Healthcare system contact following ureteroscopy: does discharge instruction readability matter?

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Introduction: *We aimed to assess the impact of discharge instruction (DCI) readability on 30-day postoperative contact with the healthcare system.*

Materials and methods: *Utilizing a multidisciplinary team, DCI were modified for patients undergoing cystoscopy, retrograde pyelogram, ureteroscopy, laser lithotripsy, and stent placement (CRULLS) from a 13th grade to a 7th grade reading level. We retrospectively reviewed 100 patients including 50 consecutive patients with original DCI (oDCI) and 50 consecutive patients with improved readability DCI (irDCI). Clinical and demographic data collected including healthcare system contact (communications [phone or electronic message], emergency department [ED], and unplanned clinic visits) within 30 days of surgery. Uni/multivariate logistic regression analyses used to identify factors, including DCI-type, associated with increased healthcare system contact. Findings reported as odds ratios with 95% confidence intervals and p values (< 0.05 significant).*

Results: *There were 105 contacts to the healthcare system within 30 days of surgery: 78 communications, 14 ED visits and 13 clinic visits. There were no significant differences between cohorts in the proportion of patients with communications (p = 0.16), ED visits (p =1.0) or clinic visits (p = 0.37). On multivariable analysis, older age and psychiatric diagnosis were associated with significantly increased odds of overall healthcare contact (p = 0.03 and p = 0.04) and communications (p = 0.02 and p = 0.03). Prior psychiatric diagnosis was also associated with significantly increased odds of unplanned clinic visits (p = 0.003). Overall, irDCI were not significantly associated with the endpoints of interest.*

Conclusions: *Increasing age and prior psychiatric diagnosis, but not irDCI, were significantly associated with an increased rate of healthcare system contact following CRULLS.*

Key Words: ureteroscopy, ureteral stent, discharge instruction, outpatient surgery

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Introduction

Postoperative patient discharge instructions (DCI) provide detailed aftercare advice, activity restrictions and commonly encountered scenarios to anticipate during recovery. High-quality DCI improves patient understanding, healthcare outcomes, and patient satisfaction.[1] Unfortunately, DCI are often, and unintentionally, written at a reading level considered too advanced for many patients to effectively

utilize. In the United States alone, about one half the population possess an 8th grade or lower reading level.[2] Furthermore, studies suggest comprehension is compromised if content exceeds a 7th grade reading level.[3]

More specifically, studies evaluating patient education materials within the field of urology have been performed,[4,5] along with those from other specialties.[6-9] These studies demonstrate that many educational materials provided to patients are written at too high a reading level for the average American to understand (i.e., > 7th grade reading level). The consequences of this may be two-fold: increased avoidable postoperative anxiety for the patient[10] and increased patient contact burden to the healthcare system.[11]

Therefore, we sought to standardize and improve DCI readability for patients undergoing outpatient cystoscopy, retrograde pyelogram, ureteroscopy, laser lithotripsy and ureteral stent placement (CRULLS). After generating an improved readability DCI (irDCI) we explored the impact on 30-day postoperative healthcare system contact. We hypothesized improvement in DCI readability for patients undergoing outpatient CRULLS would lead to a decrease in patient contact to the healthcare system.

Materials and methods

Internal Review Board approval was obtained. A multidisciplinary, multistakeholder group (urologists, nurses, hospital desk operation specialists, medical secretaries and patient education specialists) was assembled in November 2019 to evaluate written DCI readability for patients undergoing outpatient CRULLS within the urology department at our institution. DCI were analyzed utilizing Readability Studio Software (Oleander Software, Ltd.) which determines reading level based on the average of multiple validated readability tests for use in medical literature including the Flesch-Kincaid Grade Level, Gunning Fog, New Dale-Chall and New Fog Count.[9] The software quantifies sentence length and word complexity to calculate text readability.

Original DCI (oDCI) readability was calculated to be at a 13th grade reading level. oDCI readability was then revised under the guidance of the multidisciplinary group. Content readability was improved by deconstructing complex sentences into shorter sentences and using simpler words with fewer syllables.[12] Long, dense text was fragmented into subheadings, bullet points or lists. Redundant information was discarded to reduce reading bulk. Ultimately, these changes yielded improved readability DCI (irDCI) which were analyzed using the previously described software and noted to read at a 7th grade level.

