Title
The Timed Up and Go Test as a Measure of Frailty in Urologic Practice

Authors
Pangilinan, Jayce
Quanstrom, Kathryn
Bridge, Mark
et al.

Publication Date
2017-08-01

DOI
10.1016/j.urology.2017.03.054

Peer reviewed

HHS Public Access

Author manuscript

Urology. Author manuscript; available in PMC 2017 August 01.

Published in final edited form as:

Urology. 2017 August ; 106: 32–38. doi:10.1016/j.urology.2017.03.054.

The Timed Up and Go Test as a measure of frailty in urologic practice

Jayce Pangilinan[1], **Kathryn Quanstrom**[2], **Mark Bridge, MS**[2], **Louise C. Walter, MD**[3,4], **Emily Finlayson, MD, MS**[5], and **Anne M. Suskind, MD, MS**[2]

[1]University of Arizona College of Medicine - Tucson

[2]University of California, San Francisco, Department of Urology

[3]University of California, San Francisco, Division of Geriatrics

[4]Veterans Affairs Medical Center, San Francisco, California, Division of Geriatrics

[5]University of California, San Francisco, Department of Surgery

Abstract

Objectives—To evaluate the prevalence of frailty, a known predictor of poor outcomes, among patients presenting to an academic non-oncologic urology practice and to examine whether frailty differs among patients who did and did not undergo urologic surgery.

Methods—The Timed up and Go Test (TUGT), a parsimonious measure of frailty, was administered to patients ages ≥ 65. The TUGT, demographic data, urologic diagnoses and procedural history were abstracted from the medical record into a prospective database. TUGT times were categorized as nonfrail (≤10 sec), prefrail (11–14 sec) and frail (≥15 sec). These times were evaluated across age and urologic diagnoses and compared between patients who did and did not undergo urologic surgery using chi-square and t-tests.

Results—The TUGT was recorded for 78.9% of patient visits from December 2015 to May 2016. For 1089 patients, average age was 73.3 ± 6.3 years; average TUGT time was 11.6 ± 6.0 sec; 30.0% were categorized as prefrail and 15.2% as frail. TUGT times increased with age, with 56.9% of patients age 86 and over categorized as frail. Times varied across diagnoses (highest average TUGT was 14.3 ± 11.9 sec for patients with urinary tract infections), however no difference existed between patients who did and did not undergo surgery (p = 0.94).

Conclusions—Among our population, prefrailty and frailty were common, TUGT times increased with age and varied by urologic diagnosis, but did not differ between patients who did and did not undergo urologic surgery, presenting an opportunity to consider frailty in preoperative surgical decision making.

Keywords

geriatric; surgery; preoperative

Corresponding Author: Anne M Suskind, MD, MS, 400 Parnassus Ave, Box 0738, San Francisco, CA 94143, 415-476-1611, Fax: 415-476-8849, Anne.Suskind@ucsf.edu.

Introduction

Over two thirds of all urologic procedures in the United States are performed in adults ages 65 years and older.[1] These individuals have poorer surgical outcomes with a higher risk of complications, delirium, intensive care unit admissions, and death compared to younger individuals.[2,3] With the older population growing rapidly, there is a greater demand for preoperative risk assessment that is specific to the unique physiology of older individuals.[4]

Frailty, defined as a clinical phenotype that predisposes to physiologic vulnerability, is a strong predictor of poor surgical outcomes[5,6] and is associated with increased post-operative complications following urologic surgery.[7] Although we have previously shown that frailty is common among older individuals undergoing urologic surgery using the National Surgical Quality Improvement Program (NSQIP) Frailty Index,[8] such frailty assessment tools are not commonly utilized in practice.[4] In recognition of the need to improve surgical care among older individuals, the American College of Surgeons NSQIP and the American Geriatric Society have jointly recommended a frailty preoperative assessment for all patients 65 and older.[9]

The Timed Up and Go Test (TUGT) is a simple, yet sensitive and specific, measure of functional mobility that reveals multiple dimensions of frailty and requires no special equipment or training.[10–12] Higher TUGT times are associated with increased risk for postoperative complications and mortality in elective colorectal and cardiac operations,[13] but there is currently no literature on the use of the TUGT in urologic practice.

