#310 Patterns of treatment and diagnosis in men with overactive bladder and/or benign prostatic hyperplasia in the United States: A retrospective observational study

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Hypothesis / aims of study:

- Symptom overlap between overactive bladder (OAB) and benign prostatic hyperplasia (BPH) presents challenges in the diagnosis and treatment of these conditions in men.
- Research has largely reported on these conditions separately, despite the majority of men presenting with mixed symptoms.
- This study sought to characterize the epidemiology and treatment patterns of adult men (≥40 years) diagnosed with or treated for OAB and/or BPH (collectively referred to as lower urinary tract symptoms [LUTS]).
- Specific objectives included estimating the prevalence of male LUTS in the United States, characterizing treatment and diagnostic patterns, and summarizing clinical and demographic characteristics.

Study design, materials and methods:

- Real-world retrospective cohort study using data from the MarketScan databases from 2012 – 2017; study period starting on January 1, 2013. Data from 2012 were used for baseline characteristics and to establish pre-index treatment and diagnosis patterns. The date of the first observed OAB- or BPH-related ICD-09 code and/or fill for an OAB- or BPH-specific medication was defined as the index date.
- Patients were men ≥40 years at the beginning of the study period, with any relevant ICD diagnosis, and/or one medication claim specific to OAB or BPH. (*Overall LUTS* cohort)†
- The denominator for the prevalence estimate was informed by a count of the total number of men ≥40 years on January 1st 2013, and who were observed in the MarketScan database (irrespective of LUTS diagnosis) during the identification period (the first 24 months of the study).
- A *Treatment Patterns* ("newly treated") cohort was defined as the subset of the overall LUTS cohort who:
  - Had at least 12 months of post-index follow-up data; and
  - Received incident pharmacotherapy during the follow-up period (i.e., those who had no record of therapy during the 12-month pre-index period).
- A *New LUTS* ("newly diagnosed") cohort was defined to allow for the characterization of treatment patterns following initial diagnosis.
  - Patients were men from the overall LUTS cohort with no OAB- or BPH-related diagnosis or treatment codes during the 12-month pre-index period, with at least 12 months of post-index follow-up available.
- Descriptive characteristics of interest included age and Elixhauser comorbidity index.
- Sequencing of diagnosis and/or treatment for OAB and BPH was characterized for all cohorts.

Results:

Patient characteristics (Table 1)

- The prevalence of LUTS was estimated to be 12.2% (LUTS cohort n=462,400).
- The mean age at index was:
  - LUTS cohort: 61.3 years
  - Treatment Patterns cohort (n=128,951): 58.0 years
  - New LUTS cohort: (n=196,576) 58.5 years
- The mean Elixhauser comorbidity index was 2.1 in the LUTS cohort, and 2.0 in both the Treatment Patterns and New LUTS cohorts.
- BPH diagnostic codes were more common than OAB codes in the LUTS cohort (42.3% BPH only vs. 6.6% OAB only; 19.2% having both).
- In the 12 months post-index:
  - OAB diagnosis was more common than OAB treatment (25.8% with any OAB diagnosis vs. 7.0% with any OAB treatment).
  - BPH treatment was more common than diagnosis (61.5% with any BPH diagnosis vs. 73.7% with any BPH treatment).
- Among patients who were ever diagnosed or treated for OAB, 24% received OAB treatment at some point. Conversely, 77% of those ever diagnosed or treated for BPH received BPH treatment at some point.

