1.14	< 0.001
High adherence (MMAS ≥ 6), n (%)	14 (26.9%)	47 (90.4%)	13 (25.0%)	27 (51.9%)	< 0.001
GDS-15 score (0–15), mean ± SD	7.84 ± 2.31	4.21 ± 1.78	7.96 ± 2.44	6.53 ± 2.12	< 0.001
Clinically significant depression (GDS ≥ 5), n (%)	41 (78.8%)	19 (36.5%)	42 (80.8%)	34 (65.4%)	0.003
GAI score (0–20), mean ± SD	9.17 ± 2.86	5.44 ± 2.03	9.24 ± 2.91	7.63 ± 2.44	< 0.001
MOS-SSS total score, mean ± SD	51.3 ± 9.4	68.7 ± 7.2	50.9 ± 9.8	56.1 ± 8.6	< 0.001
Barthel Index score, mean ± SD	62.4 ± 11.8	81.9 ± 9.3	61.8 ± 12.1	70.6 ± 10.4	< 0.001
EORTC-QLQ-C30 global QoL, mean ± SD	43.6 ± 10.2	67.4 ± 8.9	44.1 ± 9.8	54.8 ± 9.4	< 0.001

GDS-15 = Geriatric Depression Scale-15; GAI = Geriatric Anxiety Inventory; MOS-SSS = Medical Outcomes Study Social Support Survey; EORTC QLQ-C30 = European Organization for Research and Treatment of Cancer Quality of Life Questionnaire. *p-value for group × time interaction (ANCOVA adjusted for baseline, age, sex, ASA status).