In order to address this knowledge gap, we incorporated the TUGT into the intake for all patients age 65 and older in an academic non-oncologic urology practice and recorded times in the University of California, San Francisco Geriatric Urology Database (UCSF-GUD). The purpose of this study is to describe trends and distributions of TUGT times among older urologic patients across age groups and urologic diagnoses, and between patients who did and did not undergo urologic procedures. A secondary aim of this study is to report the uptake of incorporating such a measure in a busy clinical practice. Findings from this study will be helpful to begin to describe the extent of frailty among urologic patients so that urologists can better understand the need for incorporating frailty measures into daily practice.

Methods

Patients and Database

This study uses data from the UCSF-GUD from September 2015 to July 2016. Data is collected into the UCSF-GUD in an on-going and prospective fashion. Patients were included in the database if they were age 65 or older presenting with a benign urologic condition for either a new or follow up visit to the UCSF Urology Faculty Practice during this time frame. This study was approved by our institution's Institutional Review Board.

Data, including the TUGT, were abstracted from the electronic medical record (EMR) and deposited in the UCSF-GUD using *Epic* analytical software including *Clarity* and *Cogito*

Data Warehouse. Clarity produces raw data reports from the medical record and *Cogito Data Warehouse* is a central data repository of select EMR elements. The elements extracted from the patient charts included age, gender, race, TUGT times, and *International Statistical Classification of Diseases* (ICD) 9 codes associated with each visit. Information on urologic surgical history was also extracted using *Epic* analytical software from the UCSF Department of Urology surgery scheduling database.

Timed Up and Go Test (TUGT)

As standard practice in our clinic, medical assistants ask patients if they are willing to complete the TUGT at the time that vitals are taken during intake for both new and follow up patient visits. In order to complete the TUGT, patients are instructed to stand from a seated position in a chair, walk at their normal pace 10 feet to a mark on the floor, turn around, return to the chair and sit back down. If a patient walks with a walking aid such as a cane or a walker, they are permitted to use that aid during the TUGT.[10] The time it takes the patient to complete the task, in seconds, is entered directly into the EMR. If a patient declines the TUGT or if they use a wheelchair or gurney, this is recorded in the EMR accordingly.

Implementation of this process in our clinic was initiated by an “in-service” to the medical assistants who room patients and to all of the urologists in the practice in order to get their support of the process. We decided to add the TUGT as a vital sign so that it would be administered alongside measurement of blood pressure, heart rate, height and weight at the beginning of each clinical encounter. We also selected two medical assistants to serve as champions for this project and assigned them the task of overseeing the implementation of the TUGT on the floor and helping to identify and address any barriers as they arose. Initially, we assessed weekly rates of the TUGT to evaluate its uptake and to see where improvements could be made. One of the barriers that initially arose was that administering the TUGT was not a part of the existing workflow, and it was commonly forgotten or omitted by accident. We addressed this by placing reminders at each of the vital sign terminals and by adding a place for the TUGT to be recorded on the vitals signs sheet. Once the TUGT was successfully implemented into practice, it took a mean of 52.3 seconds (range 32–75 seconds) to complete inclusive of the time spent both explaining and performing the test.

Statistical analysis

To assess the distribution of TUGT times across various urologic diagnoses, categories were formed from visit specific ICD-9 codes. The ICD-9 codes and diagnoses included in each category are outlined in Supplementary Table 1. Since a single patient can have several urologic diagnoses, each patient could be represented by more than one diagnosis category. Patients were also stratified based on whether or not they had urologic surgery during the study period.

