

ORIGINAL ARTICLE

Effect of vacation on urinary symptoms in health care workers: an Italian multicenter study

Cosimo DE NUNZIO ¹*, Antonio NACCHIA ¹, Riccardo LOMBARDO ¹,
Aldo BRASSETTI ², Angela SICA ¹, Valeria BALDASSARRI ¹, Giorgio GUARNOTTA ¹,
Yazan AL SALHI ³, Gabriele TUDERTI ², Vincenzo LI MARZI ⁴, Enrico FINAZZI AGRO ⁵,
Antonio PASTORE ³, Antonio CARBONE ³, Giuseppe SIMONE ², Andrea TUBARO ¹
on behalf of the publications committee of Italian Society of Urodynamics (SIUD)

¹Department of Urology, Sant'Andrea Hospital, Rome, Italy; ²Department of Urology, Regina Elena National Cancer Institute, Rome, Italy; ³Department of Urology, Traumatological Orthopedic Surgical Institute, Latina, Italy; ⁴Department of Urology, Careggi Hospital, University of Florence, Florence, Italy; ⁵Department of Urology, Tor Vergata University, Rome, Italy

*Corresponding author: Cosimo De Nunzio, Department of Urology, Sant'Andrea Hospital, Rome, Italy.
E-mail: cosimodenunzio@virgilio.it

ABSTRACT

BACKGROUND: Aim of our study was to assess the impact of vacation on urinary symptoms in health care workers.

METHODS: Between March 2018 to October 2019 a survey was carried out by enrolling health care system workers in three centers. Demographic and clinical characteristics of health care workers (*i.e.* age, smoking status, medical history) were collected. Lower urinary tract symptoms (LUTS) and work related quality of life were assessed before and after vacation with validated questionnaires: Overactive Bladder Questionnaire Short Form (OABq-sf), International Prostate Symptom Score (IPSS), Work-related Quality of Life (WRQOL) and SF-36 questionnaires. As well, night shift workers (NSWs), defined as working at least one time a week from 8 pm to 8 am, were compared to traditional workers (TWs).

RESULTS: A total of 236 participants (118 males and 118 females) with a median of 41 (32/49 IQR) years old were included in the survey. Healthcare workers presented after vacation an improvement in LUTS, in work related quality of life and overall health. Overall, 89 (37%) were NSWs and 147 (62%) subjects were TWs. NSWs reported a significant higher median OABq Total Score and IPSS than TWs: respectively, 27 (IQR 23-34) vs. 20 (IQR 19-24) $P=0.01$, 2 (0/6) vs. 0 (0/2) ($P<0.01$). No significative differences were found for WRQOL and SF36, respectively 66 (IQR 59/77) vs. 67 (IQR 61/82) ($P<0.29$) and 98 (97/101) vs. 98 (97/100) ($P<0.79$).

CONCLUSIONS: NSWs present worst urinary symptoms when compared to TWs. Vacation has a beneficial effect, particularly in NSWs, on urinary symptoms and work-related quality of life.

(Cite this article as: De Nunzio C, Nacchia A, Lombardo R, Brassetti A, Sica A, Baldassarri V, *et al.*; publications committee of Italian Society of Urodynamics (SIUD). Effect of vacation on urinary symptoms in health care workers: an Italian multicenter study. Minerva Urol Nephrol 2022;74:755-60. DOI: 10.23736/S2724-6051.21.04274-0)

KEY WORDS: Urinary bladder, overactive; Shift work schedule; Lower urinary tract symptoms; Holidays.

