

An International Continence Society (ICS) report on the terminology for adult neurogenic lower urinary tract dysfunction (ANLUTD)

Jerzy B. Gajewski¹  | Brigitte Schurch²  | Rizwan Hamid³ |
Márcio Averbeck⁴  | Ryuji Sakakibara⁵  | Enrico F. Agrò⁶ |
Tamara Dickinson⁷ | Christopher K. Payne⁸ | Marcus J. Drake⁹ | Bernie T. Haylen¹⁰

¹ Dalhousie University, Halifax, Nova Scotia, Canada

² Neurourology Unit, Department of Clinical Neurosciences, CHUV, University Hospital, Lausanne, Switzerland

³ Department of Neuro-Urology, Spinal Injuries Unit, RNOH, Stanmore/London, United Kingdom

⁴ Department of Urology, Moinhos de Vento Hospital, Porto Alegre, Brazil

⁵ Neurology, Internal Medicine, Sakura Medical Center, Toho University, Sakura, Japan

⁶ Department of Experimental Medicine and Surgery, Tor Vergata University, Rome, Italy

⁷ Department of Urology, UT Southwestern Medical Center Dallas, Texas

⁸ Vista Urology & Pelvic Pain Partners, San Jose, California

⁹ Bristol Urological Institute, Southmead Hospital, Westbury-on-Trym Bristol, United Kingdom

¹⁰ University of New South Wales, Sydney, New South Wales, Australia

Correspondence

Jerzy B. Gajewski, Urology Consultants, 620-5991 Spring Garden Road, Halifax. B3H 1Y6, Nova Scotia, Canada.
Email: jgajew@dal.ca

Introduction: The terminology for adult neurogenic lower urinary tract dysfunction (ANLUTD) should be defined and organized in a clinically based consensus Report.

Methods: This Report has been created by a Working Group under the auspices and guidelines of the International Continence Society (ICS) Standardization Steering Committee (SSC) assisted at intervals by external referees. All relevant definitions for ANLUTD were updated on the basis of research over the last 14 years. An extensive process of 18 rounds of internal and external review was involved to exhaustively examine each definition, with decision-making by collective opinion (consensus).

Results: A Terminology Report for ANLUTD, encompassing 97 definitions (42 NEW and 8 CHANGED, has been developed. It is clinically based with the most common diagnoses defined. Clarity and user-friendliness have been key aims to make it interpretable by practitioners and trainees in all the different groups involved not only in lower urinary tract dysfunction but additionally in many other medical specialties.

Conclusion: A consensus-based Terminology Report for ANLUTD has been produced to aid clinical practice and research.

KEYWORDS

adult, dysfunction, neurogenic, terminology, urinary tract

Rizwan Hamid, Marcus J. Drake, and Bernie Haylen belongs to Standardization Steering Committee ICS.

Jerzy B. Gajewski, Brigitte Schurch, Rizwan Hamid, Márcio Averbeck, Ryuji Sakakibara, Enrico Finazz Agrò, Tamara Dickinson, Christopher K. Payne, Marcus J. Drake, Bernie Haylen belongs to ICS SSC Working Group on Adult Neurogenic Lower Urinary Tract Dysfunction.

1 | INTRODUCTION

“Adult” refers to “a fully grown and physically mature individual”^{1,2} “Neurogenic” refers to “originating in the nervous system.”² “Lower Urinary Tract (LUT)” refers to the bladder, urethra (and prostate in men).² “Dysfunction”

refers to abnormal or difficult function. “Adult neurogenic lower urinary tract dysfunction (ANLUTD)” refers to abnormal or difficult function of the bladder, urethra (and/or prostate in men) in mature individuals in the context of clinically confirmed relevant neurologic disorder. There is currently no single document focusing on the definitions related to ANLUTD. Many ANLUTD symptoms and signs have been defined in core current terminology reports for lower urinary tract and pelvic floor dysfunction.^{3,4,5} With the advantage of ongoing research into ANLUTD epidemiology, pathophysiology as well as pharmacological initiatives by generalist and specialist medical practitioners, it is timely to reconsider the different definitions.

2 | METHODOLOGY

This document was developed according to the published methodology of the International Continence Society Standardization Steering Committee.⁶ This document aligns with the previous standardizations of the ICS on lower urinary tract dysfunction and is adapted to a group of patients with ANLUTD. Thus, ANLUTD can be diagnosed in the presence of neurological disease only. The intent is to supersede older terminology of “Neurogenic Bladder” or “Neurogenic Bladder Dysfunction”: these definitions are misleading, because the dysfunction(s) may involve not only the bladder but also the urethral sphincter competence or relaxation. Furthermore, using a single term to indicate a broad spectrum of dysfunctions is restrictive and unclear. For instance, there are many differences, in terms of investigations needed, treatment and prognosis, between a male patient with spinal cord injury (SCI) at cervical level and a female patient with Parkinson's disease, both complaining of Lower Urinary Tract Symptoms (LUTS) and “labeled” as having a “Neurogenic Bladder.” Finally, these definitions could lead to the conviction that the dysfunction may be due to a problem of the bladder, whilst the primary defect is in the central or peripheral nervous system. The document contains some original standardization of LUTS-related definitions, some modified with designation “CHANGED” and some newly defined — “NEW.”

