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Hospitalist Co-Management of Urethroplasty Patients in an Academic Center: Implementation of a Standardized Postoperative Care Model

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Abstract: Objectives: to evaluate whether hospitalist co-management would lead to improved outcomes and value in patients undergoing urethroplasty (UPL) with a single surgeon for urethral stricture disease (USD). Material: A co-management model with hospitalists was introduced in August 2019 for all patients undergoing UPL for USD with a single surgeon in a United States teaching center. The hospitalist worked closely with the urologic surgeon and the support staff. The hospitalist managed post-operative concerns, such as pain and comorbidities, as well as conducted rounds with the urological team for disposition planning and addressing interdisciplinary needs. Retrospective analysis compared a 42-month period before initiation of co-management (Jan 2016–July 2019) with a 32-month period after initiation (Aug 2019–March 2022). Outcomes assessed were recurrence of stricture, complications, length of stay, readmission, and emergency room visits. Results: A total of 135 patients (71 surgeon-managed, 64 co-managed) underwent urethroplasty from January 2016 to March 2022. Hospitalist co-management did not affect complications, length of stay, readmission, and emergency room visits. Accounting for confounding variables using multivariable analysis, no factors were independently associated with recurrence. There were no demographic, comorbidity, or American Society of Anesthesiologists (ASA) score differences between the two groups. Conclusions: This study suggests that hospitalist care for patients undergoing urethroplasty may be non-inferior to surgeon care, based on similar outcomes between the two groups. There were no significant differences in the total length of stay or blood pressure readings, and the complication rates and hospital readmission rates were also similar.

Keywords: co-management; urology hospitalist; urethral stricture disease; USD; urethroplasty

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1. Introduction

Improved chronic disease management has contributed to an aging population living with multiple chronic medical conditions. The 2018 National Health Interview Survey estimates that 51.8% of adults in the United States have at least one chronic medical condition and 27.2% have two or more [1,2].

Hospitalist co-management (HCM) has demonstrated more consistent management of medical comorbidities and improved perioperative outcomes in vascular, colorectal, and orthopedic surgery patient populations [3]. The primary benefits of HCM are prevention and early diagnosis and management of medical complications [4]. However, the hospitalist model has also been shown to reduce the cost, mortality, and length of stay (LOS) and improve quality and safety measures [5]. Currently, there is little evidence that supports hospitalist co-management in urology, especially for rare pathologies such as urethral stricture disease (USD).

In this retrospective cohort analysis of a prospectively maintained USD database, we sought to evaluate whether the implementation of hospitalist co-management and a

standardized postoperative care plan would lead to the improved management of chronic medical conditions and perioperative outcomes in male patients undergoing urethroplasty (UPL) with a single surgeon for USD at an academic quaternary care center.

2. Methods

In August 2019, hospitalist co-management and a standardized postoperative care plan were implemented for male urology patients undergoing UPL. The model was created to streamline admission and postoperative care. All UPL patients were co-managed by the primary urologist and an internal medicine team, which included residents and advanced practice providers including house staff, physician assistants, consultants, social workers, and case managers. Delegation of responsibilities between the two groups is shown in (Table 1). Consultants, social workers, and case managers were readily available on an as-needed basis.

Table 1. Responsibility Delegation.

Developed by Urology and IM *	Urology	Yellow Team	Comments
Admission status order	X		Urology knows procedure, estimated LOS, etc.
Code status	X		Urology would address prior to OR.
Diet/Vitals		X	ERAS
Activity		X	
Lines/Tubes	X		To specify Cath/Tube instructions. (bladder scan, etc.)
DVT prophylaxis		X	Urology to let IM know if the patient requires chemical prophylaxis, otherwise, SCDs ** and ambulation ordered for all patients.
Intravenous fluid		X	
Pain management		X	IM writes all discharge prescriptions including triplicates.
Labs	X	X	IM will order CBC/bmp *** next morning if admitted.
Imaging	X	X	
Case Management Consult	X		
Rehab Consult	X	X	
Home Medication History—conducted by nursing			
Admission Medication Reconciliation		X	
Discharge Medication Reconciliation		X	
Discharge Order Initiation		X	
Discharge Instruction	X	X	
Discharge Appointment	X		

* Internal Medicine. ** Sequential Compression Device. *** Basic metabolic panel.