Night shift work (NSW) is highly frequent in our society with a prevalence of 15-30%.¹ Furthermore, several studies have displayed that NSW negatively impacts the overall health of workers with detrimental effects on cardiovascular, metabolic, gastrointestinal and psychiatric health.² Moreover, it interferes with the body's

natural circadian rhythm and decline of sleep duration and quality.³

Lower urinary tract symptoms (LUTS) are one of the most common and troublesome medical conditions in older men. LUTS may be present in up to 97% of men ≥ 65 years old and are associated with worse health quality.⁴ Further-

more, LUTS increases the risk of impaired sleep quality through nocturia episodes. As well, it has been reported that an improvement in LUTS may improve sleep disturbances.⁵ Currently, the true relationship between night shift work and urogenital diseases has been only preliminary investigated. Initial studies report that night-shift workers (NSWs) have a higher prevalence of LUTS, elevated prostate specific antigen (PSA) levels, hypogonadal symptoms and sexual dysfunction.⁶⁻⁹

Several studies have investigated the possible impact of lifestyle modification on LUTS even in NSW.^{10, 11} However, no studies have evaluated the possible role of vacation on LUTS. Vacation may improve cellular health, regulation of stress response, immune function and metabolism^{7, 8} which have been involved in LUTS pathogenesis.

The aim of the present study was to assess the impact of vacation on LUTS and quality of life (QoL) in health care workers and particularly identify possible differences between NSW and NW.

Materials and methods

From March 2018 to October 2019, a prospective study was conducted in three Italian centers (Sant'Andrea Hospital, ICOT Latina, Regina Elena National Cancer Institute, Rome) enrolling health care workers. They were nurses and doctors less than 50 years old. Participants were divided in NSWs and TWs. NSW was defined as a subject with at least one night shift work (from 8.00pm to 8.00am) per week in contrast to traditional workers (TWs). Only stable NSWs (at least 1 year) were included. All the participants signed a dedicated informed consent and the study was conducted in accordance with the principles of the declaration of Helsinki.

The selection criteria included patients of either sex, naïve to other previous LUTS treatment as well as without any sleep disorders and use of sleep-assistant-medicines. A negative urine culture was required to exclude urinary tract infections. Overactive Bladder questionnaire-short form (OABq-sf)¹² and IPSS were used to assess urinary symptoms.

QoL was assessed by the Work-Related Quality of Life (WRQoL) Scale. The questionnaire is a 23-item psychometric scale used to gauge the perceived quality of life of employees through six psychosocial sub-factors. The WRQoL is composed by six sub-scale General Well-Being (GWB), Home-Work Interface (HWI), Job and Career Satisfaction (JCS), Control at Work (CAW), Working Conditions (WCS), Stress at Work (SAW).¹³ As well the SF36 questionnaire was used to evaluate health status. All questionnaire were filled at baseline and three weeks after a vacation of at least 7 days.

Statistical analysis

Statistical analysis was performed using the SPSS 24.0 IBM software. Collected data were analyzed in according to being NSWs or TWs and before and after vacation through descriptive methods and P values <0.05 were considered statistically significant. Due to absence of normality distribution, Mann-Whitney test was used for comparisons of continuous variables while Fisher's Exact test for comparisons of categorical variables. Wilcoxon rank test was performed to test significant differences before and after vacation. An alpha value of 5% was considered as threshold for significance. Data are presented as median (Inter quartile range (IQR)).

Results

Overall, two hundred thirty-six subjects with a median age of 41 years (IQR 32-49) were enrolled: 118 (50%) males and 118 (50%) females. Participants' characteristics are summarized in Table I. In particular, 137 (58%) participants were nurses and 99 (42%) physicians.

Regarding night work status, 147 (63%) subjects were TWs and 89 (37%) were NSWs. No significative differences were observed for age, BMI, diabetes, hypertension, cardiac heart diseases and smoking status between TWs or NSWs (Table II). Urine-culture was performed for all participants and they were all negative. NSWs and TWs respectively worked a median of 10 (IQR 10-12) vs. 0 hours per night, 8 (IQR 7-8) vs. 8.5 (IQR 8.0-10.0) hours per day (P=0.05) and 36 (IQR 24-40) vs. 45 (IQR 40-48) hours

TABLE I.—*Population's characteristics.*

Overall participants	236
Gender	
Males	118 (50%)
Females	118 (50%)
Job	
Nurse	137 (58%)
Doctors	99 (42%)
Night work	
TWs	147 (63%)
NSWs	89 (37%)
Smokers	100 (42%)
Age	41 (IQR 32/49)
BMI	24 (IQR 23/27)
Diabetes	13 (6%)
Hypertension	36 (15%)
Cardiac Heart Disease	8 (3%)

Data are reported as median (interquartile range) or n (%). Age is reported in years, BMI is reported in kg/m².