Table 1 Diagnostic and treatment sequencing observed during the 12 months post-index

	LUTS (N = 462,400)	Treatment Patterns (N = 128,951)	New LUTS (N=196,576)
	n (%)	n (%)	n (%)
Characteristics			
Age			
Median (Q1 - Q3)	61 (54 - 67)	57 (51 - 63)	58 (52 - 63)
Mean (95% CI)	61.3 (61.3 – 61.4)	58.0 (57.9 – 58.0)	58.5 (58.5 – 58.5)
40-49	60,118 (13.0)	25,890 (20.1)	34,955 (17.8)
50-59	149,027 (32.2)	50,795 (39.4)	76,768 (39.1)
60-69	157,590 (34.1)	36,484 (28.3)	59,541 (30.3)
70-79	64,913 (14.0)	11,380 (8.8)	18,687 (9.5)
80+	30,752 (6.7)	4,402 (3.4)	6,625 (3.4)
Elixhauser comorbidity index			
Median (Q1 - Q3)	2.00 (1.00 - 3.00)	2.00 (1.00 - 3.00)	2.00 (1.00 - 2.00)
Mean (95% CI)	2.10 (2.10 - 2.11)	2.00 (1.99 - 2.01)	1.97 (1.97 - 1.98)
Treatment sequencing			
OAB Rx only	12,943 (2.8)	4,259 (3.3)	3,909 (2.0)
BPH Rx only	321,342 (69.5)	117,887 (91.4)	102,120 (51.9)
OAB Rx then BPH Rx	4,759 (1.0)	1,396 (1.1)	535 (0.3)
BPH Rx then OAB Rx	13,050 (2.8)	4,998 (3.9)	2,185 (1.1)
BPH Rx and OAB Rx	1,722 (0.4)	411 (0.3)	328 (0.2)
Never treated for OAB or BPH with Rx	108,584 (23.5)	0 (0.0)	87,499 (44.5)
Diagnostic* sequencing			
BPH Dx only	195,769 (42.3)	42,964 (33.3)	90,657 (46.1)
OAB Dx only	30,589 (6.6)	8,995 (7.0)	20,093 (10.2)
BPH Dx then OAB Dx	43,793 (9.5)	12,850 (10.0)	8,495 (4.3)
OAB Dx then BPH Dx	22,450 (4.9)	8,203 (6.4)	7,753 (3.9)
BPH Dx and OAB Dx	22,404 (4.8)	5,926 (4.6)	8,909 (4.5)
Never received OAB or BPH diagnosis	147,395 (31.9)	50,013 (38.8)	60,669 (30.9)

LUTS=Lower Urinary Tract Symptoms; OAB=Overactive Bladder; BPH=Begin Prostate Hyperplasia; Dx=Diagnosis; Rx=Prescription
*Diagnoses were based on ICD codes; i.e. at least one inpatient code and/or at least two outpatient codes.

Treatment Patterns cohort

- 17,123 (13.3%) individuals received ≥two lines of therapy with alpha-blockers the most frequently prescribed across all lines of therapy (39 months mean follow-up) (Table 2).
- The most common first-line treatments were BPH treatments, including alpha-blockers (76.7%) and tadalafil (16.1%)(Table 2).
- Following first-line: 3.9% switched from BPH to OAB medication; 1.1% switched from OAB to BPH medication; 0.3% received OAB and BPH in combination (Table 1).
- For patients receiving OAB-specific medication in the first-line:
  - Where further lines of therapy were observed, the majority moved to a BPH medication, and a small proportion to OAB + BPH combination therapy.
  - Proportion discontinuing treatment or moving to BPH procedures was less for mirabegron than antimuscarinics.
- Only 3.7% who received alpha blockers as first-line moved on to OAB-specific medication; 0.7% moved to a combination therapy; 62.4% discontinued treatment.
- A higher proportion of men who received alpha-blockers as their first-line discontinued treatment altogether (62.4%), compared to those receiving antimuscarinics (55.5%) or mirabegron (47.2%).

New LUTS cohort

- Among newly diagnosed patients who initiated treatment post-index (n=118,591, 60.3% of all newly-diagnosed patients), the median time to initiating treatment was 128 days (interquartile range 21-466 days).
- Similar to the Treatment Patterns cohort, the most common first-line treatments were alpha-blockers (76.9%) and tadalafil (16.4%) (Table 2).
- Among patients initiating a first-line of therapy, 12.8% went on to receive a second-line of therapy, and 6.6% a third-line (Table 2).