We retrospectively reviewed a prospectively gathered database of male patients who were evaluated for USD by a single surgeon at an academic quaternary care center (Dell Seton Medical Center at the University of Texas, Austin, TX, USA) from 2016 to March 2022. A total of 283 males were evaluated for USD. Those who were treated with an intervention other than UPL or who had an outpatient UPL were excluded from this study. Those who had a UPL between August 2016 to August 2019 were included in the surgeon-managed group (n = 71) and those who had a UPL between August 2019 and March 2022 were included in the co-management group (n = 64).

In the surgeon-managed group, the urologist was responsible for all aspects of perioperative care including the management of chronic medical conditions such as performing the medication reconciliation and blood pressure control. In the co-managed group, the urologist managed the surgical and urologic aspects of care including the code status, diet, foley catheter directives, surgical site evaluation, and arranging necessary follow-up. Hospitalists performed medication reconciliation; managed chronic medical conditions and pain; and contributed to the disposition and discharge planning. Interdisciplinary rounds

were conducted daily by the urology team and internal medicine team for the coordination of care.

Demographic, clinical, surgical, and perioperative outcome variables were compared between these cohorts: age, ethnicity, American Society of Anesthesiologists (ASA) score, Body Mass Index (BMI), insurance type, Charlson Comorbidity Index (CCI), Voiding Cystourethrogram (VCUG), and operative details such as type of UPL and length of the stricture.

We also reviewed the patient charts for outcome variables including length of stay (LOS); mean blood pressure on arrival and before discharge (Mean Blood Pressure = Diastolic Pressure + 1/3 (Systolic Pressure-Diastolic Pressure)) [6]; 90-day postoperative complications as classified by the Clavien-Dindo scale; stricture recurrence, which is defined as having a stricture not passable with a 17f cystoscope [7,8]; 30-day emergency room visits; hospital readmissions; and infection within 15 days of surgery.

Data was stored on the Research Electronic Data Capture (REDCap, Vanderbilt, Nashville, TN, USA) system, an internet-based HIPAA-compliant data collection tool. To seek the factors associated with the co-management model and recurrence, we performed Chi-square or Fisher-exact tests for independent variables that are categorical. For continuous variables, *T*-tests were used if the distribution of the independent variable was parametric, otherwise, Wilcoxon-Mann-Whitney tests were used for non-parametric data (Appendix A). Variables with *p*-values less than 0.10 were examined to identify factors associated to the recurrence rate. These variables were included in the multivariable analysis, where a significance level of a *p*-value below 0.05 was used to determine the statistical significance.

Power analysis indicated that a minimum sample size of 75 patients would provide 90% statistical power with alpha set at 0.05. This was based on a regression with five predictors and the assumption that the change in cognitive bias measures would account for 5% or more of the variability in patient ratings and the complete model would account for at least 15% variability.

3. Results

In bivariate analysis, there was no significant difference between the co-management group and the surgeon group in terms of the baseline variables (Table 2). Of the 71 men who were managed by surgeon only, 38% (27) underwent an anterior anastomosis UPL and 34% (24) had substitution buccal graft UPL, while 17% (11) and 55% (35) of the co-management group had anterior anastomosis and substitutional BMG graft, respectively (*p*-value = 0.014).

Table 2. Baseline variables.

	Co-Management		
Mean Characteristics (±SD)	**No**	**Yes**	***p* Value**
Age	57 (44–69)	60 (47–74)	0.12
BMI	29.4 ± 7.9	30.0 ± 6.8	0.61
CCI	2 (0–3)	2 (0.5–4.5)	0.33
Mean BP at arrival	99.7 ± 11.8	97.5 ± 10.3	0.26
Stricture length	2 (1–5)	3.5 (1–5)	0.10
Race			0.54
White	87% (62)	91% (58)	
Other	13% (9)	9% (6)	
Hispanic			0.90
No	77% (55)	77% (49)	
Yes	23% (16)	23% (15)	