In order to ensure that each patient was only represented once in our analyses involving the TUGT, the first chronological visit with a TUGT value in the database was identified and used in the cases where multiple patient visits occurred. TUGT times were reported as either

ordinal or continuous values. For ordinal values, the TUGT times were categorized into fast (≤ 10 seconds), intermediate (11–14 seconds), and slow (≥ 15 seconds) groups, which correspond to nonfrail, prefrail, and frail categories, respectively.[13,14] For continuous values, TUGT times are represented in seconds as means with standard deviations. Descriptive characteristics are represented as frequencies and percentages. Chi-square tests were used to examine differences between nonfrail, prefail, and frail groups, while differences between patients who did and did not have surgery were evaluated using t-tests.

Results

The adoption of the TUGT by month in the clinic is illustrated in Supplementary Figure 1. The UCSF-GUD began in September of 2015 and it took approximately three months for the majority of patients presenting to the clinic to undergo this test. Starting from December 2015 onward, 78.9% (1793/2273) of visits had a TUGT recorded in the EMR. For the purposes of this study, we used a six-month period of data from December of 2015 through May 2016.

During these six months, 1089 patients had at least one recorded TUGT, excluding 49 patents that declined the test and 71 patients who used a wheelchair or gurney, which were excluded from the analyses. The mean age of the cohort was 73.3 ± 6.3 years and the majority were men [77.6% (845/1089)]. The cohort was predominantly white [64.7% (705/1089)] and patients ages 65 to 75 accounted for 69.0% (751/1089) of the cohort. The mean TUGT time for the cohort was 11.6 ± 6.0 seconds. Almost one third of the cohort's TUGT times fit into the prefrail category [30.0% (327/1089)] and 15.2% (165/1089) of the TUGT times indicated frailty (Table 1). Of note, individuals who were in a wheelchair or gurney who were excluded from the analyses (N=71) were older (76.3 compared to 73.3 years, p=0.0001), had a higher rate of being female (42.0% compared to 22.4%, p=0.0001), and had a higher rate of the following urologic diagnoses: renal calculi (25% compared to 12%, p=0.0014), neurogenic bladder (24% compared to 3%, p<0.0001), and urinary retention (17% compared to 7%, p=0.0021).

Figure 1 illustrates TUGT times by age, which increased from 9.8 ± 2.9 seconds in the 65–70 age group to 18.8 ± 13.2 seconds in the 86 and older age group. Overall, the number of nonfrail individuals decreased with age and the number of frail individuals increased with age ($p < 0.05$). Accordingly, the oldest age groups, 81–85 and 86 and older, had the highest percentages of frail individuals [28.4% (29/102)) and 56.9% (33/58), respectively].

Mean TUGT times varied greatly based on different urologic diagnoses (Table 2). Individuals with urinary tract infections (UTIs) had the slowest TUGT times (14.3 ± 11.9 seconds) while individuals with general male urologic conditions such as erectile dysfunction had the fastest TUGT times (9.9 ± 3.0 seconds).

Out of the 1089 patients, 16.5 % (180) did and 83.5 % (909) did not undergo urologic surgery during the time period examined. There was no statistically significant difference in mean TUGT times between patients who had a urologic procedure performed (11.6 ± 4.3 seconds) and those who did not (11.5 ± 6.2 seconds, p = 0.94). Even after the cohort was

stratified by age (Figure 2), there were no significant differences between mean TUGT times for each age group (all p values >0.05). Data stratified by urologic diagnosis also showed no differences between mean TUGT times between surgical and non-surgical groups (all p values >0.05), data not shown.

Comment

This study demonstrates the successful uptake of the TUGT in a busy non-oncologic urology practice whereby 78.9% (1793/2273) of visits included this measure after 3 months of its implementation. From these data, we found that TUGT times for urologic patients increased with age, with a larger number of individuals with high TUGT times in the older age groups. TUGT times also differed across urologic diagnosis categories, where patients diagnosed with UTIs were among the frailest individuals presenting for urologic care. We also found that there were no statistically significant differences in TUGT times between individuals who did and did not undergo urologic surgery.