Table 2 Treatments by lines of therapy for the Treatment Patterns & New LUTS cohorts

	Treatment Patterns cohort			New LUTS cohort		
	Line of therapy*			Line of therapy*		
	First (N=128,951)	Second (N=17,123)	Third (N=8,911)	First (N=118,591)	Second (N=15,237)	Third (N=7,859)
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Therapy						
Antimuscarinics (monotherapy)	5,390 (4.2)	3,536 (20.7)	821 (9.2)	4,765 (4.0)	3,204 (21.0)	709 (9.0)
Mirabegron (monotherapy)	434 (0.3)	541 (3.2)	205 (2.3)	364 (0.3)	459 (3.0)	178 (2.3)
Multiple OAB†		7 (0.0)	29 (0.3)	0 (0)	5 (0.0)	26 (0.3)
OAB procedures‡		30 (0.2)	15 (0.2)	0 (0)	25 (0.2)	12 (0.2)
Alpha-blockers (monotherapy)	98,938 (76.7)	4,454 (26.0)	5,565 (62.5)	91,167 (76.9)	3,967 (26.0)	4,960 (63.1)
5-alpha-reductase inhibitors (monotherapy)	3,036 (2.4)	1,425 (8.3)	426 (4.8)	2,530 (2.1)	1,253 (8.2)	355 (4.5)
Tadalafil 2.5mg or 5mg (monotherapy)	20,762 (16.1)	3,046 (17.8)	960 (10.8)	19,424 (16.4)	2,753 (18.1)	854 (10.9)
BPH Surgery†		1,805 (10.5)	255 (2.9)	0 (0)	1,552 (10.2)	211 (2.7)
Multiple BPH	273 (0.2)	1,472 (8.6)	375 (4.2)	239 (0.2)	1,297 (8.5)	330 (4.2)
OAB+BPH	118 (0.1)	807 (4.7)	260 (2.9)	102 (0.1)	722 (4.7)	224 (2.9)

OAB = Overactive bladder; *Patients without corresponding line of therapies are excluded †Patients with multiple OAB therapies, OAB procedures, or BPH surgery observed as first-line therapy are excluded from treatment patterns cohort ‡Sacral Neuromodulation; Percutaneous Tibial Nerve Stimulation; Benign Prostate Hyperplasia

Interpretation of results:

- LUTS was a prevalent condition among males ≥40 years;
- Diagnoses and treatments were more common for BPH than for OAB;
- A large proportion of men who receive alpha blockers as first-line therapy for LUTS discontinued treatment altogether, while only a small proportion were treated for OAB.
- Treatment patterns indicated undertreatment of OAB: OAB diagnosis rates were notably higher than OAB treatment rates, in contrast to BPH, for which treatment rates were higher than diagnosis rates.

Conclusions:

- Correct diagnosis and management of OAB among males is challenging given the inherent symptom overlap with BPH.
- Our data suggest potential undertreatment of men with LUTS.
- The differences between diagnosis and treatment patterns for BPH and OAB highlight the potential undertreatment of OAB, in particular.

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†OAB ICD-9 codes: 788.3, 788.31, 788.33, 788.37, 788.41, 788.43, 788.63 and 788.91; OAB medications: darifenacin, fesoterodine, oxybutynin, solifenacin, tolterodine, trospium and mirabegron; BPH ICD-9: 596.0, 600, 600.0x, 600.1, 600.1x, 600.2, 600.2x, 600.3, 600.9 and 600.9x; BPH medications: terazosin, doxazosin, tamsulosin, alfluzosin, silodosin, dutasteride and daily tadalafil. Men with neurogenic bladder/neurogenic detrusor overactivity, Parkinson's disease, multiple sclerosis, spinal cord injury, malignant neoplasm, renal impairment, hepatic insufficiency, trauma, or organ transplantation were excluded from the analysis.