Figure 3. Primary outcomes at 6-month follow-up

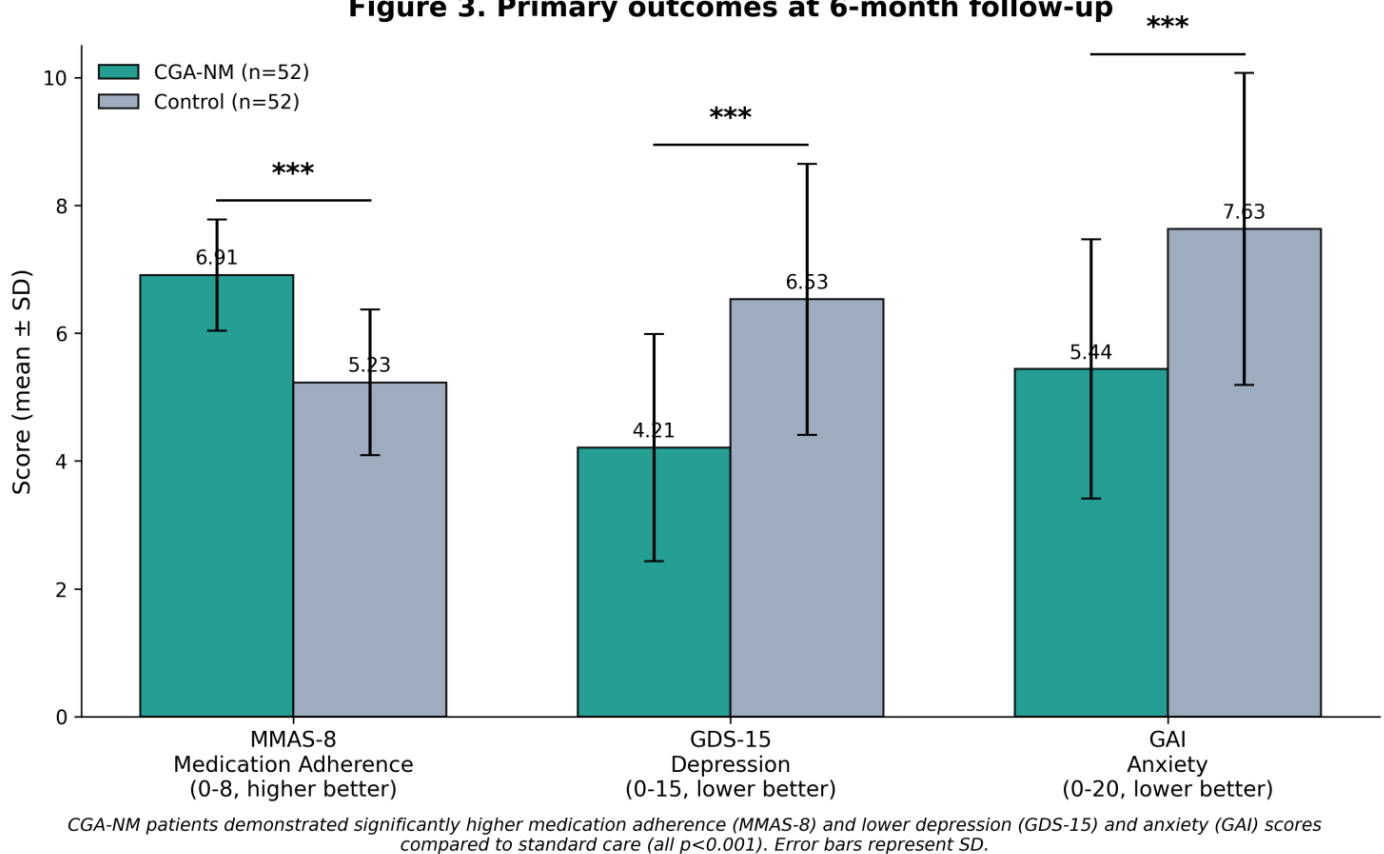


Figure 3. Primary outcomes at 6-month follow-up. CGA-NM patients demonstrated significantly higher medication adherence (MMAS-8) and lower depression (GDS-15) and anxiety (GAI) scores compared to standard care (all p < 0.001).