We then sought to determine the impact of irDCI on 30-day contact with the healthcare system. We retrospectively reviewed 100 patients who underwent outpatient CRULLS. Each patient had English as their preferred language in the electronic medical record. The first cohort consisted of 50 consecutive patients who underwent outpatient CRULLS between September 1st, 2019 and December 31st, 2019 and were provided with oDCI. The second cohort consisted of 50 consecutive patients who underwent outpatient CRULLS between September 1st, 2020 and December 31st, 2020 and were provided irDCI. The procedures were performed by multiple urologists within our department. Demographic and clinical information were collected and analyzed for each cohort. Education level was determined by chart review of patient reported highest grade level completed. Data involving 30-day contact with the healthcare system (direct communications [phone or electronic message], ED visits and unplanned clinic visits) were collected for each cohort. Both cohorts were compared utilizing univariate and multivariate models to determine which factors, if any, were associated with the odds of contact with the healthcare system within 30 days of outpatient CRULLS.

Statistical methods

Statistical analyses were performed using JMP Pro 14.1.0 (SAS Institute, Cary, NC, USA). Continuous variables were reported as mean (± standard deviation [SD]) or median (interquartile range [IQR]) where appropriate, while categorical variables were reported as numbers or counts and percentages (%). Univariate and multivariate logistic regression were used to identify factors associated with increased patient contact to the healthcare system. Findings were reported as odds ratios (OR) with 95% confidence intervals (CI) and p values. A two-tailed p value of < 0.05 was considered significant.

Results

One hundred patients who underwent outpatient CRULLS were included in the study. Fifty patients each were provided oDCI (13th grade reading level) and irDCI (7th grade reading level) following their procedure. Clinical and demographic features of each cohort are summarized in Table 1. Those in the oDCI group were significantly younger than those in

TABLE 1. **Comparison of oDCI and irDCI**

	oDCI (n = 50)	**irDCI (n = 50)**	**p value**
Median age, years (IQR)	57.5 (47.8-62.3)	64.5 (55.5-72)	0.01*
Patients ≥ 65 yrs. (%)	9 (18)	25 (50)	
Sex			0.32
Male, n (%)	30 (60)	25 (50)	
Female, n (%)	20 (40)	25 (50)	
Marital status			0.31
Single, n (%)	9 (18)	13 (26)	
Married, n (%)	40 (80)	37 (74)	
Unknown, n (%)	1 (2)	0 (0)	
Education			0.81
College, n (%)	36 (72)	33 (66)	
High school, n (%)	10 (20)	12 (24)	
Unknown, n (%)	4 (8)	5 (10)	
Prior stent			0.26
Yes, n (%)	16 (32)	11 (22)	
No, n (%)	34 (68)	39 (78)	
Pre-stented			0.83
Yes, n (%)	33 (66)	32 (64)	
No, n (%)	17 (34)	18 (36)	
Voiding symptoms			0.67
Yes, n (%)	15 (30)	17 (34)	
No, n (%)	35 (70)	33 (66)	
Psychological disease			1.0
Yes, n (%)	16 (32)	16 (32)	
No, n (%)	34 (68)	34 (68)	
Stone type			0.23
Calcium oxalate, n (%)	37 (77.1)	39 (82.9)	
Calcium phosphate, n (%)	6 (12.5)	6 (12.8)	
Struvite, n (%)	0 (0)	1 (2.1)	
Uric acid, n (%)	5 (10.4)	1 (2.1)	
Stone location			0.23
Renal, n (%)	20 (40)	12 (24	
Ureteric, n (%)	27 (54)	34 (68)	
Renal & ureteric, n (%)	3 (6)	4 (8)	
Scope type			0.09
Rigid, n (%)	12 (24)	20 (40)	
Flexible, n (%)	38 (76)	30 (60)	
Extraction string			
Yes, n (%)	36 (72)	30 (60)	
No, n (%)	14 (28)	20 (40)	
Median days stent-in (IQR)	4.5 (3-7)	5 (3.8-14)	0.41
Median number of communications (range)	0 (0-8)	1 (0-3)	0.20

oDCI = original discharge instructions
irDCI = improved readability discharge instructions
IQR = interquartile range