TABLE II.—*NSWs vs. TWs.*

	NSWs	TWs	P
Subjects	89	147	
Age	39 (32/45)	41 (31/51)	0.56
BMI	23 (22/25)	23 (22/24)	0.44
Diabetes	5 (5%)	8 (5%)	0.80
Hypertension	15 (17%)	21 (14%)	0.24
Cardiac heart disease	5 (6%)	3 (2%)	0.87
No smoker/smoker	55/34	81/66	0.08
Night hours per day	10 (10/12)	0	
Night hours per week	12 (10/15)	0	
Work hours per day	8 (7/8)	8 (8/10)	0.05
Hours per week	36 (24/40)	45 (40/48)	0.01
OABq-SF	27 (23/34)	20 (19/24)	0.01
OABq-SB	10 (8/12)	7(6/8)	0.01
OABq-HRQOL	16 (15/21)	13(13/15)	0.01
IPSS	2 (0/6)	0 (0/2)	0.01
sIPSS	0 (0/1)	0 (0/1)	0.01
vIPSS	1 (0/4)	0 (0/1)	0.01
WRQOL	66 (59/77)	67 (61/82)	0.29
GWb	15 (12/21)	19 (13/23)	0.08
HWI	13 (10/13)	11 (10/13)	0.01
JCS	14 (11/15)	13 (11/20)	0.94
CAW	10 (6/13)	9 (8/10)	0.13
WCS	9 (8/10)	10 (8/14)	0.03
SAW	8 (5/9)	10 (8/14)	0.65
SF36	98 (97/101)	98 (97/100)	0.79

OABq-sf: Overactive Bladder Questionnaire Short Form; OABq-SB: OABq symptom bother; OABq-HRQOL: OABq Health Related Quality of Life; IPSS: International Prostate Symptom Score; sIPSS: storage IPSS; vIPSS: voiding IPSS; WRQOL: Work-related Quality of Life; GWb: general well-being; HWI: home-work interface; JCS: job and career satisfaction; CAW: Control at Work; WCS: working conditions; SAW: stress at work. Data are presented as median (interquartile range) and N. (%). Age is reported in years, BMI is reported in kg/m².

per week ($P=0.01$). NSWs reported a significant higher median OABq Total Score, symptoms bother and QoL Score than TWs: respectively, 27

(IQR 23-34) vs. 20 (IQR 19-24) $P=0.01$; 10 (IQR 8-12) vs. 7 (IQR 6-8) $P=0.01$; 16 (IQR 15-21) vs. 13 (IQR 13-15) $P=0.01$. Health care workers presented an improvement in urinary symptoms after vacation. More specifically OABq scores were lower after vacation (23 vs. 20, $P=0.01$), as in NSWs (26 vs. 24, $P=0.01$) as in TWs (21 vs. 19, $P=0.01$). As well, they presented an improvement in quality of life after vacation on WRQOL scores (67 vs. 69, $P=0.01$), as in NSWs (66 vs. 71, $P=0.01$) as in TWs (67 vs. 69, $P=0.04$), and on SF-36 questionnaire (98 vs. 101, $P=0.01$), as in NSWs (98 vs. 100, $P=0.01$) as in TWs (98 vs. 101, $P=0.01$) (Table III). Moreover, we observed NSWs had a median reduction of two points on OABscore and an improvement of 2.5 points on WRQOL and two point on SF36. TWs had a median reduction on OABscore of 0.5 point and a median improvement of two points on WRQOL and one point on SF36 (Figure 1).