Table 2. *Cont.*

	Co-Management		
Mean Characteristics (±SD)	**No**	**Yes**	***p* Value**
ASA			0.14
1	9% (6)	2% (1)	
2	64% (45)	57% (34)	
3	26% (18)	38% (23)	
4	1% (1)	3% (2)	
Insurance			0.46
No insurance	10% (7)	5% (3)	
Medicaid	3% (2)	6% (4)	
Medicare	25% (18)	34% (22)	
Private	13% (9)	14% (9)	
Other	49% (35)	41% (26)	
Operation technique			**0.014**
Anterior anastomosis	38% (27)	17% (11)	
Substitution graft	34% (24)	55% (35)	
Other technique	28% (20)	28% (18)	
Alcohol			0.19
Not Using	58% (41)	40% (22)	
≤2 per day	39% (28)	53% (29)	
>2 per day	1% (1)	5% (3)	
Quit	1% (1)	2% (1)	
Smoker			0.95
Never	77% (55)	75% (43)	
Current	4% (3)	5% (3)	
Quit	18% (13)	19% (11)	

Continuous variables with parametric distribution were reported as mean ± SD. Non-parametric variables were reported as median (interquartile range). Categorical variables were shown as percent (number). p values < 0.10 are bold.

The total LOS remained low with a median of one day in both groups. The mean blood pressure recorded on the morning of arrival was the same between the two groups. Moreover, the mean blood pressure obtained at their discharge was similar in both groups, 87.1 ± 10.7 vs. 89.3 ± 9.9 (p-value = 0.22).

Postoperatively in the surgeon-managed group, 73% of patients were complication-free within 90 days while 20% (14) visited the emergency department within one month and 11% (8) were admitted within 30 days of reoperation. Within a 15-day follow-up period, 14% (10) of the surgeon-only managed patients had a genitourinary infection. In the co-management group, 66% were complication-free, 25% (16) visited the emergency room within 30 days, 17% (11) of all the patients had an infection, and 16% (10) were readmitted, which was not significantly different (Table 3).

Table 3. Bivariate analysis of Co-management Hospitalist Care on Mean Blood Pressure at the time of Discharge, Rate of Post-Operation Complication within 90 days, Infection within 15 days, Recurrence, Readmission and Emergency visit within 30 days, VCUG, and LOS.

	Surgeon Only	**Co-Management Support**	***p* Value**
Mean BP at discharge	87.1 ± 10.7	89.3 ± 9.9	0.22
Clavien-Dindo score			0.30
No complication	73% (52)	66% (42)	
grade 1	3% (2)	3% (2)	
grade 2	21% (15)	20% (13)	
grade 3a	3% (2)	11% (7)	

Table 3. *Cont.*

	Surgeon Only	Co-Management Support	*p* Value
Re-admission within 30 days			0.46
Yes	11% (8)	16% (10)	
Infection within 15 days			0.62
Yes	14% (10)	17% (11)	
Emergency visit within 30 days			0.46
Yes	20% (14)	25% (16)	
Recurrence			**0.032**
Yes	35% (25)	19% (12)	
VCUG after 1 month			0.33
Normal	82% (58)	69% (44)	
Extravasation	1% (1)	8% (5)	
Restenosis	1% (1)	2% (1)	
Fistula	1% (1)	2% (1)	
Not done	14% (10)	20% (13)	
LOS	1 (1–1)	1 (1–1)	0.79

Continuous variables with parametric distribution were reported as mean ± SD. Non-parametric variables were reported as median (interquartile range). Categorical variables were shown as percent (number). *p* values < 0.10 are bold.

Accounting for confounding variables using logistic regression, no factors were independently associated with recurrence (all *p*-values greater than 0.05) (Table 4).

Table 4. Logistic Regression of factors associated with recurrence.

Variable (Reference)	Odd's Ratio (95% Confidence Interval)	Standard Error	*p* Value
Co-management Hospitalist Care (No)			
Yes	0.47 (0.18 to 1.17)	0.22	0.11
Alcohol Use (Does not Consume)			
≤2perday	0.47 (0.20 to 1.14)	0.21	0.094
Operation technique (Other technique)			
Anterior anastomosis	0.73 (0.25 to 2.16)	0.40	0.57
Substitution graft	0.41 (0.15 to 1.16)	0.22	0.093
Age	1.02 (0.99 to 1.05)	0.01	0.11

4. Discussion

In previous studies, the hospitalist's role in managing perioperative patients has been well defined in the fields of orthopedics, vascular surgery, and neurosurgery [9–11]. In these studies, patients were hospitalized for a longer time. Even though our UPL patients stayed at the hospital for a short time, our study examining the Peri UPL responsibilities of the co-management team, consisting of internal medicine doctors, physician assistants, consultants, social workers, and case managers working closely with the urologic surgeon, is unique.