This Terminology Report is inherently and appropriately a definitional document, collating the definitions of those terms, that is, “words used to express a defined concept in a particular branch of study,”⁷ here ANLUTD. Emphasis has been on comprehensively including those terms in current use in the relevant peer-reviewed literature. The definitions of those terms will be reviewed with all available evidence. The aim is to assist clinical practice and research. Some new and revised terms have been included. Explanatory notes on definitions have been referred, where

possible, to the “Footnotes” section. Like all the other joint ICS terminology reports, every effort has been made to ensure this Report is:

1. User-friendly: It should be able to be understood by all clinical and research users.
2. Clinically based: Refers to the relevant clinical practice.
3. Origin: Where a term's existing definition (from one of multiple sources used) is deemed appropriate, that definition will remain and be duly referenced. A large number of these, because of their long-term use, have now become generic, as apparent by their listing in medical dictionaries.
4. Able to provide explanations: Where a specific explanation is deemed appropriate to describe a change from earlier definitions or to qualify the current definition, this will be included as Footnote to this paper. Wherever possible, evidence-based medical principles will be followed.

This document has involved 18 rounds of full review, by co-authors, of an initial draft (Version 1) completed 16.09.2014. Comments for each round of review were collated and debated as necessary in order to form a subsequent version. Live meetings on the document took place in Zurich and Tokyo.*

This document covers symptoms, signs, urodynamic observations and definitions, clinical diagnoses, and treatment.

3 | RESULTS

1 ANLUTD SYMPTOMS:

Symptom: Any morbid phenomenon or departure from the normal in structure, function, or sensation, experienced by individual and indicative of disease or a health problem.² Symptoms are either volunteered by, or elicited from the individual or may be described by the patient's caregiver.^{3,4,5} LUTS are classified as neurogenic in the presence of a relevant neurological disease ONLY. Symptoms are a subjective indicator of, or change in disease as perceived by the patient, carer, or partner that may lead the patient to seek help from healthcare professionals. They are usually qualitative. In general, LUTS cannot be used to make a definitive diagnosis. LUTS in people with neurological disease can also indicate pathologies other than NLUTD, such as urinary infection.

*14th International Neuro-Urology Meeting, Zürich 2016 and International Continence Society Meeting, Tokyo, 2016.

Three groups of LUTS are: storage, voiding, and post micturition symptoms.

1.1. Storage Symptoms are experienced during the storage phase of the bladder, (CHANGED).[†]

1.1.1. Increased daytime urinary frequency: Complaint that micturition occurs more frequently during waking hours than previously deemed normal.⁵

1.1.2. Nocturia is waking to pass urine during the main sleep period.⁸ (CHANGED)

1.1.3. Urgency is the complaint of a sudden compelling desire to pass urine, which is difficult to defer.⁴

1.1.4. Urinary incontinence: Complaint of involuntary loss of urine.⁵ ‡

1.1.4.1. Stress Urinary Incontinence is the complaint of involuntary leakage on effort or exertion, or on sneezing or coughing.⁴

1.1.4.2. Urgency Urinary Incontinence is the complaint of involuntary loss of urine associated with urgency.⁵

1.1.4.3. Mixed Urinary Incontinence is the complaint of involuntary leakage associated with urgency and also with exertion, effort, sneezing, or coughing.⁵

1.1.4.4. Enuresis: Complaint of intermittent incontinence that occurs during periods of sleep⁸ (NEW).

1.1.4.4.1. Primary enuresis has been present lifelong (NEW).

1.1.4.4.2. Acquired enuresis is an enuresis developed in adults (NEW).⁸

1.1.4.5. Continuous (urinary) incontinence: Complaint of continuous involuntary loss of urine⁵

1.1.4.6. Impaired cognition urinary incontinence: Complaint of periodic urinary incontinence that the individual with cognitive impairment

reports to have occurred without being aware of it. (NEW)

1.1.4.7. Impaired mobility urinary incontinence: Complaint of inability to reach the toilet on time for voiding because of physical or medical disability (NEW).^{||}

1.1.4.8. Sexual activity urinary incontinence is the individual report of urinary incontinence associated with or during sexual activity (NEW).[¶]

1.1.4.9. Other situational types of urinary incontinence may exist, for example giggle incontinence, or incontinence associated with epileptic seizures, sphincter denervation in cauda equina and in the Onuf's nuclei lesions in Multiple system atrophy (NEW).