Discussion

In an Italian multicenter cohort of health workers, we confirmed that NSWs have higher urinary symptoms than traditional workers. We confirmed previous study which a single center series of NSWs had higher OABq Total Score, OABq-SB Score and OABq-HRQL Score in NSWs than TWs.¹⁴ Likewise, a worsening on quality of life was referred. Moreover, we found fewer urinary symptoms after vacation. We also observed a positive effect of vacation on LUTS, particularly on storage symptoms and QoL. It is well known that working during the night interferes with the body's natural circadian rhythm with negative impact on sleep quality and duration. It has been also estimated that almost 90% of shift workers experience fatigue at work and 38% of NSW are affected by insomnia.¹⁵ Originally, Strohmaier *et al.*¹⁶ reviewed epidemiological studies regarding the association of NSW with type 2 diabetes and cardiovascular disease risk moving from the evidence that myocardial infarction is more common in the early morning hours. Then night workers have been also found to experience a higher risk of cardiometabolic diseases including type 2 diabetes and cardiovascular diseases; the mechanistic studies suggest that these effects are mediated by alterations

TABLE III.—Urinary symptoms, quality of life and health before and after vacation.

	Overall Population			NSW			TW		
	Before vacation	After vacation	P	Before vacation	After vacation	P	Before vacation	After vacation	P
OABq – 1	8 (6/11)	7 (6/9)	0.01	10 (8/12)	9 (7/11)	0.01	7 (6/10)	6 (6/7)	0.01
OABq – 2	15 (13/18)	13 (13/15)	0.01	16 (15/21)	15 (13/19)	0.01	14 (13/17)	13 (13/14)	0.01
OABq – SF	23 (20/28)	20 (19/24)	0.01	26 (23/33)	24 (20/31)	0.01	21 (19/27)	19 (19/20)	0.01
IPSS -tot	1 (0/4)	0 (0/2)	0.03	2 (2/6)	1 (1/2)	0.04	1 (1/8)	0 (0/1)	0.15
sIPSS	0 (0/1)	0 (0/1)	0.02	0 (0/1)	0 (0/1)	0.07	0 (0/0)	0 (0/0)	0.10
vIPSS	0 (0/3)	0 (0/2)	0.05	1 (1/3)	0 (0/1)	0.02	0 (0/1)	0 (0/1)	0.47
WRQOL	67 (61/78)	69 (61/81)	0.01	66 (59/77)	71 (61/81)	0.01	67 (61/81)	69 (63/84)	0.04
GWB	15 (13/23)	18 (13/24)	0.01	15 (12/21)	16 (14/33)	0.01	19 (13/23)	20 (13/25)	0.01
HWI	12 (10/13)	13 (10/14)	0.01	13 (10/13)	13 (11/14)	0.01	11 (10/13)	12 (10/13)	0.01
JCS	13 (12/19)	14 (12/19)	0.01	14 (11/15)	14 (12/17)	0.01	13 (11/20)	14 (12/21)	0.01
CAW	9 (7/12)	10 (8/12)	0.01	9 (8/10)	9 (8/10)	0.01	10 (6/13)	10 (8/14)	0.01
WCS	9 (8/11)	10 (8/11)	0.01	9 (8/10)	9 (8/10)	0.02	10 (8/14)	10 (8/14)	0.09
SAW	7 (5/9)	8 (5/9)	0.01	8 (5/9)	8 (6/9)	0.01	7 (5/9)	8 (5/9)	0.01
SF36	98 (97/100)	101 (99/102)	0.01	98 (97/101)	100 (97/103)	0.01	98 (97/100)	101 (100/102)	0.01

OABq-sf: Overactive Bladder Questionnaire Short Form; OABq-SB: IPSS: International Prostate Symptom Score; sIPSS: storage IPSS; vIPSS: voiding IPSS; WRQOL: Work-related Quality of Life; GWB: general well-being; HWI: home-work interface; JCS: job and career satisfaction; CAW: Control at Work; WCS: working conditions; SAW: stress at work. Data are presented as median (interquartile range).