TABLE 2. **30-day postoperative outcomes**

	oDCI (n = 50)	irDCI (n = 50)	p value
Patients with communications, no (%)	20 (40)	27 (54)	0.16
Communications per patient, mean (SD)	0.74 (1.37)	0.82 (0.90)	0.20
Patients with ED visit, no (%)	7 (14)	7 (14)	1
Patients with unplanned clinic visit, no (%)	5 (10)	8 (16)	0.37

oDCI = original discharge instructions; irDCI = improved readability discharge instructions

the irDCI group (median 57.5 vs. 64.5; p = 0.01). The groups were similar with respect to education level (p = 0.81), proportion that were pre-stented (p = 0.83), and duration of pre-stenting (p = 0.41). For the oDCI group 22% (10/46) were provided DCI with a readability grade level above their highest achieved grade as compared with 0% (0/45) of the irDCI group (p = < 0.001).

A total of 105 contacts to the healthcare system occurred within 30 days of CRULLS (oDCI 49 [21 unique patients] vs. irDCI 56 [27 unique patients]): 78 electronic communications (phone or electronic message) (37 vs. 41), 14 ED visits (7 vs. 7) and 13 unplanned clinic visits (5 vs. 8). There were no hospital readmissions. There was no statistically significant difference in the number of communications (p = 0.16), ED visits (p = 1.0) or unplanned clinic visits (p = 0.37) between groups, Table 2. Indications for healthcare contact are presented in Table 3. Notably, all ED and clinic visits were preceded by communications for the same indication.

We then assessed the association of various factors with the number of contacts to the healthcare system, while controlling for patient related variables, Table 4. We found that irDCI were not significantly associated with total contacts to the healthcare system (p = 0.65), communications (p = 0.53), ED visits (p = 0.63) or unplanned clinic visits (p = 0.55). Increased age (≥ 65 yrs)

TABLE 3. **Indications for healthcare system contact**

	Original DCI (%)	Improved readability DCI (%)
Communications		
Pain	8 (40)	4 (15)
Hematuria/LUTS	5 (25)	10 (37)
Urinary retention	1 (5)	0 (0)
Infectious symptoms	2 (10)	0 (0)
Bowel changes/GI upset	2 (10)	1 (4)
Miscellaneous questions	1 (5)	5 (19)
Issues with stent removal	1 (5)	7 (26)
ED visits		
Urinary retention	2 (40)	4 (67)
Diarrhea	1 (20)	0 (0)
Pain	1 (20)	1 (17)
Infection	1 (20)	1 (17)
Clinic visits		
Pain	2 (50)	1 (13)
Urinary issues	1 (25)	3 (38)
Diarrhea	1 (25)	0 (0)
Follow up ED visit	0 (0)	1 (13)
Assistance with stent removal	0 (0)	3 (38)

LUTS = lower urinary tract symptoms; DCI = discharge instructions ; GI = gastrointestinal

TABLE 4. **Factors associated with healthcare contact**

	n = 100	Univariable			Multivariable		
		OR	95% CI	p	OR	95% CI	p
Total contacts to system							
	Age ≥ 65 yrs.	2.8	1.94-6.66	0.02*	2.7	1.09-6.94	0.03*
	Psychiatric diagnosis	2.4	1.00-5.64	0.05*	1.2	1.03-6.14	0.04*
	irDCI	1.6	0.74-3.57	0.23	1.2	0.51-2.92	0.65
Communications	Age ≥ 65 yrs.	3.0	1.27-7.12	0.01*	2.9	1.14-7.32	0.02*
	Psychiatric diagnosis	2.5	1.07-6.01	0.03*	2.7	1.09-6.68	0.03*
	irDCI	1.8	0.79-3.89	0.16	1.3	0.55-3.18	0.53
ED visits	Age ≥ 65 yrs.	2.1	0.63-7.24	0.22	2.4	0.64-9.18	0.19
	Psychiatric diagnosis	1.6	0.47-5.54	0.45	1.6	0.47-5.69	0.44
	irDCI	1.0	0.29-3.34	1	0.7	0.19-2.73	0.63
Clinic visits	Age ≥ 65 yrs.	1.8	0.56-5.88	0.33	1.6	0.42-6.30	0.49
	Psychiatric diagnosis	6.3	1.75-22.31	0.003*	6.4	1.77-23.08	0.003*
	irDCI	1.7	0.52-5.66	0.37	1.5	0.39-5.91	0.55

