*Volumen 12, número 3 de 2025*
https://doi.org/10.53853/encr.12.3.947

REVISTA COLOMBIANA de Endocrinología Diabetes & Metabolismo

Consensus

# Type 2 diabetes and urinary incontinence: A scoping review and position statement

Alex Ramirez-Rincón[1-3], Juan F. Sierra-Carvajal[4], Geraldine Altamar-Canales[5], Diana C Henao-Carrillo[6], Nicolas Coronel-Restrepo[7], Juan C. Restrepo-Medrano[8], Carlos E. Builes-Montaño[9,10]

[1]Universidad Pontificia Bolivariana, Medellín, Colombia
[2]Clínica Las Américas, Medellín, Colombia
[3]SURA Personal Benefits, Medellín, Colombia
[4]Asociación Colombiana de Instituciones de Salud Domiciliaria, Bogotá, Colombia
[5]Universidad del Valle, Cali, Colombia
[6]Hospital Universitario San Ignacio, Pontificia Universidad Javeriana, Bogotá, Colombia
[7]Clinica Medellin Grupo Quiron Salud, Medellín, Colombia
[8]Universidad de Antioquia, Medellín, Colombia
[9]Hospital Pablo Tobón Uribe, Medellín, Colombia
[10]Universidad de Antioquia, Medellín, Colombia

**How to cite this article:** Ramirez-Rincón A, Sierra-Carvajal JF, Altamar-Canales G, Henao-Carrillo DC, Coronel-Restrepo N, Restrepo-Medrano JC, et al. Type 2 diabetes and urinary incontinence: A scoping review and position statement. Rev Colomb Endocrinol Diabet Metab. 2025;12(3):e947. https://doi.org/10.53853/encr.12.3.947

**Submitted:** 08/April/2025 **Accepted:** 29/August/2025 **Published:** 15/October/2025

## Abstract

**Context:** Urinary incontinence (UI) is a highly prevalent and disabling condition among older adults and women with type 2 diabetes (T2D), yet it remains underrecognized in clinical guidelines. The global rise in diabetes and population aging amplifies its burden.

**Objective:** This position statement aims to raise clinical awareness about urinary incontinence in individuals with diabetes and provide evidence-based recommendations for its management. A multidisciplinary consensus process identified key barriers, challenges, and care priorities to guide healthcare professionals in delivering more comprehensive and person-centered care.

**Methods:** A scoping review was conducted to examine the clinical literature on urinary incontinence and its association with type 2 diabetes, following the Joanna Briggs Institute Reviewer's Manual and PRISMA-ScR guidelines. The Nominal Group Technique was also used to obtain insights from a multidisciplinary panel of experts, including endocrinologists, geriatricians, nurses, and pelvic floor specialists.

## Highlights

- Urinary incontinence affects up to 50% of women and 20% of men with type 2 diabetes, with significantly higher prevalence in older adults, particularly postmenopausal women and institutionalized individuals.
- Diabetes is a consistent risk factor for urinary incontinence, along with age, obesity, parity, poor glycemic control, and insulin resistance. Women with diabetes have up to a 2.5-fold increased risk compared to non-diabetic women.
- Urinary incontinence in people with diabetes severely impacts

**Corresponding author:** Carlos E. Builes-Montaño, CL 78B #69 - 240, Hospital Pablo Tobón Uribe, Medellín, Colombia. E-mail: cbuiles@hptu.org.co

E-ISSN: 2805-5853 | L-ISSN: 2389-9786

**Results:** The review included 32 peer-reviewed articles and informed structured discussions on the epidemiology, clinical impact, treatment strategies, and lived experiences related to urinary incontinence in people with type 2 diabetes. The expert panel generated 57 ideas; 23 were considered critically important and incorporated into the final position statement.

**Conclusions:** Urinary incontinence remains underdiagnosed and undertreated among older adults and postmenopausal women with type 2 diabetes. Contributing factors include fragmented care, limited provider awareness, and financial barriers. Multidisciplinary strategies focusing on metabolic control, patient education, and improved healthcare accessibility are essential for advancing the quality of care and reducing the burden of urinary incontinence in this vulnerable population.

**Keywords:** Diabetes mellitus, diabetes complications, urinary incontinence, elderly.

quality of life, mental health, daily functioning, sleep, and healthcare resource use, yet, it remains underdiagnosed and is primarily managed with absorbent products rather than evidence-based care.

- A multidisciplinary expert panel identified priority recommendations through a structured consensus process, emphasizing the need for integrated care strategies involving primary care, nursing, geriatrics, endocrinology, and psychosocial support.

# Diabetes tipo 2 e incontinencia urinaria: una revisión exploratoria y declaración de posición

## Resumen

**Contexto:** la incontinencia urinaria (IU) es una condición altamente prevalente y discapacitante en adultos mayores y en mujeres con diabetes tipo 2 (DM2), pero continúa siendo poco reconocida en las guías clínicas. El aumento global de la diabetes y el envejecimiento poblacional amplifican su impacto.

**Objetivo:** esta declaración de posición tiene como objetivo aumentar la conciencia clínica sobre la incontinencia urinaria en personas con diabetes y proporcionar recomendaciones basadas en la evidencia para su manejo. Para ello, se llevó a cabo un proceso de consenso multidisciplinario para identificar barreras clave, desafíos y prioridades de atención, con el fin de guiar a los profesionales de la salud hacia una atención más integral y centrada en la persona.