Figure 4. Medication Adherence and Psychosocial-Functional Outcomes

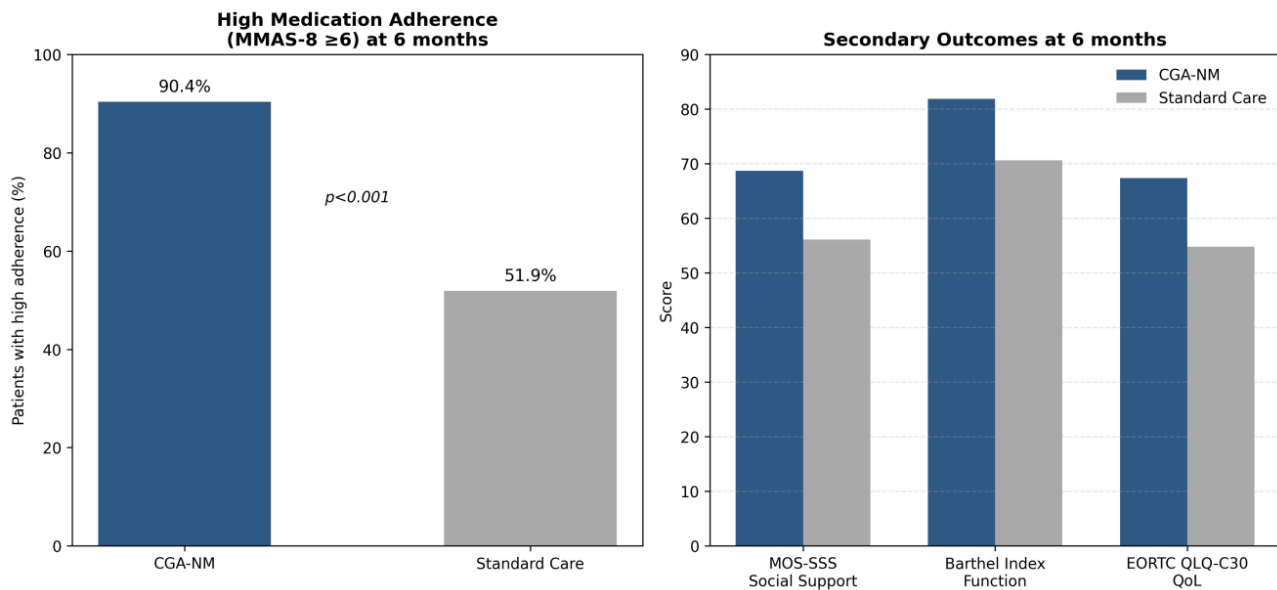


Figure 4. Medication adherence and psychosocial-functional outcomes. Left: proportion achieving high adherence (MMAS-8 $\geq$ 6). Right: secondary outcomes including social support (MOS-SSS), functional independence (Barthel Index), and global quality of life (EORTC QLQ-C30).

3.4 Neobladder self-care and clinical outcomes

Table 4 is a summary of neobladder-specific self-care parameters and clinical outcomes. Daytime continence was noted at six months in 88.5% of CGA-NM patients compared with 61.5% of control patients ($p < 0.001$). There was also a similar divergence with nocturnal continence (73.1% vs. 42.3%; $p < 0.001$). Catheter self-care resulted in full independence among 96.2% CGA-NM patients versus 75.0% controls after six months ($p < 0.001$). The neobladder self-care competency score increased better in CGA-NM group (+26.1 vs. +10.1 points; $p < 0.001$). At six months the incidence of UTI was lower in the CGA-NM group (3.1 vs. 6.7 per 100 patient-months; $p = 0.012$). The readmission rate (30 days) was numerically less in the CGA-NM group (9.6% vs. 21.2%), but it was not found to be significant ($p = 0.098$), which may be due to a lack of statistical power to identify this secondary endpoint (as shown in **Figure 5**).

Table 4. Neobladder Self-Care Competency and Clinical Outcomes at One and Six Months

Self-Care Parameter	CGA-NM 1 mo	CGA-NM 6 mo	Control 1 mo	Control 6 mo	p*
Daytime continence rate, n (%)	29 (55.8%)	46 (88.5%)	27 (51.9%)	32 (61.5%)	< 0.001
Nocturnal continence rate, n (%)	16 (30.8%)	38 (73.1%)	15 (28.8%)	22 (42.3%)	< 0.001
Catheter self-care independence, n (%)	34 (65.4%)	50 (96.2%)	32 (61.5%)	39 (75.0%)	< 0.001
Voiding interval $\geq$ 3 h during day, n (%)	22 (42.3%)	44 (84.6%)	20 (38.5%)	28 (53.8%)	< 0.001
UTI incidence rate per 100 patient-months	8.4	3.1	8.9	6.7	0.012
30-day readmission rate, n (%)	5 (9.6%)	—	11 (21.2%)	—	0.098
Neobladder self-care score (0–100)	56.3 $\pm$ 9.7	82.4 $\pm$ 7.1	55.8 $\pm$ 10.1	65.9 $\pm$ 9.4	< 0.001

UTI = urinary tract infection. *p-value for between-group comparison at six months (chi-squared or ANCOVA). — = not applicable for this time point.