1.1.5. Bladder Sensation can be defined, during history taking by following categories.

1.1.5.1. Normal: the individual is aware of bladder filling and increasing sensation up to a strong desire to void.⁴

1.1.5.2. Increased: Increased bladder sensation: complaint that the desire to void during bladder filling occurs earlier or is more persistent to that previous experienced. N.B. This differs from urgency by the fact that micturition can be postponed despite the desire to void.⁵

1.1.5.3. Reduced: Reduced bladder sensation: complaint that the definite desire to void occurs later to that previously experienced despite an awareness that the bladder is filling.⁵

1.1.5.4. Absent: the individual reports no sensation of bladder filling or desire to void.⁴

1.1.5.5. Non-specific bladder awareness: the individual reports no specific bladder sensation, but may perceive, for example, abdominal fullness,

[†]Some symptoms in NLUTD cannot be defined properly when there is a significant reduction in motor and/or sensory function. "Complaint" is intended to mean the patient (or sometimes caregiver) expresses the symptom is present, regardless of whether it also causes them bother.

[‡]Loss of urine can result from: (a) incontinence; (b) involuntary passing of urine; (c) incontinence that is not derived from an abnormality in the lower urinary tract or its innervation, but from immobility, cognitive disability, and decreased motivation impaired patient's mobility enhances likelihood of being incontinent.

[§]Mature CNS regulation ensures voiding (detrusor contraction with outlet relaxation) is under voluntary control. Abnormal voiding reflexes, or disinhibition, may result in the person passing urine without voluntary control. Confirming the precise underlying mechanism(s) is often not possible in routine clinical practice. Enuresis is considered different from urgency urinary incontinence.

^{||}This inability includes (any combination of) the individual's physical as well as social causes or reasons. Other signs or symptoms of LUTD should not be present, or should be reported by the professional (as primary or as accessory) (eg, "Urgency urinary incontinence" with "mobility impairment"; or "Mobility impairment urinary incontinence" with "stress urinary incontinence.")

[¶]Sexual activity urinary incontinence may be reported as a single symptom, but may also be reported in association with other LUTD. Sexual activity urinary incontinence is documented (in combination with other symptoms) as being the primary or the as the associated symptom (or vice versa) based on the individual's expression of predominance.

vegetative symptoms, urethral sensations or spasticity as bladder filling awareness or a sign of bladder fullness. (CHANGED).

1.1.5.6. Abnormal sensations: awareness of sensation in the bladder, urethra or pelvis, described with words like “tingling,” “burning,” or “electric shock,” in the setting of a clinically relevant neurologic disorder (eg, incomplete spinal cord lesion) (NEW).

1.1.5.7. Bladder Pain: Complaint of suprapubic or retropubic pain, pressure or discomfort, related to the bladder, and usually increasing with bladder filling. It may persist or be relieved after voiding.⁴

1.2. Voiding symptoms: A departure from normal sensation or function, experienced by a person during the act of micturition.^{2 #}

1.2.1. Slow stream: Complaint of a urinary stream perceived as slower compared to previous performance or in comparison with others.⁵

1.2.2. Spraying (splitting) of the urinary stream: Complaint that the urine passage is a spray or split rather than a single discrete stream.⁵

1.2.3. Intermittent stream (Intermittency) is the term used when the individual describes urine flow, which stops and starts on one or more occasions, during micturition.⁴

1.2.4. Hesitancy: Complaint of a delay in initiating micturition.⁵

1.2.5. Straining to void: Complaint of the need to make an intensive effort (by abdominal straining, Valsalva or suprapubic pressure) to either initiate, maintain or improve the urinary stream.⁵

1.2.6. Terminal dribble is the term used when an individual describes a prolonged final part of micturition, when the flow has slowed to a trickle/dribble.⁴

1.3. Post Micturition Symptoms are experienced immediately after micturition.⁴

1.3.1. Feeling of incomplete emptying: Complaint that the bladder does not feel empty after micturition.⁵

1.3.2. Post micturition leakage: Complaint of a further involuntary passage of urine following the completion of micturition.^{4,5}

2 ANLUTD SIGNS

Sign: Any abnormality indicative of disease or a health problem, discoverable on examination of the patient; an objective indication of disease² or a health problem. Signs are observed by the physician including simple means to verify symptoms and quantify them.

Measuring the frequency, severity and impact of lower urinary tract symptoms by asking the patient to record micturitions and symptoms for a period of days provides invaluable information. The recording of “micturition events” can be in three main forms.^{**}

2.1. Micturition Time Chart: this records only the times of micturitions, day and night, for at least 24 h.⁴

2.2. Frequency Volume Chart (FVC): this records the volumes voided as well as the time of each micturition, day and night, for at least 24 h.⁴

2.3. Bladder Diary: this records the times of micturitions and voided volumes, incontinence episodes, pad usage, and other information such as fluid intake, the degree of urgency, and the degree of incontinence.^{4,9 ††}

3 ANLUTD URODYNAMIC OBSERVATIONS AND DEFINITIONS

3.1 Filling cystometry definitions

Bladder storage function should be described according to bladder sensation, detrusor activity, bladder compliance and bladder capacity. Storage abnormalities identified may or may not be the result of a clinically relevant neurologic disorder.