With regard to age, trends in TUGT times observed in our cohort are consistent with the literature; as individuals grow older, their mean TUGT times increase and frailty becomes more prevalent. Interestingly, our study also demonstrates that as patients get older, there is more variation in their TUGT scores compared to younger patients, demonstrated by wider standard deviations associated with TUGT measurements (9.8 ± (2.9 for ages 65–70 compared to 18.8 ± 13.2 for ages >85). Furthermore, there is a wide range of TUGT times among older individuals and age alone is not necessarily a good surrogate for frailty.

Compared to other studies consisting of community-dwelling older adults, the patients seen in our practice are frailer, indicated by longer TUGT times. Steffen and colleagues reported mean TUGT times in a community-dwelling cohort as 8 seconds for individuals ages 60–69 (compared to 9.8 seconds in our cohort of individuals ages 65–70) and 9 seconds for individuals ages 70–79 (compared to 11.2 and 12.9 seconds for individuals ages 71–75 and 76–80, respectively in our cohort). For the older age groups, the study also reported mean TUGT times as 10 and 11 seconds in males and females ages 80–89, respectively (compared to our results of 13.5 and 18.8 seconds among individuals ages 81–85 and >85, respectively).[11] In a different study, Hofheinz and colleagues reported an mean TUGT time of 8.39 seconds among individuals ages 60–87 (compared to an mean TUGT time of 11.6 seconds among our cohort).[15] These comparisons suggest that older adults seeking care for urologic conditions may be frailer than the general population of community-dwelling older individuals.

In this study, the number of individuals categorized as having slower TUGT times increased with age, with over half of the individuals older than 85 years recording TUGT times ≥15 seconds. Slow TUGT times of ≥15 seconds were shown by Robinson and colleagues to be associated with higher rates of one or more postoperative complications, discharge to an institutional care facility, 30-day hospital readmission, and 1-year mortality.[13] Additionally, if prefrail TUGT times (11–14 seconds) are considered, the majority of TUGT times in our cohort were either prefrail or frail starting at age 75. Robinson found that even intermediate

TUGT times of 11–14 seconds were associated with higher risks of one or more postoperative complications and institutionalization.[13]

This is the first study to describe TUGT times across different urologic diagnoses, demonstrating that certain diagnosis categories are associated with slower TUGT times, such as UTI or Neurogenic Bladder. Trends of frailty, as measured by the TUGT, by urologic diagnosis can inform clinicians in the urologic setting to think about frailty in patients presenting with these diagnoses. The mechanisms underpinning these TUGT differences among the diagnosis categories provide the basis for further research.

There were no differences in TUGT times between patients who did and did not undergo urologic surgery in our cohort, even when stratified by age and by urologic diagnosis. This finding suggests that the TUGT did not influence surgical decision-making despite literature suggesting that frailty adversely affects post-operative outcomes. While the reasons behind this finding are beyond the scope of this study, there are several possible explanations. First, this study does not take into account the nuances of the surgical decision-making process or the complexity of the type of procedure being performed. Further, if a urologist chose a lower risk procedure for an individual based on frailty, such as a ureteral stent instead of a percutaneous nephrolithotomy or ureteroscopy for a patient with a stone, this would not be reflected in our data. Additionally, this finding may represent the more complex patient population that is referred to our academic tertiary referral practice or a lack of integration of these findings into practice.

There are certain limitations that should be considered with interpretation of this study. First, the generalizability of this study may be limited because our data represent patients seen in an academic referral practice. Due to the need for specialized care, these patients may be sicker and frailer than patients presenting to community practices. Second, while the TUGT has excellent test-retest, interrater and intrarater reliability,[15,16] there are a number of influences on an individual's TUGT performance at a particular point in time, such as acute illness. This study analyzed the first TUGT time recorded for each patient. However, with subsequent visit TUGT times recorded in the geriatric urology database, it is possible to utilize these longitudinal data in further analysis.