**Métodos:** se realizó una revisión de alcance de la literatura clínica sobre la asociación entre la incontinencia urinaria y la diabetes tipo 2, siguiendo el Manual del Revisor del Instituto Joanna Briggs y las directrices PRISMA-ScR. Además, se utilizó la Técnica de Grupo Nominal para obtener aportes de un panel multidisciplinario de expertos, compuesto por endocrinólogos, geriatras, personal de enfermería y especialistas en piso pélvico.

**Resultados:** la revisión incluyó 32 artículos revisados por pares y sustentó discusiones estructuradas sobre la epidemiología, el impacto clínico, las estrategias terapéuticas y las experiencias vividas por personas con diabetes tipo 2 e incontinencia urinaria. El panel de expertos generó 57 propuestas, de las cuales 23 fueron consideradas críticamente importantes y se incorporaron en la declaración final.

**Conclusiones:** la incontinencia urinaria continúa siendo infradiagnosticada e insuficientemente tratada en adultos mayores y mujeres posmenopáusicas con diabetes tipo 2. Entre los factores que contribuyen a esta situación se encuentran la fragmentación de la atención, la limitada conciencia por parte del personal sanitario y las barreras económicas. Las estrategias multidisciplinarias que priorizan el control metabólico, la educación del paciente y una mejor accesibilidad a los servicios de salud son fundamentales para mejorar la calidad de la atención y reducir la carga de la incontinencia urinaria en esta población vulnerable.

**Palabras clave:** diabetes mellitus, complicaciones de la diabetes, incontinencia urinaria, personas mayores.

## Destacados

- La incontinencia urinaria afecta hasta al 50 % de las mujeres y al 20 % de los hombres con diabetes tipo 2, con una prevalencia significativamente mayor en los adultos mayores, en particular las mujeres posmenopáusicas y las personas institucionalizadas.
- La diabetes es un factor de riesgo constante para la incontinencia urinaria, junto con la edad, la obesidad, la paridad, el mal control glucémico y la resistencia a la insulina. Las mujeres diabéticas presentan un riesgo hasta 2,5 veces mayor que las no diabéticas.
- La incontinencia urinaria en personas con diabetes afecta gravemente la calidad de vida, la salud mental, el funcionamiento diario, el sueño y el uso de recursos sanitarios. Sin embargo, sigue estando infradiagnosticada y se maneja principalmente con productos absorbentes en lugar de intervenciones basadas en la evidencia.
- Un panel de expertos multidisciplinario identificó recomendaciones prioritarias mediante un proceso de consenso estructurado, haciendo hincapié en la necesidad de estrategias de atención integradas que incluyan atención primaria, enfermería, geriatría, endocrinología y apoyo psicosocial.

## Introduction

Urinary incontinence (UI) represents a primary global health concern, particularly among older adults. A comprehensive meta-analysis of more than 518,000 women over the age of 55 reported a global UI prevalence of 37.1%, with the highest rates observed in Asia (45.1%), and some localized studies reporting figures as high as 80%. Additionally, UI affects 10–20% of all women and up to 77% of those residing in nursing homes (1). Beyond the physical symptoms, UI contributes to substantial psychosocial distress, reduced quality of life, and higher risks of falls, depression, and institutionalization. Economically, the condition imposes a substantial healthcare burden, estimated at $66 billion annually in the United States alone, largely driven by costs related to routine care, nursing home admissions, and associated comorbidities (2).

Multiple risk factors contribute to the development and severity of UI, particularly in older women. Age, obesity, number and type of childbirths, low educational level, and comorbid conditions such as hypertension and diabetes, along with other modifiable and non-modifiable risk factors (3).

Diabetes represents one of the most pressing global health challenges of the 21st century, with 529 million individuals affected worldwide in 2021 and a projected rise to 1.31 billion by 2050. Type 2 diabetes (T2D) accounts for over 96% of cases and 95% of diabetes-related disability-adjusted life years (DALYs), with more than half of this burden attributable to high body mass index (BMI). The global age-standardized prevalence of diabetes was 6.1% in 2021 but reached alarming levels in specific regions and age groups—exceeding 39% among individuals aged 75–79 in North Africa and the Middle East and surpassing 76% in some countries, such as Qatar (4). This growing burden, mainly driven by modifiable risk factors including obesity, physical inactivity, and poor diet, has profound implications for healthcare systems and is closely associated with rising rates of disabling complications such as UI.

The global trend of population aging is closely linked to the increasing burden of diabetes and its complications, including UI. In the United States, the prevalence of diabetes among adults aged 65 and older reached 33.0% in 2011–2012, significantly higher than the 17.5% in those aged 45–64 and 5.0% in individuals under 45. Between 1988 and 2012, the age-standardized prevalence of diabetes increased across all age groups, income and education levels, and ethnic backgrounds, with the most pronounced growth among older adults. This demographic shift not only heightens the overall disease burden but also amplifies the risk of complications such as UI, which is particularly common and debilitating in elderly populations. Addressing UI in the context of diabetes requires an integrated approach that considers the intersecting effects of age, chronic disease, and systemic gaps in healthcare (5).

This position statement was developed on behalf of the Diabetes Committee from the Asociación Colombiana de Endocrinología, Diabetes y Metabolismo and includes clinical recommendations. UI in people with T2D has not been adequately addressed in current guidelines, highlighting the need for additional information to assist clinicians. Created by a multidisciplinary task force, this statement recognizes the longstanding concern regarding UI among individuals with diabetes. It aims to comprehensively synthesize the challenges posed by the heterogeneity of this condition, its impact on quality of life beyond traditional medical care, and the specific care needs of those living with both T2D and UI.