3.1.1. Bladder sensation during filling cystometry

3.1.1.1. Normal bladder sensation can be judged by three defined points (as per ICS recommendations) noted during filling cystometry: First sensation of bladder filling, First desire to void and Strong desire to void, and evaluated in relation to the bladder volume at that moment and in relation to the patient's symptomatic complaints.^{4,7}

3.1.1.2. Reduced Bladder Sensation: Bladder sensation perceived to be diminished during filling cystometry.⁵

^{**}Validated questionnaires are useful for recording symptoms, their frequency, severity and bother, and the impact of LUTS on QoL. The instrument used should be specified. Some instruments were not validated in NLUTD or are impossible to implement because of sensory or motor deficiency in NLUTD.

^{††}Recommended minimum duration of 3 days.⁹ Some information could be difficult or impossible to collect because of sensory or motor deficiency in NLUTD.

[#]Some symptoms in NLUTD cannot be defined properly when there is a significant reduction in motor and/or sensory function.

3.1.1.3. Absent Bladder Sensation: The patient reports no bladder sensation during filling cystometry.⁵

3.1.1.4. Bladder oversensitivity: Increased perceived bladder sensation during bladder filling with: an early first desire to void; an early strong desire to void, which occurs at low bladder volume; a low maximum cystometric bladder capacity and no abnormal increases in detrusor pressure.⁵

3.1.1.5. Abnormal sensations: awareness of sensation in the bladder, urethra or pelvis, described with words like “tingling,” “burning,” or “electric shock,” in the setting of a clinically relevant neurologic disorder (eg, incomplete spinal cord lesion) (NEW).

3.1.1.6. Non-specific bladder awareness: perception of bladder filling as abdominal fullness, vegetative symptoms, spasticity or other “non-bladder awareness,” in the setting of a clinically relevant neurologic disorder (eg, incomplete spinal cord lesion) (NEW).

3.1.1.7. Bladder Pain: An unpleasant sensation (pain, pressure, discomfort) perceived to be related to the urinary bladder. (CHANGED).^{‡‡}

3.1.2. Bladder capacity during filling cystometry

3.1.2.1. Cystometric capacity is the bladder volume at the end of the filling cystometry, when “permission to void or to empty the bladder” is usually given. The end point should be specified, for example, if filling is stopped when the patient has a normal desire to void. The cystometric capacity is the volume voided together with any residual urine.^{4§§}

3.1.3. Detrusor function during filling cystometry

3.1.3.1. Neurogenic detrusor overactivity is an urodynamic observation characterized by involuntary detrusor contractions during the filling phase which may be spontaneous or provoked in the setting of a clinically relevant neurologic disease.^{4|||}

Specific types of neurogenic detrusor overactivity include:

3.1.3.1.1. Phasic detrusor overactivity is defined by a characteristic wave form, and may or may not lead to urinary incontinence.^{4¶¶}

3.1.3.1.2. Terminal detrusor overactivity is defined as involuntary detrusor contraction occurring near or at the maximum cystometric capacity, which cannot be suppressed, and results in incontinence or even reflex bladder emptying (reflex voiding) (CHANGED).^{###}

3.1.3.1.3. Sustained detrusor overactivity is defined as a continuous detrusor contraction without returning to the detrusor resting pressure (NEW).

3.1.3.1.4. Compound detrusor contraction is defined as a phasic detrusor contraction with a subsequent increase in detrusor and base pressure with each subsequent contraction (NEW).

3.1.3.1.5. High pressure detrusor overactivity is defined as a phasic, terminal, sustained or compound high maximal detrusor overactivity with the high detrusor pressure perceived by investigator to be potentially detrimental to the patient's renal function and/or health and the value should be defined in the report (NEW).

^{‡‡}The pain may be felt suprapubically or retropubically. It usually increases with bladder filling, and may persist after voiding. Bladder pain may or may not relate to clinically relevant neurologic disorder.

^{§§}In certain types of dysfunction including neurogenic LUTD, the cystometric capacity cannot be defined in the same terms. In the absence of sensation, the cystometric capacity is the volume at which the clinician decides to terminate filling. The reason(s) for terminating filling should be defined in the report, for example, high detrusor filling pressure, large infused volume or pain. If there is uncontrollable voiding/bladder emptying, it is the volume at which this begins. In the presence of sphincter incompetence the cystometric capacity may be significantly increased by occlusion of the urethra, for example, by a Foley catheter balloon.⁴

^{|||}Provoked contraction may be elicited by cough, change of position etc., or by urethral/sphincter to bladder reflex.

^{¶¶}Phasic detrusor contractions are not always accompanied by any sensation, or may be interpreted as a first sensation of bladder filling, or as a normal desire to void. In neurogenic LUTD phasic detrusor contraction may elicit autonomic dysreflexia or abnormal bladder sensation.

^{###}Terminal detrusor overactivity is typically associated with reduced bladder sensation, for example in the elderly stroke patient when urgency may be felt as the voiding contraction occurs. However, in neurogenic LUTD phasic detrusor contraction may elicit autonomic dysreflexia or abnormal bladder sensation and in complete spinal cord injury patients there may be no sensation whatsoever.