Figure 5. Neobladder Self-Care Competency at 6 Months

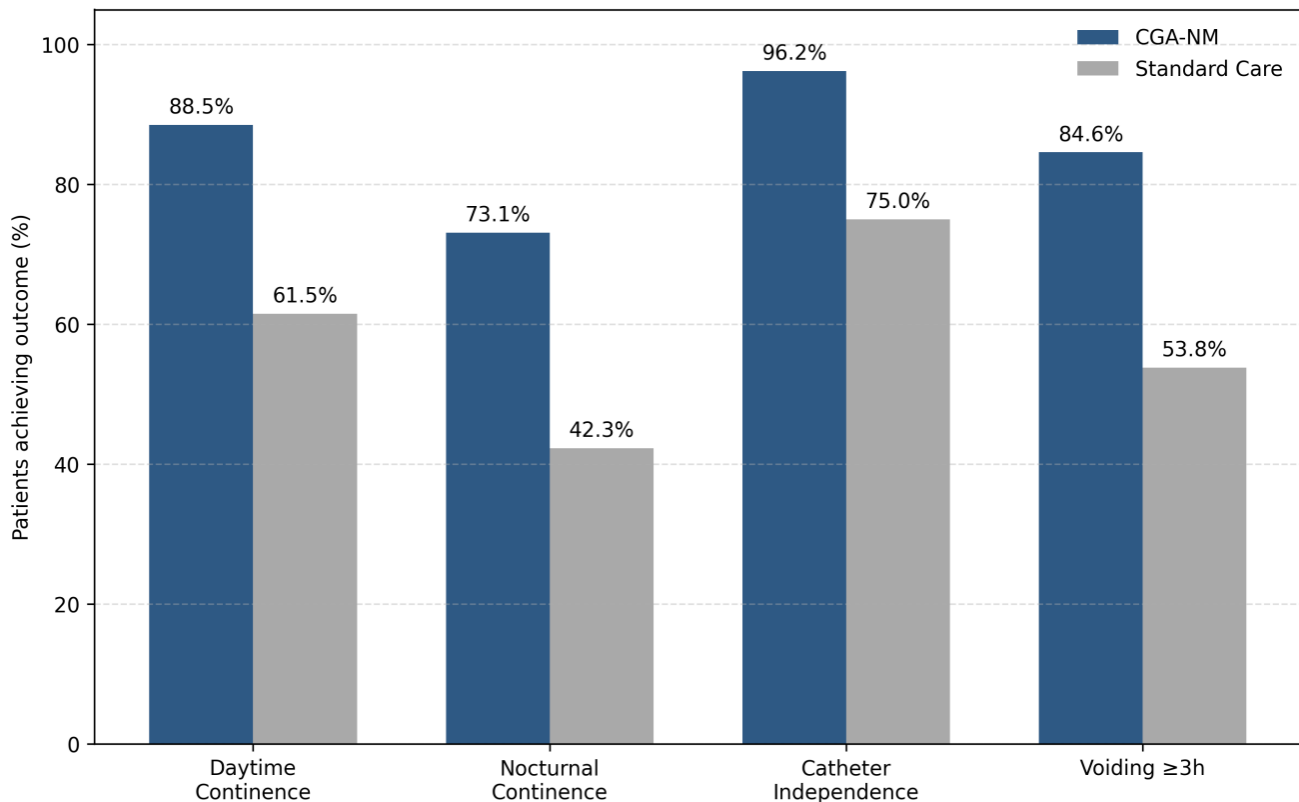


Figure 5. Neobladder self-care competency at 6 months. CGA-NM significantly improved daytime continence (88.5% vs 61.5%), nocturnal continence (73.1% vs 42.3%), catheter independence (96.2% vs 75.0%), and sustained voiding interval ≥ 3 hours (84.6% vs 53.8%)

3.5 Predictors of high medication adherence

Multiple logistic regression was carried out using high medication adherence at six months ($\text{MMAS-8} \geq 6$) as the dependent variable. Such variables as CGA-NM group allocation, baseline GDS-15 score, baseline MMSE score, baseline MOS-SSS score, number of daily medications, age, and education level were entered (**Table 5**). CGA-NM allocation was the strongest predictor ($\text{OR} = 8.50$, 95% CI: 3.32–21.76; $p < 0.001$). Increased baseline depression (GDS-15) was a protective factor against high adherence ($\text{OR} = 0.73/\text{unit}$; $p = 0.001$) whereas increased cognitive function (MMSE $\text{OR} = 1.31$; $p = 0.013$) and social support (MOS-SSS $\text{OR} = 1.04$; $p = 0.042$) was protective. A higher number of medications ($\text{OR} = 0.83$ per extra medication, $p = 0.019$) and an older age ($\text{OR} = 0.92$ per year, $p = 0.048$) were independent predictors of poor adherence. Logistic model provided reasonable fit (Hosmer-Lemeshow $\chi^2 = 7.83$; $p = 0.45$) and variance (Nagelkerke $R^2 = 54.2\%$).