## Methods

### Scoping review

A scoping review of the available research on the relationship and implications of UI in individuals with T2D was conducted. The scoping review method was selected to map the different types of evidence, summarize research findings, and identify gaps that warrant further research (6). The review will adhere to the methodology outlined in the Joanna Briggs Institute Reviewer's Manual (2) and is reported by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) (7). Although protocol registration in platforms

such as PROSPERO is recommended to enhance transparency and avoid duplication, the present study did not meet PROSPERO's eligibility criteria because scoping reviews are currently not accepted for registration. However, the full protocol was developed prior to conducting the review and is provided as supplementary material to ensure methodological transparency and reproducibility.

## Research question

What is the extent of published evidence on the relationship between urinary incontinence and type 2 diabetes?

## Research sub-questions

1. What is the epidemiological association between type 2 diabetes and urinary incontinence?
2. What is the clinical impact of urinary incontinence in people with type 2 diabetes?
3. What are the available treatment options for urinary incontinence for people with type 2 diabetes?

## Inclusion criteria

Studies were eligible if they reported research on T2D and UI. The following types of research were included: clinical trials and posterior analysis; epidemiological studies, including cohort and case-control studies; cross-sectional analysis; case series and case reports; and qualitative research studies. Poster publications, narrative reviews, and letters to the editor were excluded.

## Search methods for identification of studies

### *Electronic searches*

The following databases were searched from inception through December 2024: MEDLINE (Pubmed) and Embase. Studies in any language, from any country, and from any date were included. In addition, we screened reference lists from relevant published studies. The details of the full search strategy are provided in Supplementary Table 1.

## Data collection and charting

### *Study selection*

To identify the studies to be included, two authors (CEBM and AHRR) independently scanned the title and abstract of every record retrieved in the search. All potentially relevant articles were read in full. A third reviewer was available to resolve conflicts, but it was not required. The selection process followed the recommendations of the PRISMA-ScR checklist (2), and a PRISMA flowchart of study selection was provided following the PRISMA statement (8).

### *Data charting*

Relevant information from each included study was extracted using a standardized data charting form that captured the following fields: author(s), year of publication, country of origin, type of research, type of population, age of the included population, and main findings related to the review. This approach allowed for a comprehensive summary of the critical conclusions.

## Presentation of the results

The findings are presented in a narrative report that synthesizes the extracted data. The report is structured into sections corresponding to the research sub-questions. Qualitative studies were identified during the search, providing valuable insights not initially anticipated in the predefined sub-questions. Consequently, an additional section was incorporated to include these findings.

## Nominal group technique

The project coordinating committee consisted of two authors (CEBM, AHRR). A focus group was conducted iteratively to plan the questions and statements for discussion in the Nominal Group Technique (NGT). The expert panel consisted of five specialists (9): two endocrinologists, one expert in domiciliary care, one geriatrician, and one registered nurse. Panelists were selected using a stakeholder analysis (10).

A modified NGT was used, retaining its main phases:

(i) The Nominal or Silent Phase, where participants individually considered a

question presented to them and wrote down their responses;

(ii) The Item Generation Phase, where participants shared their responses with the group in turns, with items recorded without discussion;

(iii) The Discussion and Clarification Phase, where group members discussed, clarified, and elaborated on the items, combining similar ones and removing duplicates;

(iv) The Voting Phase, where participants ranked the items to establish priorities (9, 11).

The Nominal or Silent Phase was conducted using an online questionnaire. The Item Generation and the Discussion and Clarification Phases were held via videoconference, and the meeting was transcribed using the artificial intelligence tool Read AI. Finally, the Voting Phase was carried out through an online form, using a 9-point Likert scale for each idea.

The expert panel identified key barriers and challenges, which were organized and subsequently assessed by the panel members in terms of their relevance, potential impact, and feasibility of being addressed within the context of the Colombian healthcare system. Additionally, the experts developed a list of key healthcare team members whose involvement in caring for individuals with UI and T2D was considered essential. These aspects were evaluated using a 5-point Likert scale (1 = Very Low, 2 = Low, 3 = Moderate, 4 = High, 5 = Very High).

## Panel recommendations

The online questionnaire responses were exported to a spreadsheet for consensus analysis. A threshold level of agreement of 70% among participants was established using the following ranges:1–3 points for *limited importance*, 4–6 for *important but not critical*, and 7–9 for critically important. In cases of strong disagreement, characterized by one panel member scoring a 1 and another scoring a 9, outliers were excluded, and the remaining responses were reviewed for consensus. For each statement, the median and interquartile range were calculated to illustrate variability, and all statements achieving consensus were reported (12).

Qualitative and quantitative data were collected during the NGT session and analyzed thematically to identify key themes. Since achieving consensus was not the primary objective of the NGT, most of the data are presented as thematic analysis results in the form of statements. Subsequently, a draft of the analysis was shared with the participants, who confirmed that the data accurately represented the discussions.

## Scoping review

The database and resource searches identified 267 records. After duplicate removal, 190 records remained for screening, of which 60 were selected based on title and abstract evaluation. Following full-text assessment, 28 studies were excluded. The PRISMA flow diagram detailing the study selection process and reasons for exclusion is presented in Figure 1. The key characteristics of the included studies are summarized in Supplementary Table 2.

A total of 32 studies were analyzed to assess the association between T2D and UI (13–44), covering a wide range of study designs, populations, and methodologies. The studies were conducted across different countries, including the United States, Canada, China, Denmark, Norway, Palestine, Jordan, India, Taiwan, and several European nations, reflecting a global interest in this comorbidity. The study designs included cross-sectional studies (n=22), cohort studies (n=5), randomized controlled trials (n=3), and qualitative research (n=2). Most studies utilized population-based health surveys (NHANES, LOFUS, EPINCONT), clinical registries, or hospital-based data.