3.1.3.1.6. Neurogenic Detrusor Overactivity

Incontinence is incontinence due to involuntary neurogenic detrusor overactivity (NEW).^{***}

3.1.3.2. Leak point pressures:

3.1.3.2.1. Detrusor Leak Point Pressure (DLPP)

is defined as the lowest detrusor pressure at which urine leakage occurs in the absence of either a detrusor contraction or increased abdominal pressure.⁴

3.1.3.2.2. Detrusor Overactivity Leak Point Pressure (DOLPP)

is defined as the lowest detrusor pressure rise with detrusor overactivity at which urine leakage first occurs in the absence of voluntary detrusor contraction or increased abdominal pressure (NEW).

3.1.3.2.3. Detrusor Leak Point Volume (DLPV)

is defined as a bladder volume at which first urine leakage occurs, either with detrusor overactivity or low compliance (NEW).

3.1.3.2.4. Abdominal Leak Point Pressure (ALPP)

is the intravesical pressure at which urine leakage occurs due to increased abdominal pressure in the absence of a detrusor contraction.^{4 †††}

3.1.3.2.5. Bladder compliance

during filling cystometry describes the relationship between change in bladder volume

and change in detrusor pressure.^{4 †††}

3.2. Pressure Flow Study Definitions

3.2.1. Detrusor function during the voiding phase in people that can initiate voluntary voiding

3.1.3.2.1. Normal detrusor function is a voluntarily initiated continuous detrusor contraction that leads to complete bladder emptying within a normal time span, and in the absence of obstruction. For a given detrusor contraction, magnitude of the recorded pressure rise will depend on the degree of outlet resistance.⁴

3.1.3.2.2. Neurogenic detrusor underactivity is defined as a contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span in the setting of a clinically relevant neurologic disorder (NEW).

3.1.3.2.3. Neurogenic acontractile detrusor is one that cannot be demonstrated to contract during urodynamic studies in the setting of a clinically relevant neurologic lesion (NEW).

3.1.3.2.4. Balanced bladder emptying is a bladder emptying with physiological detrusor pressure and low residual as perceived by the investigator, and should be defined in the report (NEW).

^{‡‡‡}Compliance is calculated by dividing the volume change (ΔV) by the change in detrusor pressure (Δp_{det}) during that change in bladder volume ($C = \Delta V / \Delta p_{det}$). It is expressed in mL/cm H₂O. The normal value are not well defined however any report on compliance must include reference to the rate of filling and position of patient. A variety of means of calculating bladder compliance has been described. The ICS recommends that three standard points should be used for compliance calculations: the investigator may wish to define additional points. These points are measured excluding any detrusor contraction. The standards points are: (1) The detrusor pressure at the start of bladder filling and the corresponding bladder volume (usually zero). (2) The detrusor pressure at the bladder volume when the bladder pressure rises significantly and decreased compliance commences (Low compliance starting volume). (3) The detrusor pressure (and corresponding bladder volume) at cystometric capacity or immediately before the start of any detrusor contraction that causes significant leakage (and therefore causes the bladder volume to decrease, affecting compliance calculation).

^{***}Incontinence can occur with or without any sensation of urgency or awareness.

^{†††}This test can be applied to both neurogenic and non-neurogenic patients with stress urinary incontinence.

3.2.2. Detrusor function during pressure flow studies in people that cannot initiate voluntary voiding.

3.2.2.1. Initiated reflex bladder emptying is an artificially elicited LUT reflex comprised of various manoeuvres (exogenous stimuli) performed by the patient or the therapist, resulting in complete or incomplete bladder emptying (NEW).^{§§§}

3.2.3 Sphincter function during pressure flow studies

3.2.3.1. Detrusor-Sphincter Dyssynergia (DSD): describes a detrusor contraction concurrent with an involuntary contraction of the urethral and/or periurethral striated muscle. Occasionally flow may be prevented altogether.^{4||||}

3.2.3.2. Non-relaxing urethral sphincter is characterized by a non-relaxing, obstructing urethral sphincter resulting in reduced urine flow.^{4||¶¶}

3.2.3.3. Delayed relaxation of the urethral sphincter is characterized by impaired and hindered relaxation of the sphincter during voiding attempt resulting in delay of urine flow (NEW).^{###}

4 ANLUTD CLINICAL DIAGNOSES

Clinical diagnoses are the clinical manifestation of symptoms and signs, which are characterized by specific urodynamic findings and/or non-urodynamic evidence defined by the presence of urodynamic observations associated with characteristic symptoms or signs and/or non-urodynamic evidence of relevant pathological process.

This depends on the extent of loss of neurological function and depends on which part(s) of the nervous system is affected. Neural lesions are described according to time of onset, risk of neurological progression, completeness, and neurological level.

