

# Understanding the Economic Impact of Neurogenic Lower Urinary Tract Dysfunction



Isaac D. Palma-Zamora, MD, Humphrey O. Atiemo, MD\*

## KEYWORDS

- Neurogenic bladder (NGB) • Economic impact • Health care costs • Financial burden
- Resource utilization

## KEY POINTS

- Neurogenic bladder (NGB) is a chronic and disabling condition that is associated with multiple comorbidities and a widespread economic impact.
- There is a paucity of literature regarding the cost of care in patients with NGB due to methodological and practical challenges in estimating its economic footprint.
- NGB is an end-organ manifestation of an underlying disease process. Its associated health care costs may represent but a small portion of the total medical costs of the underlying disease process.

## INTRODUCTION

Function of the lower urinary tract is governed by an intricate neurologic system that coordinates the storage and voiding of urine. Disturbances to the central nervous system, autonomic nervous system, or peripheral nervous system may result in neurogenic lower urinary tract dysfunction (NLUTD), a condition commonly known as NGB.

Multiple approaches have been used to define NGB based on functional, anatomic, and syndromic descriptions.<sup>1,2</sup> Functional assessments are based on urodynamic characterization. The presence, type, and severity of lower urinary tract dysfunction (LUTD) are influenced by the location of the underlying neurologic insult. Diseases involving the upper motor neurons or suprasacral cord most commonly lead to neurogenic detrusor instability, whereas injury to lower motor neurons typically manifest as urinary retention (UR). These symptoms can be identified in patients with

multiple sclerosis (MS), spinal cord injury (SCI), traumatic brain injury, stroke, dementia, Parkinson disease, central nervous system tumors, diabetes mellitus, and pelvic surgery.<sup>2,3</sup> The onset and severity of the NGB symptoms remain variable and poorly understood.

One of the severe manifestations of NGB is poor bladder compliance. It involves the emergence of a high-pressure urine storage system and a propensity for developing urinary tract infections (UTIs) through various mechanisms, including ongoing catheterization, immunodeficiency, molecular structural changes in the bladder wall, UR, and dysfunction of the detrusor muscle and urethral sphincter complex.<sup>4</sup> Left untreated, deterioration of the urinary tract from recurrent renal injuries may progress to kidney failure.

Understanding the economic impact of NGB may guide the development of treatment strategies designed to improve the management of NGB. Available literature on the cost of care and

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Disclosures: The authors have nothing to disclose.

Vattikuti Urology Institute, Henry Ford Hospital, 2799 West Grand Boulevard, Detroit, MI 48202, USA

\* Corresponding author. Henry Ford Hospital, K-9 Urology, 2799 West Grand Boulevard, Detroit, MI 48202.

E-mail address: [hatiemo1@hfhs.org](mailto:hatiemo1@hfhs.org)

Urol Clin N Am 44 (2017) 333–343

<http://dx.doi.org/10.1016/j.ucl.2017.04.001>

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resource utilization is sparse and heterogeneous. This article examines cost perspectives, resource utilization, health care costs, and implications of managing NGB patients by extrapolating from associated underlying neurologic conditions and similar forms of urinary dysfunction, such as over-active bladder (OAB) and urinary incontinence (UI), and where available, the assessment of pertinent literature.

### UNDERSTANDING ESTIMATION STUDIES AND TYPES OF COST

A multitude of nonstandardized approaches have been used to estimate the economic impact of NGB, OAB, and UI. Cost-of-illness estimation methods have previously been described, including top-down or bottom-up approaches.<sup>5</sup> Longitudinal cohort studies often use a top-down approach that relies on health claims data or registries. A bottom-up approach may use cross-sectional surveys to estimate cost of care. Furthermore, studies may emphasize the cost perspective by the consumer, payer, society, or other.

Health care costs can be presented in various forms: direct, indirect, and intangible. The distinction between them is subjective and at times overlapping. For example, loss of employment due to health disability can be considered both an indirect and intangible cost. Cost estimates may reflect all medical expenses versus disease-specific costs. The latter may be difficult to ascertain in patients with chronic and disabling conditions, such as those with NGB, because the underlying neurologic disease may limit the ability to assess disease-specific costs due to confounding. An alternative is to extrapolate from similar conditions. For example, the costs associated with the management of UI may be similar between OAB and NGB.<sup>5</sup> Patients with NGB differ, however, from those with OAB and may view their NLUTD differently,<sup>6</sup> which limits the ability to generalize health resource utilization (HRU) patterns and treatment outcomes.

Patient encounters generate a trail of expenditures that can be used to estimate the direct and indirect costs associated with an illness. Direct costs are those associated with the delivery of medical services, such as medications, diagnostic work-up, and indicated procedures. Their cost is influenced by the acuity of the presenting condition and health care setting at which medical attention is sought. Indirect expenses, for example, include administrative costs for the payer and payments by the consumer in the form of premiums, deductibles, and copays.

### INTANGIBLE COSTS

Similarly, the economic burden of an illness can be described by intangible costs. Patients with NGB may be physically incapacitated and unable to carry out activities of daily living due to their underlying disability. As a result, a series of arrangements may be necessary, such as transportation to and from health care settings or placement in long-term facilities, including assisted living and nursing homes. Furthermore, physical incapacitation limits a patient's ability to participate in forms of employment that lead to a loss of income and decreased earning potential stemming from permanent job loss, temporary unemployment, decreased productivity, or absenteeism. Unemployment rates at 1 year and 30 years postinjury in SCI patients are 86% and 58%, respectively.<sup>7,8</sup> NGB patients with Medicaid coverage and potential job opportunities often have a dilemma because increased income may compromise their eligibility for government assistance, including health coverage, with disability status providing higher levels of medical coverage than actual limited employment. Some investigators have estimated work productivity loss in patients with OAB and UI.<sup>9-12</sup> Their extrapolation to the NGB population, however, is inappropriate due to the different type and degree of underlying disability.

Bladder dysfunction is present in approximately 80% of patients with MS.<sup>13</sup> Hence, the economic repercussions in patients with MS and other NGB diagnosis may be similar. In MS, costs associated with the loss of employment exceed health care costs.<sup>14</sup> Estimation of decreased earning potential in MS patients relies on census data and labor statistics to estimate annual incomes based on age and national average of hourly wages.<sup>15,16</sup> Furthermore, the personal intangible costs are influenced by the natural history of the underlying neurologic condition. For example, the cumulative costs associated with NGB from Parkinson disease are different from those in patients with MS. A substantial portion of the negative economic impact in patients with MS falls under intangible costs because the condition presents during the most productive years of life and patients have a relative normal life expectancy.<sup>14</sup> In older populations, increasing costs may be driven by direct medical costs (ie, institutionalization) and less so by lost earning potential.<sup>10</sup> Unlike in the general population with OAB/UI, the disease-specific personal economic implications of NGB are unclear given their disability at baseline. Future approaches may consider, for example, comparing the incomes of patients with and without MS to derive the NGB-specific economic implications.

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