

THE DIAGNOSTIC CATEGORISATION OF LOWER URINARY TRACT SYMPTOMS: IS THE OVERACTIVE BLADDER A DISTINCT CLINICAL ENTITY?

Hypothesis / aims of study

We are drawn to categorisation as a means of bringing order to our perceptions of the world around us. As clinicians, we typically take diagnostic categorisation for granted, without considering the strength of our assumptions, or the potential for generating error. Immanuel Kant warned of the illusion of categorisation: "Do not confuse the thought of things [categories] as things in themselves"; Darwin also cautioned that "Nature does not make jumps". More recently, Dawkins has criticised "The tyranny of the discontinuous mind"¹. Nature is inimical to categorisation, and its use in clinical science may distort our understanding of disease¹.

This study used cluster analysis to scrutinise the relationships between common lower urinary tract symptoms (LUTS). The purpose was to determine whether natural clustering could be found to justify the use of common diagnostic categories including the overactive bladder (OAB), stress urinary incontinence (SUI), voiding symptoms, and lower urinary tract pain symptoms. These groups are so well accepted that such an analysis might at face value seem eccentric, but robust science requires that all such assumptions be rigorously tested.

Cluster analysis is an exploratory tool designed to reveal natural groupings (or clusters) within datasets. Objects are grouped, characterised by similarities in the properties of constituent members. The mathematics hinges on calculating distances between variables, and grouping them by defining the distance ranges that should delineate group membership.

Study design, materials and methods

Recruitment and data collection were undertaken in a single, specialist incontinence service in the UK between 2002 and 2011. Patients presenting with one or more LUTS underwent a complete symptom assessment using a fixed protocol to ensure consistency. The data were collected by one researcher and recorded in a secure clinical database. The diagnostic groups included storage symptoms, subdivided into (1) OAB and (2) SUI; (3) voiding symptoms (including postmicturition symptoms); and (4) lower urinary tract pain symptoms. Symptom groupings were constructed in accordance with the terminology report of the International Continence Society². Symptom assessment used 37 individual questions and responses were registered as Boolean Yes/No outcomes. For the analysis, all of these symptoms were ungrouped and randomly ordered.

The SPSS Two Step Cluster Analysis procedure was used to identify clusters based on a distance measure assuming independence and a multinomial distribution.

Results

2642 patients (F= 2312, M=330; mean age = 56; sd=31) with LUTS, underwent symptom assessment over 17 242 consultations; the dataset comprised 568,986 individual symptom elements. Various Cluster analyses showed poor silhouette measures of cohesion and separation until OAB symptoms were removed.

When the analysis was repeated with OAB symptoms excluded, the remaining symptom groups formed clusters with some overlap. The figure, its core consisting of a three-variable Venn diagram, demonstrates the relationship between SUI, voiding symptoms, and pain symptoms. The intersections and proportions have been constructed to accurately reflect the expression of these symptoms in the study population. These three groups were identified successfully by the cluster analysis.

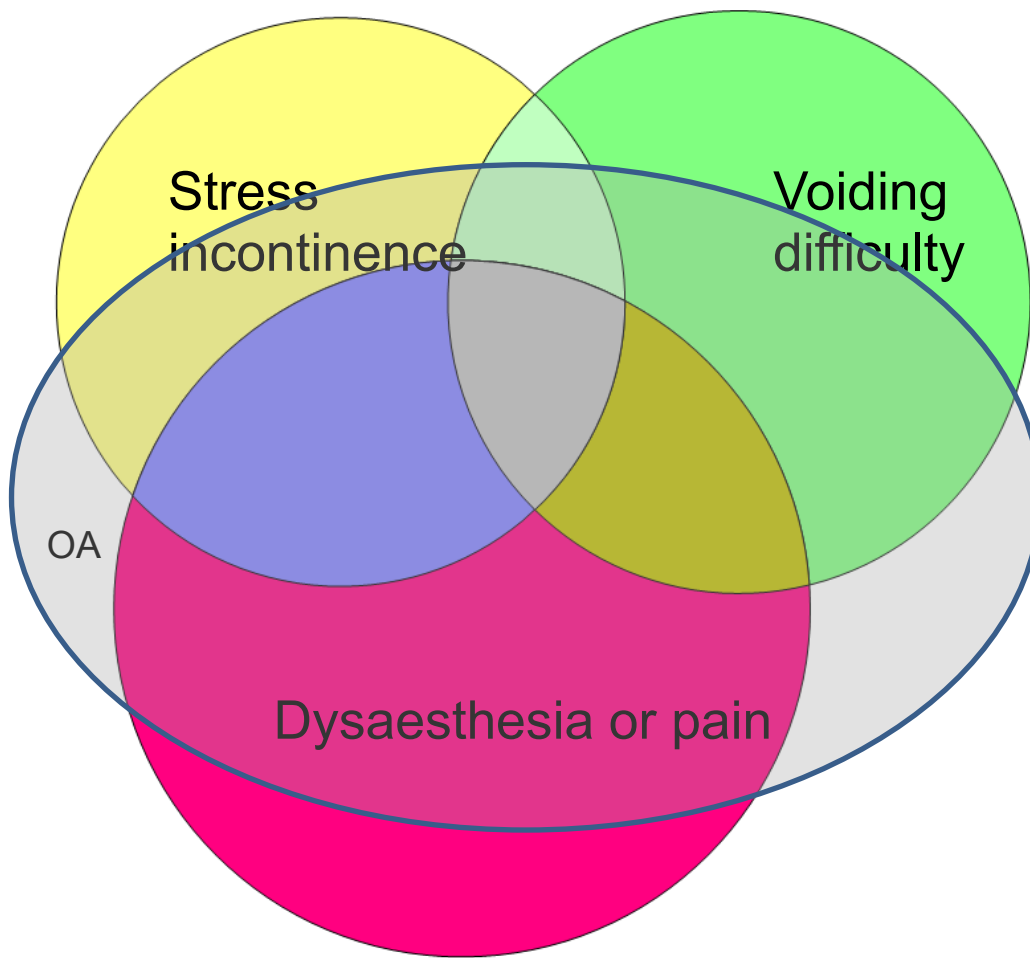
A fourth variable, representing OAB symptoms, has been added to this diagram. OAB symptoms were not found to cluster, other than through the property that their removal from the dataset permitted the other clusters to be circumscribed. The problem caused by OAB symptoms, illustrated in the figure, resulted from these storage symptoms being scattered throughout the entire dataset, thereby failing to comply with clustering criteria.

Interpretation of results

This analysis provides evidence that OAB does not form a distinct categorical clinical group. It implies that we may conjecture properties about OAB that are not founded in nature. The expression of LUTS demonstrates substantial overlap, distributed through a continuum, with disparate elements exerting different influences amongst individual patients. These interactions raise important questions relating our understanding of LUTS.

Concluding message

Large population-based, symptom prevalence studies have already reported significant symptom multiplicity and overlap in patients with OAB³. This study, using an very large and carefully collected dataset, challenges categorisation as a means of understanding, studying and treating LUTS, whilst demonstrating natural clustering of some elements.



References

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3. Irwin DE, Abrams P, Milsom I, Kopp Z, Reilly K. Understanding the elements of overactive bladder: questions raised by the EPIC study. BJU Int 2008 June;101(11):1381-7.

Disclosures

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