The sample sizes varied significantly across studies, ranging from 123 to 118,000 participants. Most studies focused on women (n=28), with only a few including men (n=5), emphasizing the higher prevalence of UI in females. Participants' ages ranged from 18 to over 85 years, with mean ages typically between 55 and 75 years. While most studies focused on postmenopausal women, some reported findings in older adults receiving home care services (26,39) or frail elderly populations (32).

## Epidemiology of urinary incontinence in people with type 2 diabetes

Studies investigating the incidence and prevalence of UI in individuals with T2D have reported disparate results, mainly due to differing study designs and patient populations. Jackson *et al.* (13) found that UI affected approximately 60% of postmenopausal women, highlighting this group's notable prevalence of UI. Danforth *et al.* (19) observed a weekly UI incidence of 8.7% in women with diabetes, significantly higher compared to the 5.3% observed in women without diabetes, reinforcing the association between diabetes and greater UI risk. Similarly, Devore *et al.* (26) reported that around 48% of women with diabetes experienced UI, while Ebbesen *et al.* (17) found a prevalence of 39% compared with 26% among non-diabetic women. These and other findings are presented in Table 1, providing further comparative data on the higher prevalence of UI in individuals with diabetes.

**Table 1.** Epidemiological association between type 2 diabetes and urinary incontinence

| Author | Year | Country | Methodology | Study Population | Incidence/ Prevalence of UI in Diabetes | OR (95% CI) for UI / Key Associations | Risk factors (with 95% CI) |
|---|---|---|---|---|---|---|---|
| Jackson et al. (13) | 2005 | USA | Cross-sectional study | 1,017 postmenopausal women (218 with diabetes) | Any UI: 60%; Severe UI: 8% | | |
| Lewis et al. (14) | 2005 | USA | Cross-sectional, population-based study | 10,678 women aged 50–90 | UI reported by 22% | Noninsulin-requiring diabetes: OR 1.20 (1.00–1.45) | Insulin-requiring diabetes OR 1.63 (1.28–2.09) |
| Lifford et al. (15) | 2005 | USA | Prospective observational study | 81,845 women (NHS cohort) | Prevalent UI RR 1.28; Incident UI RR 1.21; Severe UI RR 1.40–1.97 | | |
| Brown et al. (16) | 2006 | USA | Cross-sectional study using NHANES data | 1,461 nonpregnant adult women | Weekly UI: 35.4% in people with diabetes/ impaired fasting glucose vs 16.8% in normals | | |
| Ebbesen et al. (17) | 2007 | Norway | Cross-sectional, population-based study | 21,057 women aged ≥20 (685 with diabetes) | UI prevalence: 39% in people with diabetes vs. 26% in people without diabetes | Urge UI OR 1.49 (1.03–2.16); Mixed UI OR 1.32 (1.05–1.67); Severe UI OR 1.54 (1.21–1.96) | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Danforth et al. (18) | 2009 | USA | Prospective cohort study | ˜71,650 female nurses aged 37–79 (NHS and NHS II) | Weekly UI: 8.7% of people with diabetes vs. 5.3% of people without diabetes | Overall OR 1.2 (1.0–1.3); Urge UI OR 1.4 (1.0–1.9) | |
| Phelan et al. (22) | 2009 | USA | Cross-sectional analysis (Look AHEAD baseline) | 2,994 overweight/obese women with type 2 diabetes | Weekly UI prevalence: 27% | | Asians had ˜75% lower odds, and African Americans had ˜55% lower odds vs. non-Hispanic whites. |
| Izci et al. (21) | 2009 | Turkey | Cross-sectional, case-control study | 910 women (273 diabetics, 637 nondiabetics) | UI prevalence: 41% in people with diabetes vs 22.1% in people without diabetes | ˜2.5fold increased risk for UI in people with diabetes | |
| Devore et al. (26) | 2012 | USA | Prospective cohort study | 9,994 women with type 2 diabetes (from NHS cohorts) | Any UI: 48%; Frequent UI: 29%; Incidence: 9.1 & 3.4 per 100 person-years | | |
| BaniIssa et al. (28) | 2013 | Jordan | Cross-sectional survey | Adult women with type 2 diabetes attending primary health centers | Weekly UI prevalence: 31.5% | Any UI OR 1.99 (1.44–2.74); Urge UI OR 2.23 (1.38–3.61); Stress UI OR 1.54 (1.07–2.22) | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hsu et al. (32) | 2014 | USA | Cross-sectional study | 447 frail, community-dwelling older adults with diabetes (2,602 UI measurements) | | | Reported predictors: Age >85: OR 3.13 (2.15–4.56); dependence in ambulation: OR 1.48 (1.19–1.84); dependence in transferring: OR 2.02 (1.58–2.58); insulin use: OR 2.62 (1.67–4.13); use of oral agents: OR 1.81 (1.33–3.54). |
| Weinberg et al. (34) | 2015 | USA | Cross-sectional analysis (NHANES) | 12,408 women | UI prevalence: 52.5% in people with diabetes vs 38.6% in nondiabetics | | |
| Mahishale et al. (35) | 2019 | India | Cross-sectional observational study | 123 male patients with type 2 diabetes | UI prevalence: 15.4% (moderate severity; mean ICIQ score 9.2) | | |
| Nazzal et al. (36) | 2020 | Palestine | Cross-sectional study | 381 women with type 2 diabetes | 43.2% reported UI | | History of recurrent UTI: OR 3.0 (1.9–4.9); Parity: OR 1.7 (1.1–2.7). |
| Northwood et al. (39) | 2020 | Canada | Cross-sectional study (using RAIHC data) | 125,781 older homecare clients with diabetes in Ontario | UI rate ~31.2% among homecare recipients | | Activities of daily living and cognitive impairment noted; no numerical estimates provided. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Løwenstein et al. (37) | 2021 | Denmark | Cross-sectional study (LOFUS) | 7,906 women with diabetes (via questionnaire, HbA1c, prescriptions) | UI prevalence: 50.3% in diabetics | Unadjusted OR 1.56 (1.27–1.92); Adjusted OR 1.11 (0.88–1.38); Subgroup (multiple meds) OR 2.75 (1.38–5.48) | For females, diabetes (vs. non-MetS/ nonobese) had OR 2.33 (1.88–2.87) for any UI (as per regression models). |
| Li et al. (UI & Sleep) (42) | 2022 | Taiwan (R.O.C.) | Cross-sectional study | 237 older women with type 2 diabetes (endocrinology outpatients) | UI prevalence: 48.52% | | Advanced age: OR 1.057 (1.001–1.116) per year; BMI: OR 1.116 (1.042–1.196) per 1 kg/ $m^2$; History of vaginal delivery: OR 3.147 (1.508–6.568). |
| Fwu et al. (43) | 2024 | USA | Cross-sectional analysis (NHANES 2003–2020) | 8,586 males and 8,420 females (adults ≥20 years) | In females, UI prevalence increased with obesity/ MetS; in males, UI associations were sex-specific | For females: Diabetes OR 2.33 (1.88–2.87); For males: Diabetes OR 1.35 (1.07–1.70) | Obesity/ metabolic phenotype: in females, diabetes had OR 2.33 (1.88–2.87) for any UI; in males, diabetes OR 1.35 (1.07–1.70). |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Li et al. (Insulin Resistance & UI) (44) | 2024 | China | Cross-sectional study | Three hundred sixty-six female patients with T2DM were hospitalized. | UI prevalence: 50.8% | | Per unit increases – Age: OR 1.080 (1.039–1.122); Parity: OR 2.339 (1.532–3.570); BMI: OR 1.332 (1.019–1.600); HOMA-IR: OR 1.475 (1.231–1.768); plus quartile results; Moderate UI OR = 2.197 (1.031–4.683, P=0.041); Severe UI OR = 5.699 (1.685–19.276, P=0.005) |