Among the co-management UPL patients, the infection rates, postoperative emergency visits, and readmission rates within 30 days remained low after the appliance of the new approach. Moreover, the blood pressure, an indicator of medical reconciliation especially in the elderly, was not significantly different. Another study that implemented co-management in a neurosurgical department revealed that the readmission rate and LOS did not make a significant difference. However, their healthcare team reported perceived improvement in care quality [12]. Our result was consistent with the result from many other published data on co-management, including a meta-analysis that reviewed different

surgeries [13]. Another institute that studied the co-management in a neurosurgical setting had an unchanged number of 30-day readmission and mortality [14].

The finding that there was no significant difference in the recurrence rates between patients managed by hospitalists and those managed by surgeons suggests that hospitalist care may be non-inferior to surgeon care for patients undergoing treatment for urethroplasty. This may have the added benefit of reducing the workload of surgeons.

The length of stay remained the same in the co-management group. This is likely attributable to the low number of UPL patients that spend the night. Although patients in the co-management group had a mean age of 60 (47–74) and 98% of them had ASA > 1, it did not extend hospitalization. There are numerous possible explanations for the unchanged LOS range. One could be the fact that the UPL is minimally invasive and extracorporeal; therefore, UPL patients were less affected by postoperative pain and other criteria that prolong discharge. More invasive and complicated operations have been studied which resulted in an increase in LOS [3,15].

There were several strengths in our study. We were able to prospectively collect all the data regarding patients' complications and surgical outcomes in the five years. Moreover, we measured factors associated with the patient's health such as blood pressure and ASA.

Several inherent limitations to our study, including a short LOS and same-day discharge, prevented a large sample size to evaluate the patients for blood pressure properly after the medication reconciliation. In addition, universal medical records to check for postoperative infection of out-of-network ER visits do not exist; therefore, there might be some underreporting of these events.

5. Conclusions

This study suggests that hospitalist care for patients undergoing urethroplasty may be non-inferior to surgeon care, based on the similar outcomes between the two groups. There were no significant differences in the total length of stay or blood pressure readings, and the complication rates and hospital readmission rates were also similar.

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Informed Consent Statement: The IRB waives the requirement to obtain subject authorization for use of PHI and alters or waives the requirement to obtain prior authorization of the individuals.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to PHI protection issue.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Bivariate Analysis of Factors Associated with Recurrence.

	Recurrence		*p* Value
	No	Yes	
Smoker			0.77
Never	78% (72)	72% (26)	
Current	4% (4)	6% (2)	
Quit	17% (16)	22% (8)	

Table A1. *Cont.*

	Recurrence		*p* Value
	No	Yes	
Alcohol			**0.05**
Not having	43% (39)	69% (24)	
≤2 per day	51% (46)	31% (11)	
>2 per day	4% (4)	0% (0)	
Quit	0% (2)	0% (0)	
Hispanic	22% (22)	24% (9)	0.82
Race			0.59
White	90% (88)	86% (32)	
Other	10% (10)	14% (5)	
Insurance			0.32
No insurance	6% (6)	11% (4)	
Medicaid	6% (6)	0% (0)	
Medicare	27% (26)	38% (14)	
Private	14% (14)	11% (4)	
Other	47% (46)	41% (15)	
ASA			0.41
1	7% (7)	0% (0)	
2	60% (56)	64% (23)	
3	31% (29)	33% (12)	
4	2% (2)	3% (1)	
Recreational drug	6% (6)	3% (1)	0.42
Operation technique			**0.08**
Anterior Anastomosis	28% (27)	30% (11)	
Substitution graft	49% (48)	30% (11)	
Other technique	23% (23)	41% (15)	
Continuous Variables			
Age	56 (44–71)	63 (54–72)	**0.09**
Surgery duration	170 (135–200)	158 (125–205)	0.42
Stricture length	2 (1–5)	2 (1–5)	0.98
LOS	1 (1–1)	1 (1–1)	0.49
Mean arrival BP	98 (90–106)	98 (91–107)	0.54
Last mean BP	89 (80–95)	89 (83–96)	0.28
CCI	2 (0–3)	2 (1–4)	0.20

Continuous variables with parametric distribution were reported as mean ± SD. Non-parametric variables were reported as median (interquartile range). Categorical variables were shown as percent (number). *p* values < 0.10 are bold.

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