OR = odds ratio; CI = confidence interval; ED = emergency department; Total contacts to system = sum of communications, ED and unplanned clinic visits; Communications = phone calls/electronic messages; Clinic visits = unplanned visit to the clinic; irDCI = improved readability discharge instructions

was significantly associated with increased odds of total healthcare contacts (OR 2.7, 95% CI 1.09-6.94; p = 0.03) and communications (OR 2.9, 95% CI 1.14-7.32; p = 0.02). Prior psychiatric diagnosis was significantly associated with increased odds of total contacts (OR 1.2, 95%CI 1.03-6.14; p = 0.04), communications (OR 2.7, 95% CI 1.09-6.68; p = 0.03) and clinic visits (OR 6.4, 95% CI 1.77-23.08; p = 0.003).

Discussion

Health literacy, or the degree to which an individual can obtain, process, and understand basic health information to make appropriate healthcare decisions, is facilitated by providing patient education materials at or below a 7th grade reading level.[3,13] More than one-third of Americans possess basic (skills necessary to perform simple everyday literacy activities, for example one-step problem with simple arithmetic operation) or below basic (no more than the most simple and concrete literacy skills) health literacy.[14] Urologic patient educational materials are typically written above the recommended reading level, with a reported median reading level of 9th grade.[13,15] Prior to revision, our institutional education materials for outpatient CRULLS read at a 13th grade level, higher than the self-reported education level for roughly a quarter of the study cohort. Previous reports indicate two-thirds of patients undergoing CRULLS make unprompted postoperative healthcare system contact, and up to 80% are for a patient-perceived postoperative complication.[16] Therefore, we sought to evaluate the impact of irDCI on 30-day contact with the healthcare system following outpatient CRULLS while decreasing DCI readability from a 13th to a 7th grade reading level. Contact included communications (phone calls or electronic message), ED visits, and/or unplanned clinic visits. We hypothesized that improved DCI readability would result in decreased patient contact burden with the healthcare system. Surprisingly, we found no significant difference in communications, ED visits, and unplanned clinic visits between the oDCI and irDCI cohorts within 30 days of outpatient CRULLS. Interestingly, we found an association between preoperative psychiatric diagnoses and communications or unplanned clinic visits. Our findings are unique in that, to our knowledge, we are the first to specifically evaluate the introduction of irDCI following CRULLS and their impact on healthcare system contact.

Efforts have been made in several fields to improve the readability of discharge instructions in hopes of decreasing the burden of healthcare system contact. Previously, Choudhry et al evaluated DCI for 1072 trauma patients.[11] Their group improved DCI readability from a 19th grade to a 6th grade reading level and observed a significant decrease in patient phone calls (21.9% vs. 9%, p < 0.001) and hospital readmissions

(1.9% vs. 0.9%, p = 0.002). Similarly, our group evaluated irDCI (7th grade reading level) for patients undergoing robot assisted laparoscopic prostatectomy.[17] With irDCI the number of patient phone calls/electronic messages (2.3 vs. 1.4, p = 0.02) and unplanned face-to-face visits decreased significantly (20% vs. 4%, p = 0.02).