4.1. Spinal Shock Phase is usually temporary following acute neurologic insult or SCI that is characterized by loss of sensory, motor and reflex activity below the level of injury. NLUTD in Spinal Shock: is usually a temporary complete painless urinary retention (NEW).

4.2. Suprapontine Lesion (SPL) is a neurological lesion above the pons (forebrain or midbrain). NLUTD in SPL: there is a reflex contraction of the detrusor with impaired cerebral regulation and central inhibition and usually synergistic voiding/bladder emptying (NEW)^{****}

4.3. Suprasacral spinal cord/pontine lesion (SSL) is a neurological lesion in suprasacral spine and/or pons. NLUTD in SSL: Detrusor overactivity (DO) and DO incontinence are common, with or without detrusor-urethral sphincter dyssynergia (DSD), often resulting in a significant post void residual (PVR) and “high pressure” bladder (NEW).^{††††}

4.4. Sacral Spinal Cord Lesion (SSCL) is a neurological lesion in the sacral spinal cord. NLUTD in SSCL; findings include acontractile detrusor with or without decreased bladder compliance and usually with impaired sphincter activity. (NEW).^{****}

^{****}Lesions resulting from cerebral or brainstem lesion with preservation of the pontine micturition center (PMC), that is, cerebrovascular disease, degenerative disease, hydrocephalus, intracranial neoplasms, traumatic brain injury (the list is incomplete). This may lead to inability to initiate voiding, inappropriate timing of bladder emptying, detrusor overactivity (DO), and DO incontinence.

^{††††}Lesion persists after resolution of the spinal shock. Bladder sensation may be somewhat preserved (incomplete lesions) but voluntary control of the micturition reflex arc is lost. Altered function of the sympathetic spinal centre in the thoraco-lumbar spinal cord may alter blood pressure control. Complete SSL above T6 may be associated with autonomic dysreflexia when there is residual sympathetic nucleus function; this should be included in the description of the lesion.

^{****}There is a loss of parasympathetic control of the detrusor and a somatic denervation of the external urethral sphincter. Sensory impairment is typically associated with a complete lesion. Some afferent pathways remain intact due to potential preservation of hypogastric afferents. Some patients may have stress urinary incontinence (SUI) due to sphincter deficiency (loss of Onuf's nuclei).

^{§§§}Spontaneous reflex bladder emptying is termed Detrusor Overactivity Incontinence

^{||||}Neurological disease that impairs the ability of the PMC or its pathways to co-ordinate function of the LUT spinal centres, leading to detrusor contraction against a contracting outlet. Detrusor sphincter dyssynergia (DSD) typically occurs in patients with a supra-sacral lesion, and is uncommon in lesions of the lower cord. DSD is responsible for bladder outlet obstruction and occasionally flow may be prevented altogether.

^{¶¶¶}Non-relaxing sphincter obstruction is found in individuals with a neurological lesion (sacral and infra-sacral lesions such as meningomyelocoele) and after radical pelvic surgery. It may relate to both smooth and striated muscle sphincter.

^{###}This can occur in some patients with Parkinson's disease or muscular dystrophy

- 4.5. Infrasacral (cauda equina and peripheral nerves) Lesion (CEPNL)** is a neurological lesion affecting the cauda equina and/or peripheral nerves. NLUTD in CEPNL: acontractile detrusor and/or SUI may be present. In diabetic neuropathy, detrusor overactivity can be seen in combination with the above (NEW).^{§§§§}
- 4.6. Mixed Neuronal Lesion** is resulting from lesions of the neural pathway at different levels of the central nervous system concurrently (NEW)
- 4.7. Autonomic Dysreflexia** is a syndrome resulting from upper thoracic or cervical spinal cord injury above T6, elicited by a stimulus in the field of distribution of the autonomous sympathetic nucleus, characterized by unregulated sympathetic function below the lesion and compensatory autonomic responses (NEW).^{|||||}
- 4.7.1. Asymptomatic Autonomic Dysreflexia:** increase of blood pressure without any other symptoms (NEW).^{¶¶¶¶}
- 4.8. Neurogenic Overactive Bladder** is characterized by urgency, with or without urgency urinary incontinence, usually with increased daytime frequency and nocturia in the setting of a clinically relevant neurologic disorder with at least partially preserved sensation (NEW).^{####}
- 4.9. Voiding dysregulation** is urination in situations which are generally regarded as socially inappropriate, such as while still fully dressed, or in a public setting away from toilet facilities (NEW).
- 4.10. Involuntary voiding** is both a symptom and a diagnosis of sporadic bladder emptying

when awake, without intention to void (NEW).^{*****}

- 4.11. Urinary retention** is an inability to properly empty the bladder and can be divided into acute, chronic, complete and incomplete (NEW).
- 4.11.1. Acute retention** of urine is defined as an acute event of painful, palpable or percussable bladder, when the patient is unable to pass any urine when the bladder is full.^{5 +++++}
- 4.11.2. Chronic retention** of urine is defined as a non-painful bladder, which remains palpable or percussable after the patient has passed urine. Such patients may be incontinent.^{4*****}
- 4.11.3. Complete urinary retention** is an inability to empty any amount of bladder volume (or the requirement for use of a catheter, consciously or unconsciously due to anatomical or functional bladder outlet obstruction, detrusor underactivity or both (NEW).
- 4.11.4. Incomplete urinary retention** is impaired bladder emptying due to anatomical or functional bladder outlet obstruction, detrusor underactivity or both, when the voided volume is smaller than Post Void Residual.
- 4.11.5. Post void residual (PVR)** is defined as the volume of urine left in the bladder at the end of micturition.⁴