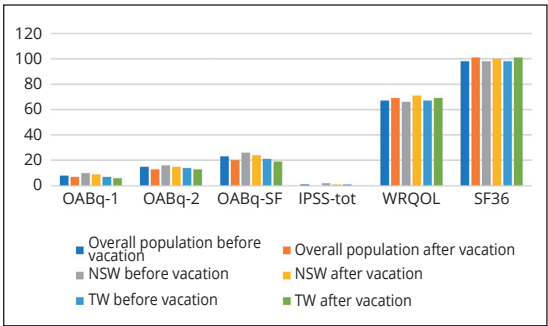


Figure 1.—Questionnaires of NSWs and TWs before and after vacation.

in melatonin levels and melatonin's function on melatonin receptors throughout the body, as well as through clock-genetic variants, and inflammatory and endothelial pathways common to cardiovascular diseases and type 2 diabetes.¹⁷

At present, few studies have evaluated the possible impact of NSW on LUTS, their impact on QoL and the effect of vacation of them. Araujo *et al.*¹⁸ performed a 5-years long longitudinal study to observe the relationship between sleep disorders and urinary symptoms. The authors found that sleep restrictions were associated with storage urinary symptoms but not with voiding ones. Wang *et al.*¹⁹ found a statistically significance but not clinically relevant difference in the rate of nocturia episodes between nurses performing NSW and TWs.

Similar results were observed by Kim *et al.*

who evaluated 1741 patients comparing nocturia in NSWs and TWs through frequency volume charts. The authors found that nocturia frequency increased in the NSW group (2.38 ± 1.44 vs. 2.18 ± 1.04 , $P < 0.01$) speculating to a circadian cycle disruption as possible cause.¹⁹ However at our knowledge just only this least study assessed the impact on QoL.

The mechanism by which NSW leads to urinary symptoms and vacation restore these symptoms is not fully understood but only supposed. For instance, it has been proposed a psychological stress-related mechanism disrupting brain-bladder signaling at the level of urothelium and predisposing to LUTS.²⁰ Again, a melatonin-mediated pathway was also suggested, according to which a lower secretion of this endogenous hormone leads to increase urine production and decrease bladder capacity thus increasing nocturia in NSWs.²¹ Another possible explanation could be the adaptation to the changed schedule. When circadian changes occur, the body steadily adapt over time, though not as successfully as when the new schedule is completely in sync with the solar light cycle. This process is called entrainment, and as such, prolonged night shift schedules actually adapt to the new rhythm.¹⁹

Effects of vacation on urinary symptoms are poorly explored.^{5, 8, 21, 22} A metanalysis demonstrated vacation has positive effects on health and well-being, but that these effects soon fade out

after work resumption. Vacation activities and experiences have hardly been studied. Therefore, their contribution to vacation effect and fade out remains unclear.²¹ Results from a metanalysis of 2009 suggest that vacation has positive effects on health and well-being (small effect, $d=+0.43$), but that these effects soon fade out after work resumption (small effect, $d=-0.38$).²¹

Limitations of the study

We must acknowledge some limitations to the present study. The lack of frequency-volume charts did not allow the assessment of urine amount, overall/overnight urine production or nocturnal bladder capacity. Moreover, OABq considers only the last four weeks and does not allow a complete and long term evaluation. So we do not know if this is a temporary effect. As well, we did not collect data on the number of cigarettes smoked per day, or on fluid or junk food intake therefore we cannot evaluate the possible impact of these factors on LUTS and Health status before and after a vacation in health care workers. Smoking was almost statistically significant ($P=0.08$); smokers were predominant in TWs, although no significant relationship have been found with LUTS in this study probably related to the small number of patients. Previously experience from our group clearly demonstrated as smokers presented higher risk of LUTS, especially storage symptoms as nocturia although in an elderly population. This association is more evident in obese patients or in patients with metabolic syndrome. Further studies should investigate this possible relationship in our patients. Our cohort includes only young nurses or doctors (less than 50 years), with no comorbidities/chronic conditions, no chronic medications and therefore our results apply only to our study cohort (younger doctors or nurses receiving no treatments for LUTS and working in the Italian National Health System) and cannot be extended to all workers and to different health care services. The results clearly depend upon the enrolled population and the type of works. Lastly, the lack of long-term and follow-up data could be also considered an important limitation as well. However, a study evaluating the possible effect of vacation on long term