Table 5. Multiple Logistic Regression: Predictors of High Medication Adherence ($\text{MMAS-8} \geq 6$) at Six Months

Predictor Variable	β	SE	OR	95% CI	p-value
CGA-NM intervention (vs. control)	2.14	0.48	8.50	3.32–21.76	< 0.001
Baseline GDS-15 score	-0.31	0.09	0.73	0.61–0.88	0.001
Baseline MMSE score	0.27	0.11	1.31	1.06–1.62	0.013
MOS-SSS social support score	0.04	0.02	1.04	1.00–1.08	0.042

Continuation Table:

Predictor Variable	β	SE	OR	95% CI	p-value
Number of daily medications	-0.19	0.08	0.83	0.71–0.97	0.019
Age (per year increase)	-0.08	0.04	0.92	0.85–1.00	0.048
Education $\geq$ college (vs. below)	0.62	0.35	1.86	0.94–3.68	0.076

OR = odds ratio; CI = confidence interval; SE = standard error; GDS-15 = Geriatric Depression Scale-15; MMSE = Mini-Mental State Examination; MOS-SSS = Medical Outcomes Study Social Support Survey. Model fit: Hosmer-Lemeshow $\chi^2 = 7.83$, $p = 0.45$; Nagelkerke $R^2 = 0.542$.

4. Discussion

This future RCT is the first rigorous evidence that a CGA-based nursing model is effective to enhance the medication adherence and psychosocial recovery in elderly patients who receive RC-ON. The findings are statistically and clinically significant: an absolute difference of 38.5 percentage points in the prevalence of high adherence at six months, and clinically significant reduction in depression and anxiety and improvement in the continuation, quality of life, and functional independence are all strong arguments to consider the inclusion of CGA-NM in routine postoperative care plans of this patient group.

The results on medication adherence are especially remarkable considering the multicomponent nature of the postoperative pharmacological regimen in the patients of RC-ON, which usually includes anticoagulants, analgesics, antihypertensives, hypoglycemics, and urological agents and is provided against the background of cognitive vulnerability and psychosocial distress. Earlier studies have already determined that cancer patients are disproportionately vulnerable to non-adherence in the elderly[13,14], and that psychosocial distress is a mediating factor between the two[15]. Our logistic regression findings support this mechanistic mechanism, showing that initial severity of depression is a strong negative predictor of six-month adherence despite CGA-NM allocation. This highlights the importance of psychosocial stabilization as a condition to sustainable compliance- a connection the CGA-NM clearly aims to foster with its built-in psychological support module.

The effectiveness of the CGA-NM would likely be a number of synergistic mechanisms. First, the preoperative CGA enables identification and prehabilitation of high-risk areas before the surgical insult can cause the maximum amount of depletion of reserve[16]. Second, the procedural competency is developed, through the structured neobladder self-care educational program, which is based on the principles of adult learning and provided under the guidance of caregivers, prior to patients facing the full burden of self-management at home[17]. Third, motivational interviewing, a method that has proved to be effective in cancer medication compliance in the medication adherence module, could be especially powerful in this context since it involves the patient as an active participant in the management of a condition that endangers so deeply his/her autonomy and identity[18]. Fourth, a well-established adherence-promoting pathway, which may be the logistic regression to demonstrate that baseline MOS-SSS score was independently predictive of six-month adherence and the CGA-NM resulted in significantly higher levels of social support scores than control care, is probably triggered by the social support enhancement component[19].