**Source:** Own elaboration.

The studies are consistent in revealing that diabetes significantly increases the risk for UI. For instance, Lewis *et al.* (14) reported an OR of 1.63 (95% CI: 1.28–2.09) for UI among women with diabetes using insulin, suggesting a notably higher risk of UI compared to non-insulin users, who had an OR of 1.20 (95% CI: 1.00–1.45). This association has been demonstrated in other studies (19,21), which reported an approximately 2.5-fold higher risk of UI in individuals with diabetes. More recent studies, such as those conducted by Fwu *et al.* (43) and Li *et al.* (44), corroborate these earlier findings, presenting similar evidence that diabetes, particularly in combination with other metabolic factors, substantially increases the odds of developing UI. These odds ratios and their corresponding 95% confidence intervals are further elaborated in Table 1, providing a detailed overview of the epidemiological evidence linking diabetes to elevated UI risk.

In terms of risk predictors, various factors have been identified as contributing to the development of UI in populations with diabetes, with advanced age, high BMI, history of vaginal delivery, and increased parity emerging as key contributors. For example, Li *et al.* (42) reported that age is a significant predictor, with each additional year of life contributing to a slight increase in the risk of around 8%, emphasizing the growing burden among older women with diabetes. Similarly, BMI was a decisive risk factor for UI and was associated with an increased risk of 11% for each unit increase in BMI (kg/m²). Parity

also emerged as a significant determinant, with a history of vaginal delivery associated with a much higher likelihood of developing UI (OR ˜3.147, 95% CI: 1.508–6.568), as shown by Li *et al.* (42). Moreover, Li *et al.* (44) demonstrated that higher insulin resistance, as assessed using the HOMA-IR index, was independently associated with both increased prevalence and greater severity of UI; women with higher levels of insulin resistance had 5.7-fold higher odds of developing severe UI (95% CI: 1.685–19.276). All these predictor risk factors, alongside their 95% confidence intervals are detailed in Table 1.

Contrasting the findings between women and men, the prevalence and severity of UI are consistently higher in women with T2D than in their male counterparts. Most female studies report UI prevalence rates ranging from around 40% to over 50%, whereas the study by Mahishale *et al.* (35) in Indian men documented a considerably lower prevalence of approximately 15.4%. In addition, the magnitude of the associations is more significant in women. For instance, Fwu *et al.* (43) reported an OR of 2.33 for any UI in women with diabetes, compared to an OR of 1.35 for men. Moreover, the subtypes of UI varied by sex, with stress and mixed UI predominating among women, whereas urgency UI was more common in men. These findings suggest the presence of sex-specific mechanisms and highlight the potential influence of confounding factors, such as prostate conditions in men.

Across the studies, various methods have been employed to evaluate UI in individuals with T2D. Many investigations have relied on self-reported questionnaires that capture the frequency and severity of UI symptoms. For instance, several studies—such as those by Danforth *et al.* (19) and Li *et al.* (42)— used structured survey instruments that asked participants about the frequency of urine leakage and the amount lost, with some studies further classifying UI into subtypes (stress, urgency, and mixed) based on specific symptom patterns. The International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF) was frequently utilized due to its high validity, reliability, and sensitivity in assessing UI and its impact on quality of life. In addition, population-based surveys like the National Health and Nutrition Examination Survey (NHANES) provided standardized UI questions that allowed researchers to compare prevalence rates across diverse demographic groups. Other studies complemented questionnaire data with additional clinical evaluations and physical measurements. For example, some researchers performed urodynamic or pad-weighing tests to corroborate self-reported data. However, many studies preferred the non-invasive, survey-based approach to facilitate large-scale data collection.