Conclusions

In summary, the TUGT is a feasible measure of frailty in an adult urology practice and characterizes the majority of individuals in our academic non-oncologic practice as frail or prefrail. TUGT times, and thus frailty, increased with age and differed among urologic diagnoses. With no TUGT differences between individuals who did and did not undergo urologic surgery, there is an opportunity for frailty and its impact on the risks and benefits of surgery to be factored more strongly into preoperative surgical decisions. These findings indicate that frailty is sufficiently common to make the TUGT worthwhile in urology clinics and should raise awareness for all urologists to consider frailty when making treatment decisions with their older patients.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Funding: National Institute of Diabetes and Digestive and Kidney Diseases University of California, San Francisco KURe Career Development Program (K12 DK83021-07); Medical Student Training in Aging Research Program, the National Institute on Aging T35AG026736; National Institute on Aging at the National Institutes of Health (grant K24AG041180); UCSF CTSI Scholars Program; UCSF Claude D. Pepper Older Americans Independence Center

References

1. Drach GW, Griebling TL. Geriatric urology. Journal of the American Geriatrics Society. Jul; 2003 51(7 Suppl):S355–358. [PubMed: 12823668]
2. Togoni P, Simonato A, Robutti N, et al. Preoperative risk factors for postoperative delirium (POD) after urological surgery in the elderly. Archives of gerontology and geriatrics. May-Jun;2011 52(3):e166–169. [PubMed: 21084123]
3. Bjurlin MA, Goble SM, Fantus RJ, Hollowell CM. Outcomes in geriatric genitourinary trauma. Journal of the American College of Surgeons. Sep; 2011 213(3):415–421. [PubMed: 21723152]
4. Townsend NT, Robinson TN. Surgical Risk and Comorbidity in Older Urologic Patients. Clinics in geriatric medicine. Nov; 2015 31(4):591–601. [PubMed: 26476118]
5. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. The journals of gerontology. Series A, Biological sciences and medical sciences. Mar; 2001 56(3):M146–156.
6. Makary MA, Segev DL, Pronovost PJ, et al. Frailty as a predictor of surgical outcomes in older patients. Journal of the American College of Surgeons. Jun; 2010 210(6):901–908. [PubMed: 20510798]
7. Revenig LM, Canter DJ, Taylor MD, et al. Too frail for surgery? Initial results of a large multidisciplinary prospective study examining preoperative variables predictive of poor surgical outcomes. Journal of the American College of Surgeons. Oct; 2013 217(4):665–670. e661. [PubMed: 24054409]
8. Suskind AM, Jin C, Cooperberg MR, et al. Preoperative Frailty Is Associated With Discharge to Skilled or Assisted Living Facilities After Urologic Procedures of Varying Complexity. Urology. Jul.2016 97:25–32. [PubMed: 27392651]
9. Chow WB, Rosenthal RA, Merkow RP, et al. Optimal preoperative assessment of the geriatric surgical patient: a best practices guideline from the American College of Surgeons National Surgical Quality Improvement Program and the American Geriatrics Society. Journal of the American College of Surgeons. Oct; 2012 215(4):453–466. [PubMed: 22917646]
10. Podsiadlo D, Richardson S. The timed “Up & Go”: a test of basic functional mobility for frail elderly persons. Journal of the American Geriatrics Society. Feb; 1991 39(2):142–148. [PubMed: 1991946]
11. Steffen TM, Hacker TA, Mollinger L. Age- and gender-related test performance in community-dwelling elderly people: Six-Minute Walk Test, Berg Balance Scale, Timed Up & Go Test, and gait speeds. Physical therapy. Feb; 2002 82(2):128–137. [PubMed: 11856064]
12. Nordin E, Rosendahl E, Lundin-Olsson L. Timed “Up & Go” test: reliability in older people dependent in activities of daily living--focus on cognitive state. Physical therapy. May; 2006 86(5): 646–655. [PubMed: 16649889]
13. Robinson TN, Wu DS, Sauaia A, et al. Slower walking speed forecasts increased postoperative morbidity and 1-year mortality across surgical specialties. Annals of surgery. Oct; 2013 258(4): 582–588. discussion 583–590. [PubMed: 23979272]