^{§§§§}The peripheral nerves and the lower spinal centres are often grouped under the term "lower motor neurones," as damage to these structures causes loss of contractile function. Elsewhere, the neurological lesions are termed "upper motor neuron lesions," where the consequences are impaired co-ordination and reflex function. This is a considerable simplification, and anatomically inaccurate, so the committee considers categorization into lower versus upper motor neuron lesions should no longer be supported.

^{|||||}It is potentially a medical emergency characterized by hypertension, bradycardia, severe headaches, and flushing above, with pallor below the cord lesion, and sometimes convulsions.¹⁰

^{¶¶¶¶}This can happen during routine urodynamic bladder studies or bowel program.¹¹

^{####}These symptom combinations in case of preserved sensation, are suggestive of urodynamically demonstrable detrusor overactivity, but can be due to other forms of LUTD. These terms can be used if there is no proven infection or other obvious non neurological disease.

^{*****}Usually the voiding reflex is preserved, and there is only lack of proper inhibition of the voiding reflex. If that happens when asleep it is called Acquired Enuresis.

⁺⁺⁺⁺⁺Although acute retention is usually thought of as painful, in certain circumstances pain may not be a presenting feature, for example, when due to prolapsed intervertebral disc, post-partum, or after regional anaesthesia such as an epidural anaesthetic. The retention volume should be significantly greater than the expected normal bladder capacity. In patients after surgery, due to bandaging of the lower abdomen or abdominal wall pain, it may be difficult to detect a painful, palpable, or percussable bladder.⁴

^{*****}The ICS no longer recommends the term "overflow incontinence" This term is considered confusing and lacking a convincing definition. If used, a precise definition and any associated pathophysiology, such as reduced urethral function, or detrusor overactivity/low bladder compliance, should be stated. The term chronic retention, excludes transient voiding difficulty, for example, after surgery for stress incontinence, and implies a significant residual urine; a minimum figure of 300 mls has been previously mentioned.⁴

5 ANLUTD TREATMENTS DEFINITIONS

5.1 Bladder Reflex Triggering comprises various manoeuvres performed by the patient or the therapist to elicit reflex bladder emptying by exteroceptive stimuli (relating to, being, or activated by stimuli received from outside of the bladder).⁴ §§§§§

5.2 Bladder Expression refers to various compression manoeuvres aimed at increasing intravesical pressure to facilitate bladder emptying with or without obvious sensation from the bladder. (CHANGED). ¶¶¶¶¶

5.3 Catheterization is a technique for bladder emptying employing a catheter to drain the bladder or a urinary reservoir.⁴

5.3.1. Indwelling catheterization; an indwelling catheter remains in the bladder, urinary reservoir or urinary conduit for a period longer than one emptying.⁴ ¶¶¶¶¶

5.3.2. Intermittent Catheterization (IC) is defined as drainage of the bladder or a urinary reservoir with subsequent removal of the catheter mostly at regular intervals. (CHANGED)

5.3.2.1. Clean IC (CIC): use of a clean technique. This implies ordinary hand and genitals washing techniques and use of disposable or cleansed reusable catheters. (CHANGED)

5.3.2.2. Aseptic IC: This implies genital antiseptic preparation and the use of sterile (single-use) catheters and instruments/gloves in a designated clean area. (NEW)

5.3.2.3. Sterile IC: Complete sterile setting, including genital skin antiseptics, sterile gloves, forceps, gown and mask (NEW). #####

5.3.2.4. No-touch technique IC: This was introduced as an easier way for the patient to perform self-intermittent catheterization with a ready-to-use catheter (pre-lubricated catheter, usually a hydrophilic catheter). A pull-in aid or special packages

are used to handle the catheter without directly touching the sliding surface of the hydrophilic catheter (NEW). *****

5.4 Electrostimulation

5.4.1. Direct electrical neurostimulations a direct stimulation of the nerves or neural tissue to effect function of the end organ. It is done through electrodes implanted directly or near the nerve or neural tissue (NEW). †††††

5.4.2. Electrical neuromodulation is the stimulation of the nerves or neural tissue to modulate function and induce therapeutic response of the LUT (NEW). †††††

5.4.3. Transcutaneous electrical nerve stimulation (TENS) is electrical stimulation of the nerves through intact skin to modulate function and induce therapeutic response of the LUT (NEW). §§§§§

5.4.4. Pelvic electrical stimulation is the application of electrical current to stimulate the pelvic viscera or their nerve supply (NEW). ¶¶¶¶¶

4 | CONCLUSIONS

Standardized terminology is an important aspect on research and communication in NLUTD. The International Continence Society (ICS) continues to have a key role in standardizing terminology related to lower urinary tract and pelvic organ dysfunction.