LUTS restoring or development is ongoing and results will be soon available. Notwithstanding all these limitations, our study is the only available multicenter study evaluating in a homogeneous group of National Health System workers the risk of LUTS and of an impaired QoL according to the working status before and after vacation.²³⁻²⁸

Conclusions

NSW has a negative impact on micturition with an increased risk of storage urinary symptoms and a deterioration of QoL. Vacation can restore urinary symptoms, particularly in NSW. Further studies with longer follow-up are needed to clarify the pathological mechanisms behind this association and particularly to evaluate which conditions (vacation, change in working status, etc.) can possibly reverse and for how long this clinical scenario.

References

1. Ko CH, Takahashi JS. Molecular components of the mammalian circadian clock. *Hum Mol Genet* 2006;15(suppl 2):R271-7.
2. Vetter C, Devore EE, Węgrzyn LR, Massa J, Speizer FE, Kawachi I, *et al.* Association between rotating night shift work and risk of coronary heart disease among women. *JAMA* 2016;315:1726-34.
3. Ika K, Suzuki E, Mitsuhashi T, Takao S, Doi H. Shift work and diabetes mellitus among male workers in Japan: does the intensity of shift work matter? *Acta Med Okayama* 2013;67:25-33.
4. Lopes Mendes AL, Decalf V, Denys MA, Tubaro A, Everaert K. The impact of nocturnal polyuria in older people with nocturnal LUTS. *Minerva Urol Nefrol* 2017;69:377-83.
5. Helfand BT, McVary KT, Meleth S, Sharp V, Foster H, Naslund M, *et al.*; CAMUS Study Group. The relationship between lower urinary tract symptom severity and sleep disturbance in the CAMUS trial. *J Urol* 2011;185:2223-8.
6. Lindgren MC, Deng N, Pastuszak AW. Male non standard shift workers are predisposed to depression and hypogonadal symptoms. *J Sex Med* 2016;14:e7.
7. Scovell JM, Pastuszak AW, Slawin J, Badal J, Link RE, Lipshultz LI. Impaired sleep quality is associated with more significant lower urinary tract symptoms in male shift workers. *Urology* 2017;99:197-202.
8. Flynn-Evans EE, Mucci L, Stevens RG, Lockley SW. Shiftwork and prostate-specific antigen in the National Health and Nutrition Examination Survey. *J Natl Cancer Inst* 2013;105:1292-7.
9. Pastuszak AW, Moon YM, Scovell J, Badal J, Lamb DJ, Link RE, *et al.* Poor sleep quality predicts hypogonadal symptoms and sexual dysfunction in male nonstandard shift workers. *Urology* 2017;102:121-5.