14. Savva GM, Donoghue OA, Horgan F, O'Regan C, Cronin H, Kenny RA. Using timed up-and-go to identify frail members of the older population. The journals of gerontology. Series A, Biological sciences and medical sciences. Apr; 2013 68(4):441–446.
15. Hofheinz M, Schusterschitz C. Dual task interference in estimating the risk of falls and measuring change: a comparative, psychometric study of four measurements. Clinical rehabilitation. Sep; 2010 24(9):831–842. [PubMed: 20562166]
16. Shumway-Cook A, Brauer S, Woollacott M. Predicting the probability for falls in community-dwelling older adults using the Timed Up & Go Test. Physical therapy. Sep; 2000 80(9):896–903. [PubMed: 10960937]

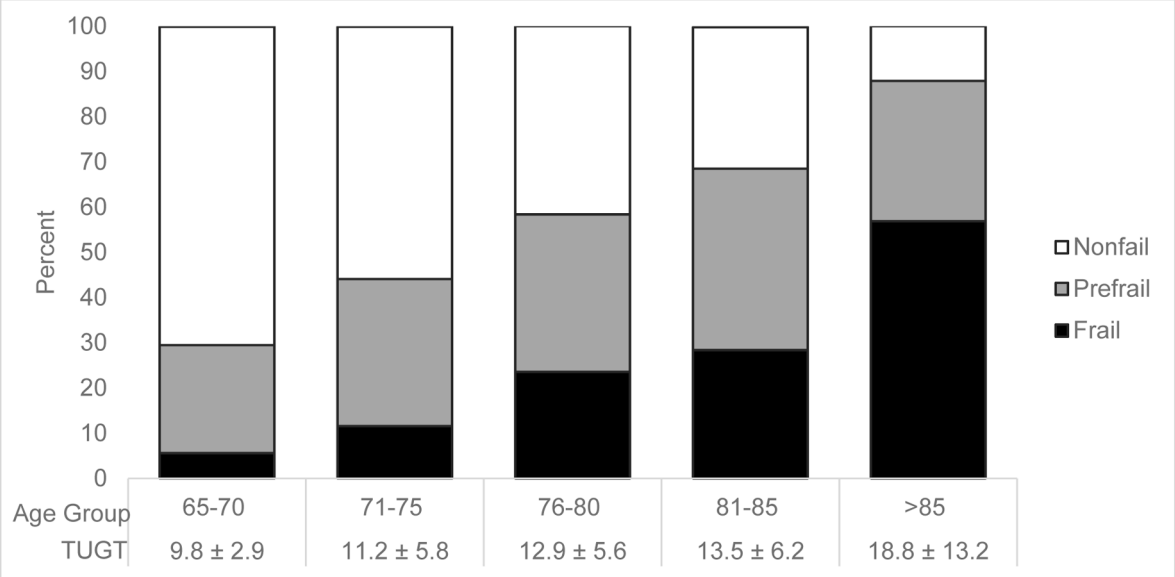

Figure 1.

Distribution of TUGT times by age group ($p < 0.05$). TUGT values listed in x axis are represented as means with standard deviations by age group.