## Clinical impact of urinary incontinence in people with type 2 diabetes

The impact of UI in individuals with T2D extends beyond physical symptoms, affecting the quality of life, healthcare resource use, sleep, daily functioning, and emotional and social well-being. The reviewed studies highlight these multidimensional effects, emphasizing the broader implications of UI in diabetic populations.

UI has a profound impact on quality of life, with affected individuals reporting declines in physical, mental, and social well-being. Studies consistently show that UI leads to increased distress, reduced independence, and limitations in social interactions. Many perceive UI as an inevitable consequence of aging and diabetes, which contributes to low rates of healthcare-seeking behavior. Moreover, the severity of UI correlates with poorer self-reported health, higher rates of functional disability, and lower overall life satisfaction (28,30,31).

Regarding healthcare resource utilization, individuals with UI and diabetes experience a higher burden on healthcare systems due to frequent medical visits, emergency department admissions, and increased need for home care assistance. UI is a predictor of hospitalization and institutionalization in long-term care facilities, with people with diabetes being at exceptionally high risk. Patients with UI are more likely to require nursing support, assistive devices, and prescription medications, leading to increased healthcare costs and resource demands (28,31).

The impact on sleep is particularly notable in patients with UI, as frequent nocturnal voiding disrupts sleep patterns and contributes to poor

sleep quality. Studies demonstrate that individuals with UI report increased rates of insomnia, excessive daytime sleepiness, and reduced sleep efficiency. Nocturia, a common symptom in patients with diabetes-related UI, further exacerbates sleep fragmentation and negatively affects cognitive function and mood (28,35).

UI significantly affects daily life activities, with individuals modifying their routines to accommodate frequent urination. Many patients limit their fluid intake, plan their outings based on restroom accessibility, and avoid social gatherings due to fear of leakage. UI-related mobility restrictions also contribute to reduced physical activity and increased risk of falls, particularly in older adults with diabetes. The interference of UI with work productivity and caregiving responsibilities further highlights its disabling nature in daily life (35,38).

The emotional and social impact of UI is substantial, with many patients experiencing embarrassment, anxiety, and depression. Women with diabetes and UI report higher levels of psychological distress, body image concerns, and feelings of shame. The stigma surrounding this condition often leads to social isolation, withdrawal from intimate relationships, and reduced participation in recreational activities. Studies suggest that UI management could significantly improve self-esteem, mental health, and overall social well-being (28,36).

## Treatment of urinary incontinence in people with type 2 diabetes

Multiple studies have examined the impact of medications, glycemic control, weight loss, and specific treatments for UI in individuals with T2D, highlighting their role in modifying UI risk, severity, and response to intervention. The selected studies provide insights into how pharmacological and non-pharmacological strategies influence UI outcomes, with notable sex-specific differences.

**Impact of diabetes medications:** The relationship between diabetes medications and UI risk remains complex, with some treatments exacerbating symptoms while others offer potential benefits. For example, insulin therapy has been linked to higher UI prevalence, particularly in older adults, possibly due to its association with weight gain and nocturnal polyuria (34).

**Impact of non-diabetes medications:** In the only study identified evaluating a non-diabetes medication for urinary incontinence in women with type 2 diabetes, duloxetine reduced the frequency of incontinence episodes by 60.77% in the treatment group compared with 33.33% in the placebo group. However, this difference did not reach statistical significance ($P$=0.107), likely due to the small sample size of participants with T2D. Importantly, quality of life, as measured by the I-QOL score, improved significantly in the duloxetine group ($P$=0.037). The authors hypothesized that the reduced efficacy in women with T2D could be related to diabetic neuropathy affecting urethral sphincter innervation and responsiveness to treatment. Higher rates of adverse effects, including nausea, fatigue, and dry mouth, were also reported in women with T2D compared to the general population. Overall, while duloxetine did not achieve a statistically significant reduction in incontinence episodes in all patients with T2D, it may offer subjective benefits in quality of life for those who respond positively (18).

**Impact of glycemic control:** The relationship between glycemic control and UI remains a critical area of investigation. Poor glycemic control (HbA1c ≥ 8.5%) has been associated with increased UI severity, likely due to its impact on neuropathy, polyuria, and impaired detrusor function (34). In contrast, studies have shown that improved glycemic control may reduce UI symptoms, particularly in cases where polyuria and detrusor overactivity are major contributors. However, this effect may be sex-specific, as women with poorly controlled diabetes exhibit a stronger association with urgency and mixed UI compared to men, potentially reflecting sex differences in bladder physiology and the influence of estrogen on metabolic pathways.

**Impact of weight loss:** Weight loss has been identified as a key modifiable factor in reducing UI symptoms, particularly in overweight and obese individuals with diabetes. Interventional studies have demonstrated that a 5–10% reduction in body weight can

significantly lower the incidence of stress UI (SUI) and urgency UI (UUI) (24). The Look AHEAD trial found that women who underwent intensive lifestyle intervention had a 42% lower incidence of UI than controls, emphasizing the benefits of structured weight loss programs in UI management (29). Interestingly, men with diabetes did not experience as pronounced a benefit from weight loss interventions, suggesting potential sex-specific differences in the pathophysiology of UI.