Ureteral stents often cause flank/suprapubic pain, urinary frequency and urgency, dysuria, and/or hematuria. Given the signs and symptoms associated with ureteral stents, patients, whether real or perceived, often believe they are having a postoperative complication. Abt et al evaluated 74 patients who underwent ureteral stent placement and were subsequently discharged with high-quality patient education materials to evaluate the impact on symptoms and problems caused by ureteral stents.[18] Education material quality was assessed using a self-developed questionnaire, and patient morbidity was assessed utilizing the Ureteral Stent Symptom Questionnaire (USSQ). They found high-quality patient education materials had limited impact on whether a patient sought help from a healthcare provider (A3) or visited the hospital (A4), concluding provider efforts would be better spent improving stent technology and avoiding stent placement when feasible. Limitations of the study included the lack of validated patient education materials and questionnaires, assessment of patient education material readability, and a control group receiving different education materials. Additionally, Carlos et al evaluated factors associated with ED visits within 30 days of ureteroscopy (1,576 cases). They found patients with a history of a psychiatric diagnosis were at an increased risk for postoperative presentation to the ED (OR 1.57, p = 0.012).[19] The association of psychiatric diagnoses with increased ED visits and healthcare system contact is not fully understood. Studies have shown anxiety and depression are associated with increased postoperative pain scores, and depression has been linked to decreased adherence to medication regimens which may partly explain this observation.[20,21] These findings highlight the importance of rigorous patient education in cases of underlying psychiatric diagnosis to alleviate underlying anxiety surrounding health conditions, and appropriate multimodal pain regimens with an emphasis on non-narcotic analgesics. Congruent with these observations, we found preoperative psychiatric diagnoses were associated with a significant increase in communications and unplanned clinic visits. However, this was not statistically significant for ED visits. On multivariable analysis, age was associated with increased total system contact and communications. The reason for this is not entirely clear but may be related to increased burden of comorbidities or more significant medication side effects due to polypharmacy.

In our study, introduction of irDCI had no significant impact on healthcare system contact. There are several potential explanations for this observation. Notably, patients receive valuable discharge education from multiple sources,[22,23] both written and verbal, and the impact of verbal counseling was unable to be quantified. In future prospective studies, verbal instruction should be standardized to evaluate its impact. Interestingly, the patient education level at our institution is higher than the national average, with 70% reporting at least a 2-year degree, compared to 35% of the US population.[24] Though education level does not necessarily equate to health literacy, it is possible we found no difference between groups because introducing irDCI provided no additional benefit over the oDCI for our specific cohort of highly educated individuals. Future study of irDCI in less educated cohorts may prove valuable and produce significant results. Furthermore, it may be possible that in certain postoperative contexts irDCI have no significant impact on contact with the healthcare system. Ureteral stents can be exceptionally uncomfortable, and the accompanying hematuria can be unsettling, leading patients to contact the healthcare system regardless of DCI readability. Lastly, given the tertiary nature of our practice, it is possible patients presented to outside emergency departments or contacted providers at other institutions, impacting our results. Ultimately, we believe patients should be provided health literacy level appropriate DCI as they remain important for several reasons including: 1) improved patient outcomes,[1] 2) increased patient satisfaction[25] and 3) decreased patient anxiety.[10]

Our study is not without limitations. This is a single, tertiary, academic-center, multi-surgeon, retrospective chart review with unmatched cohorts which increases the potential for confounding factors. The timeframe of the study may have impacted our findings, as the irDCI cohort was recruited and evaluated during the COVID-19 pandemic, potentially introducing unmeasured differences between groups. Additionally, oDCI readability/quality likely varied as this educational material was not standardized, verbal counseling was not controlled, and the irDCI has not been validated. Furthermore, reading level and health literacy were not directly assessed, and education level is not always an accurate substitute,[26] as patients may interpret the same DCI differently. Notably, patient education level in our cohort was higher than the national average, which may affect the generalizability

of our findings. Age ≥ 65 was significantly associated with increased total contacts with the healthcare system; the reason for this is unclear. Fifty percent of the irDCI group were patients ≥65 as compared with 18% of the oDCI group. This age difference could have resulted in type II error, and further study with a larger, matched cohort is required. However, even when controlling for age on multivariable analysis, irDCI were still not found to be a significant predictor of contact with the healthcare system. Finally, the overall number of healthcare system contacts was low. Future studies with larger patient populations will be necessary to provide more granular insight into the impact of discharge materials on healthcare system contact.

Conclusions

irDCI do not appear to decrease patient contact burden with the healthcare system based on our current data. Reading level appropriate DCI and verbal counselling should continue to be provided as they have been shown to decrease patient anxiety and improve patient outcomes. Research efforts may be shifted to other areas such as improving ureteral stents, procedural advancement, and development of interactive technology in an effort to improve patient and provider satisfaction. □

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