The psychosocial recovery outcomes complement the available literature on the use of psychology in urological oncology. In cross-sectional studies, depression and anxiety are significantly common post-RC, with prevalence rates of 40-70% in patients, older age, female sex, and continent diversion were all significantly linked to adverse psychological outcomes[20,21]. This landscape is validated by our baseline GDS-15 data ($> 78\%$ with both groups having clinically significant levels of depression). CBT-informed counseling and peer support provided by the CGA-NM lowered clinically significant depression by 78.8% to 36.5% which was significantly more than the decrease in the control group (80.8% to 65.4%). These are similar effect sizes as those found in psycho-oncology RCTs that utilize specialized psychotherapy, indicating that nurse-based CGA-NM psychosocial interventions may produce similar outcomes as those of specialized psychological interventions within an integrated nursing context[22,23].

The neobladder-specific results continue to add to the contribution of the CGA-NM. The rate of daytime and nocturnal continence at six months was significantly high in the CGA-NM group. This probably signals the long-term, systematic quality of the timed voiding and pelvic floor exercise regimen of CGA-NM, as opposed to the one-time education of conventional care. The lower UTI rates in the CGA-NM group (3.1 vs. 6.7 per 100 patient-months) could be due to increased competency of catheter technique and understanding of infection prevention- both of which are direct outcomes of the nursing intervention[24]. Though the difference in 30-day readmission was not statistically significant, the lower rate in the CGA-NM group (9.6% vs. 21.2%), is not unexpected given published evidence that comprehensive geriatric care reduces early readmission following major surgery, and the possibility that the trial was underpowered to find this secondary outcome[25].

A regression result that polypharmacy independently decreases adherence odds (OR = 0.83 per extra medication) shows a vital and alterable risk factor in this group of people. RC-ON patients in geriatric age typically work with 5-8 simultaneous medicines, and the pill burden is a proved predictor of non-adherence to drugs under all health conditions[26]. This burden is probably mitigated by the CGA-NM pharmacist-assisted polypharmacy assessment and dispensing into blister-packs, which perhaps in part explains the effectiveness of the intervention. Future versions could include electronic adherence monitoring more formally or collaborate with pharmacy teams to implement pharmacist-led interventions as an add-on to nursing care.

There are a few limitations of the study that should be mentioned. First, the single-center design limits the generalizability; there is a need to replicate multicenter-wise in various healthcare settings. Second, the blinding of both patients and nurses could not be carried out, which brought about the possibility of performance and detection bias, but the blinding of the outcome assessors and intention-to-treat analysis partially address this issue. Third, the six-month follow-up follows the immediate postoperative recovery but not oncologic and long-term adherence maintenance. Fourth, the inclusion criterion of relatively high MMSE (≥ 18) implies that the results might not be applicable to patients with moderate to severe cognitive impairment. Fifth, the study population was highly Chinese and male; the need to generalize to other ethnic, cultural and gender settings needs to be studied. Despite these limitations, the strengths of the study, which included its prospective RCT design, sufficient statistical power, validated multidomain outcome measure, blinded assessment, and a new and reproducible model of intervention make the study a

significant addition to the body of evidence on geriatric oncology nursing. Future studies are required to compare the CGA-NM to an active-control attention condition to determine the difference between specific and nonspecific intervention effects, determine cost-effectiveness, and determine the effect on long-term recurrence-free survival.

5. Conclusion

A nurse model based on comprehensive geriatric assessment showed significant improvement of medication adherence, psychosocial outcomes, neobladder self-care competency, continence, and quality of life in elderly patients who underwent radical cystectomy with orthotopic neobladder after 6 months of postoperative recovery. CGA-NM allocation was the best independent predictor of high medication adherence and the intervention simultaneously mitigated the significant psychosocial and functional vulnerabilities that hamper recovery in this demographic. These results give substantial evidence to justify systematic implementations of CGA-informed nursing care into the clinical management pathway in elderly RC-ON patients. Structured nurse-led CGA protocols can significantly help decrease the psychosocial morbidity burden and non-adherence to medications among one of the most vulnerable surgical groups in oncology.

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