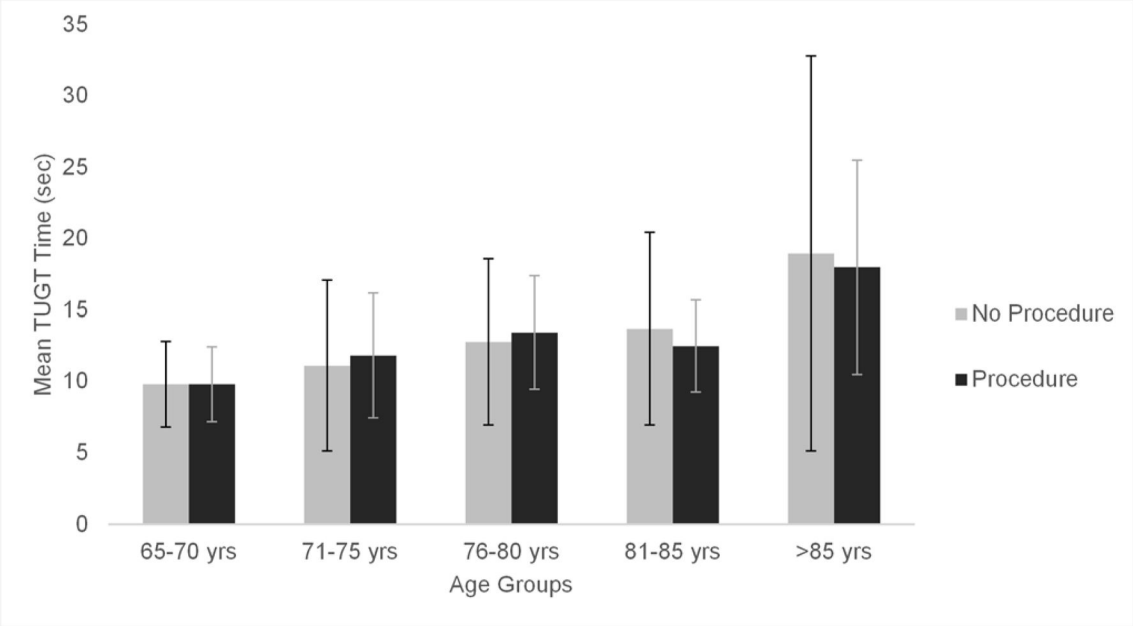

Figure 2.

Mean TUGT times per age group of patients who did and did not undergo surgery. Error bars represent standard deviations. All p values >0.05 for comparison of each age group, representing no difference between groups.

Table 1

Demographic characteristics of study cohort.

Variable	Value (N=1089)
Age; mean (SD)	73.3 (6.3)
Age Group	
65–70 years	443 (40.7%)
71–75 years	308 (28.3%)
76–80 years	178 (16.3%)
81–85 years	102 (9.4%)
> 85 years	58 (5.3%)
Gender	
Female	244 (22.4%)
Male	845 (77.6%)
Race	
Asian	126 (11.6%)
Black	49 (4.5%)
White	705 (64.7%)
Other	209 (19.2%)
TUGT time in seconds; mean (SD)	11.6 (6.0)
TUGT Classification	
Nonfrail (<10 seconds)	597 (54.8%)
Prefrail (11–14 seconds)	327 (30.0%)
Frail (≥15 seconds)	165 (15.2%)

Table 2

Mean TUGT time by urologic diagnosis category.

Variable	Value (N=1089)	TUGT (sec)	Standard Deviation
Urinary Tract Infection	109 (10.0%)	14.3	± 11.9
Neurogenic Bladder	34 (3.1%)	13.4	± 4.9
Urgency/Frequency/OAB	266 (24.4%)	13.0	± 5.6
LUTS/BPH/Retention/Nocturia	391 (35.9%)	12.4	± 5.9
Urinary Incontinence	149 (13.7%)	12.1	± 7.5
Hematuria	86 (7.9%)	11.6	± 4.7
Male Urethral	108 (9.9%)	11.1	± 3.2
Stones/Ureteral Obstruction	215 (19.7%)	10.8	± 4.7
Male General Urology	318 (29.2%)	9.9	± 3.0

OAB, overactive bladder; LUTS, lower urinary tract symptoms; BPH benign prostatic hyperplasia.