10. Epel ES, Puterman E, Lin J, Blackburn EH, Lum PY, Beckmann ND, *et al.* Meditation and vacation effects have an impact on disease-associated molecular phenotypes. *Transl Psychiatry* 2016;6:e880.
11. Díaz-Zavala RG, Castro-Cantú MF, Valencia ME, Álvarez-Hernández G, Haby MM, Esparza-Romero J. Effect of the Holiday Season on Weight Gain: A Narrative Review. *J Obes* 2017;2017:2085136.
12. Coyne KS, Thompson CL, Lai JS, Sexton CC. An overactive bladder symptom and health-related quality of life short-form: validation of the OAB-q SF. *Neurourol Urodyn* 2015;34:255–63.
13. Zubair MH, Hussain LR, Williams KN, Grannan KJ. Work-Related Quality of Life of US General Surgery Residents: Is It Really so Bad? *J Surg Educ* 2017;74:e138–46.
14. De Nunzio C, Nacchia A, Cicione A, Sica A, Baldassarri V, Voglino O, *et al.* Night shift workers refer higher urinary symptoms with an impairment quality of life: a single cohort study. *Minerva Urol Nefrol* 2020. [Epub ahead of print]
15. Deng N, Haney NM, Kohn TP, Pastuszak AW, Lipshultz LI. The effect of shift work on urogenital disease: a systematic review. *Curr Urol Rep* 2018;19:57.
16. Strohmaier S, Devore EE, Zhang Y, Schernhammer ES. A Review of Data of Findings on Night Shift Work and the Development of DM and CVD Events: a Synthesis of the Proposed Molecular Mechanisms. *Curr Diab Rep* 2018;18:132.
17. Wang Q, Hu H, Liang C. Effect of the night shift work on micturition patterns of nurses. *Beijing Da Xue Xue Bao* 2016;48:659–62.
18. Araujo AB, Yaggi HK, Yang M, McVary KT, Fang SC, Bliwise DL. Sleep related problems and urological symptoms: testing the hypothesis of bidirectionality in a longitudinal, population based study. *J Urol* 2014;191:100–6.
19. Kim JW. Effect of Shift Work on Nocturia. *Urology* 2016;87:153–60.
20. Kim KT, Kim CH, Kwon B, Han DH, Yoon SJ, Cho S, *et al.* Do rotational shifts affect micturition patterns in real practice? A pilot study in healthy, young female nurses. *Int Neurourol J* 2014;18:206–12.
21. de Bloom J, Kompier M, Geurts S, de Weerth C, Taris T, Sonnentag S. Do we recover from vacation? Meta-analysis of vacation effects on health and well-being. *J Occup Health* 2009;51:13–25.
22. Lennert T, Luft FC. Kidneys on vacation: the notion of renal work and the introduction of nonpharmacological therapies. *Am J Kidney Dis* 1997;29:777–80.
23. Gacci M, Corona G, Sebastianelli A, Serni S, De Nunzio C, Maggi M, *et al.* Male Lower Urinary Tract Symptoms and Cardiovascular Events: A Systematic Review and Meta-analysis. *Eur Urol* 2016;70:788–96.
24. De Monte C, Carradori S, Granese A, Di Pierro GB, Leonardo C, De Nunzio C. Modern extraction techniques and their impact on the pharmacological profile of *Serenoa repens* extracts for the treatment of lower urinary tract symptoms. *BMC Urol* 2014;14:63.
25. Trucchi A, De Nunzio C, Mariani S, Palleschi G, Miano L, Tubaro A. Local anesthesia reduces pain associated with transrectal prostatic biopsy. A prospective randomized study. *Urol Int* 2005;74:209–13.
26. Asimakopoulos AD, De Nunzio C, Kocjancic E, Tubaro A, Rosier PF, Finazzi-Agrò E. Measurement of post-void residual urine. *Neurourol Urodyn* 2016;35:55–7.
27. Creta M, Collà Ruvolo C, Longo N, Mangiapia F, Arcaniolo D, De Sio M, *et al.* Detrusor overactivity and underactivity: implication for LUTS related to BPH diagnosis and treatment. *Minerva Urol Nefrol* 2021;73:59–71.
28. Lombardo R, Tema G, Cornu JN, Fusco F, McVary K, Tubaro A, *et al.* The urothelium, the urinary microbiome and men LUTS: a systematic review. *Minerva Urol Nefrol* 2020;72:712–22.

Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Authors' contributions.—Cosimo De Nunzio: study conception and design, drafting of the manuscript; Antonio Nacchia: analysis and interpretation of the data, drafting of the manuscript; Riccardo Lombardo, Aldo Brasseti, Angela Sica, Valeria Baldassarri, Giorgio Guarnotta, Al Salhi Yazan, Gabriele Tuderti, Vincenzo Li Marzi, Enrico Finazzi Agrò, Antonio Pastore, Antonio Carbone and Giuseppe Simone: data collection; Andrea Tubaro: study conception and design. All authors read and approved the final version of the manuscript.

History.—Article first published online: March 29, 2021. - Manuscript accepted: February 17, 2021. - Manuscript revised: February 12, 2021. - Manuscript received: December 5, 2020.