*****The ICS Working Group recognizes that there is a lack of uniformity and consensus on the classification of aseptic technique in previously published studies, especially with regard to genital hygiene. Thus, it is strongly recommended that all aspects related to the technique of intermittent catheterization are described as completely as possible in the context of clinical research, including the environment in which catheterization is performed, the type of lubricant, the catheter characteristics, the use of gloves, as well as the genital hygiene mode.

†††††For example, stimulation of the anterior sacral roots, that is, Brindley's stimulator.

¶¶¶¶¶It is done through electrodes implanted directly on or near the nerves or neural tissue: Sacral Neuromodulation (SNM), Pudendal Nerve Stimulation (PNS), Percutaneous Tibial Nerve Stimulation (PTNS), Spinal cord stimulation (SCS), Deep brain stimulation (DBS).

§§§§§This is done by skin surface electrode(s), as touch plate(s) or superficial needle(s). Long-term or chronic electrical stimulation is delivered below the sensory threshold. Maximal electrical stimulation is using a high-intensity stimulus (just below the pain threshold). This can be done intermittently.

¶¶¶¶¶The aim of electrical stimulation may be to directly induce a therapeutic response or to modulate lower urinary tract, bowel, or sexual dysfunction through transvaginal or transrectal stimulation.

§§§§§The most commonly used manoeuvres are; suprapubic tapping, thigh scratching, and anal/rectal manipulation.

¶¶¶¶¶The most commonly used manoeuvres are; abdominal straining (Valsalva's manoeuvre) and exerting manual suprapubic pressure (Crede's manoeuvre).

†††††Indwelling catheterization may be performed transurethral, suprapubic or trans-conduit.

#####Usually performed in the surgical theatre or during diagnostic procedures.

ACKNOWLEDGMENTS

We would like to thank ICS Standardization Steering Committee for reviewing the manuscript and ICS Office for helping our subcommittee administratively.

ORCID

Jerzy B. Gajewski  <http://orcid.org/0000-0003-0769-583X>
 Brigitte Schurch  <http://orcid.org/0000-0003-4965-6898>
 Márcio Averbeck  <http://orcid.org/0000-0002-8127-7153>
 Ryuji Sakakibara  <http://orcid.org/0000-0002-5803-169X>

REFERENCES

1. *Concise Oxford English Dictionary*. 9th Edition. Oxford: Clarendon Press; 1995. 1438.
2. *Stedman's Medical Dictionary*. 28th Edition Maryland USA: Lippincott William and Wilkins Baltimore; 2006. 1884.
3. Abrams P, Blaivas JG, Stanton SL, et al. Sixth Report on the Standardisation of Terminology of Lower Urinary Tract Function. Procedures related to neurophysiological investigations: electromyography, nerve conduction studies, reflex latencies, evoked potentials and sensory testing. The International Continence Society. *Br J Urol*. 1987;59:300–304.
4. Abrams P, Cardozo L, Fall M, et al. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. *Am J Obstet Gynecol*. 2002;187:116–126.
5. Haylen BT, de Ridder D, Freeman RM, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Int Urogynecol J*. 2010;21:5–26.
6. Rosier PF, de Ridder D, Meijlink J, Webb R, Whitmore K, Drake MJ. Developing evidence-based standards for diagnosis and management of lower urinary tract or pelvic floor dysfunction. *Neurourol Urodyn*. 2012;31:621–624.
7. D'Ancona CA, Gomes MJ, Rosier PF. ICS teaching module: cystometry (basic module). *Neurourol Urodyn*. 2016;9999:1–4.
8. Hashim H, Blanker MH, Drake MJ, et al. An International Continence Society (ICS) report on the terminology for nocturia and nocturnal lower urinary tract function. *Neurourol Urodyn*. Submitted in 2017.
9. Bright E, Cotterill N, Drake M, Abrams P. Developing a validated urinary diary: phase 1. *Neurourol Urodyn*. 2012;31:625–633.
10. Curt A, Nitsche B, Rodic B, Schurch B, Dietz V. Assessment of autonomic dysreflexia in patients with spinal cord injury. *J Neurol Neurosurg Psychiatry*. 1997;62:473–477.
11. Kirshblum SC, House JG, O'Connor KC. Silent autonomic dysreflexia during a routine bowel program in persons with traumatic spinal cord injury: a preliminary study. *Arch Phys Med Rehabil*. 2002;83:1774–1776.

How to cite this article: Gajewski JB, Schurch B, Hamid R, et al. An International Continence Society (ICS) report on the terminology for adult neurogenic lower urinary tract dysfunction (ANLUTD). *Neurourology and Urodynamics*. 2017;1–10. <https://doi.org/10.1002/nau.23397>