**Specific UI treatments:** Evidence directly addressing treatments for UI in individuals with T2D is limited. Available studies suggest that pelvic floor muscle training (PFMT), bladder training, and pharmacological therapies may be less effective in women with diabetes, potentially due to neuropathy and muscle dysfunction (30). Given this gap, most recommendations for specific UI management in T2D are extrapolated from the general population, underlining the urgent need for high-quality trials in diabetic cohorts.

## Qualitative research on urinary incontinence in people with type 2 diabetes

The following findings are derived from qualitative research exploring the experiences, challenges, and strategies of UI management in older adults with T2D. This qualitative approach highlights the perspectives of patients, caregivers, and healthcare providers, offering valuable insights into the real-world implications of UI in home care settings (40,41).

UI is a prevalent issue among older adults with diabetes, with a reported 33.7% daily prevalence in home care settings. It is associated with falls, fractures, anxiety, depression, and a decline in quality of life, as well as an increased risk of premature institutionalization. Despite its high prevalence, UI remains underdiagnosed and undertreated. More than 40% of home care patients experience UI, yet few receive appropriate medical treatment. Instead, there is a widespread reliance on absorbent products, which, while providing practical support, do not address the underlying condition. The financial burden of continence products further limits access to effective treatments, particularly for individuals with limited resources.

One of the key challenges in managing UI among older adults with diabetes is the fragmented nature of healthcare services. Home care nurses play a critical role in identifying and managing UI. However, they face limited training, lack of access to specialists, and a system prioritizing task-based care over holistic management. Poor coordination between home care, primary care, and hospital services further impairs effective UI treatment. Additionally, UI in this population is influenced by hyperglycemia, polyuria, diabetic neuropathy, and detrusor dysfunction, all of which complicate management. Many diabetes-related medications, such as diuretics and antihyperglycemic agents, exacerbate UI symptoms, requiring individualized treatment approaches. Due to these challenges, nurses and caregivers frequently resort to absorbent products rather than evidence-based interventions, underscoring the need for improved training and resource allocation.

Current UI management strategies include assessments of hyperglycemia, polyuria, neuropathy, mobility limitations, and medication effects, as well as evaluations of home safety, restroom accessibility, and the availability of continence products. While pelvic floor muscle training (PFMT), bladder training, and dietary modifications aim to improve symptoms, absorbent products remain the primary coping mechanism. However, systemic barriers—including lack of integration between healthcare providers, limited electronic health record access, and difficulty obtaining specialist referrals—continue to hinder effective management. The reliance on absorbent products over medical interventions highlights the urgent need for a more structured, multidisciplinary approach to UI care in diabetic patients.

Caregivers play a central role in UI management, with 72% of patients relying on a spouse or family member for assistance. However, caregivers often experience burnout and financial strain, particularly given the high cost of continence products, which are not covered by government programs in many regions. Older adults with diabetes and UI also face the added complexity of managing multiple

chronic conditions, making it difficult to balance treatments without exacerbating symptoms. Addressing these challenges requires policy changes aimed at expanding access to continence products, strengthening nurse training, improving healthcare integration, and establishing standardized UI management guidelines for diabetic patients. Such measures would not only enhance patients' quality of life but also alleviate caregiver burden and reduce strain on healthcare systems.

## Position statement

The Generation Phase of the NGT yielded 57 ideas related to the position statement, which were narrowed down to 41 during the Discussion and Clarification Phase. Ultimately, 23 ideas were considered as critically essential and incorporated in the final position statements. All generated ideas, along with the proportion of panelists who rated them as critically important, are presented in Supplementary Table 2.

The prevalence of UI among individuals with T2D is highly variable across studies, ranging from 44% to 50.3% in women and from 15% to 20% in men. This heterogeneity may be attributed to differences in study design, population characteristics, associated risk factors, and diagnostic criteria. Higher prevalence rates have been reported in specific subgroups, including postmenopausal women (up to 60%) and institutionalized older adults (40% -70 %). Overweight and obesity, particularly with a BMI over 35 kg/m², along with poor metabolic control, are consistently identified as significant risk factors, especially in women and older adults with T2D.

UI in individuals with T2D is strongly associated with reduced quality of life and increased prevalence of depressive symptoms, underscoring the need for comprehensive assessments that address both physical and emotional health. The condition also contributes to secondary challenges such as nocturia, polyuria, limited access to bathrooms, and decreased work productivity. Effective management requires consideration of these broader clinical and functional implications alongside targeted interventions for metabolic syndrome and adiposopathy.

Management of UI in people with T2D should be multifaceted, incorporating intensive lifestyle interventions focused on weight loss, glycemic control, and symptom relief. Pelvic floor muscle training remains particularly beneficial for stress UI, while behavioral strategies—such as fluid intake regulation, caffeine reduction, increased physical activity, dietary changes, and access to absorbent products—can further support symptom management. A multidisciplinary approach involving nurses, occupational therapists, nutritionists, and gerontologists is essential to implement weight control, bowel regulation, and scheduled voiding interventions. Patient education, pharmacologic therapy, ongoing counseling, and nutritional evaluation should be integrated into care plans. Additionally, implementing screening tools for early UI detection in T2D patients and using digital health tools, such as telemedicine and artificial intelligence, may enhance personalized management. Psychosocial support programs led by psychologists can provide emotional guidance and help patients navigate the challenges of chronic disease.

Qualitative studies exploring the lived experiences of individuals with T2D and UI are critical for understanding the condition's personal, social, and emotional impact. Awareness campaigns, such as those integrated into cardiometabolic risk programs (e.g., *"It happens to me too"*), can help destigmatize UI and encourage individuals to seek care, promoting earlier diagnosis and more effective interventions.

During the Discussion and Clarification Phase, the expert panel identified key barriers and challenges hindering timely recognition and adequate management of UI in individuals with T2D. Barriers were primarily structural and systemic, including economic constraints, social and geographic inequalities, service fragmentation, and limited access to specialized care. In contrast, challenges were related to professional and societal perceptions, including the lack of awareness of UI among healthcare providers, normalization of symptoms, and underestimation of the condition's impact. Panel

members rated each element according to its relevance, potential impact, and feasibility within the Colombian healthcare system. Among the highest-rated issues were economic factors, lack of awareness among healthcare professionals, and underestimation of the problem, all of which were considered highly relevant and impactful, though varying in feasibility. Table 2 summarizes the barriers and challenges identified, along with their corresponding ratings.

**Table 2.** Barriers and challenges identified with ratings for relevance, potential impact, and feasibility

| Category | Item | Relevance | Potential impact | Feasibility |
|---|---|---|---|---|
| Barrier | Economic factors | Very High | High | High |
| Challenge | Underestimation of the problem | Very High | High | High |
| Challenge | Lack of systematic screening programs | Very High | High | Moderate |
| Challenge | Normalization of UI symptoms | Very High | High | Moderate |
| Challenge | Lack of awareness about UI among healthcare professionals | High | Very High | High |
| Barrier | Limited patient support networks | High | High | High |
| Barrier | Poor communication between patients and healthcare professionals | High | High | Very High |
| Barrier | Social and geographical conditions limiting access to care | High | High | Moderate |
| Barrier | Limited access to specialists | High | High | High |
| Challenge | Compliance with public health policies | High | High | High |
| Barrier | Fragmentation of healthcare services | High | High | Moderate |
| Barrier | Lack of interoperability between health records | Moderate | Moderate | Moderate |

**Source:** Own elaboration.

As part of the prioritization process, the expert panel also identified key healthcare and support actors whose involvement is essential in caring for individuals with T2D and UI. Each actor was rated based on their perceived importance in delivering or supporting effective care for this population. Notably, primary care physicians, nurses, endocrinologists, geriatricians, pelvic floor therapists, and caregivers received the highest scores, highlighting the need for a multidisciplinary approach. Table 3 presents the list of actors and their respective ratings.

**Table 3.** Importance of healthcare and support actors involvement in the care of individuals with T2D and UI

| Actor / Role | Importance of involvement |
|---|---|
| Primary care physicians | Very High |
| Diabetes specialists | Very High |
| Nursing professionals | Very High |
| Endocrinologists | Very High |
| Urologists / Gynecologists | Very High |
| Geriatricians | Very High |
| Pelvic floor therapists | Very High |
| Caregiver (informal or formal) | Very High |
| Proxy (legal or medical decision-maker) | Very High |
| Internal medicine specialists | High |
| Psychologists | High |
| Physiotherapists | High |
| Trained nursing assistants | High |
| Family liaison with healthcare system (Guardian) | High |
| Palliative care specialists | Moderate |

**Source:** Own elaboration.

## Discussion

The review's findings indicate that UI is a highly prevalent yet underrecognized complication of T2D, particularly among women, older adults, and individuals with metabolic dysfunction. The strong correlation between insulin resistance and UI severity underscores the importance of early metabolic control and weight management strategies in reducing disease burden. Future research should focus on longitudinal studies to establish causal relationships, clinical trials assessing pharmacologic and behavioral interventions, and the systemic integration of UI screening into diabetes care.

Raising awareness and promoting education around UI remain critical but underdeveloped dimensions of public health, particularly in aging populations with diabetes. Despite its high prevalence and debilitating impact, UI continues to be perceived as a taboo condition, contributing to delayed diagnosis, underreporting, and lack of help-seeking behavior among older adults. Schlögl

*et al.* (45) highlight that insufficient awareness persists among both patients and healthcare providers, hampering timely recognition and management. Promoting continence requires active screening by clinicians, particularly in frail older adults, along with public education campaigns that challenge stigma and empower individuals to seek evidence-based care.

This aligns closely with the position statement's call for greater clinical visibility and educational interventions to overcome key barriers and challenges, such as normalization of symptoms, underestimation of UI's impact, and limited provider knowledge. Addressing these gaps through structured, interdisciplinary approaches could significantly improve outcomes in older adults living with both diabetes and UI.

Caregivers play a central yet often invisible role in the management of UI among individuals with T2D, particularly in home-based care settings. As emphasized in the position statement, fragmented healthcare systems and limited access to specialized services frequently shift care responsibilities to family members—most often women—who may experience a range of emotional responses, including frustration, shame, and helplessness. A recent systematic review found that caregivers' psychological burden is deeply influenced by their perceived preparedness, available support systems, and coping strategies. Caregivers with limited resources are more likely to experience fatigue, social withdrawal, and reduced well-being (46). These findings underscore the need to recognize caregivers as integral members of the care team and to provide them with adequate training, emotional support, and access to resources that enable them to perform their role effectively and sustainably.

Further reinforcing this perspective, a large observational study in Japan revealed that informal caregivers attending to UI patients at home experience significantly higher physical and emotional burdens than those in institutional settings. Tasks such as managing urine leakage, nighttime assistance, and poorly fitting absorbent products were strongly associated with caregiver fatigue and disruption of daily routines. The study also identified key strategies to mitigate this burden, including the proper combination of continence care products, access to professional nursing support, and educational interventions tailored to the caregivers' needs (47). These findings directly support the position statement's recommendations for integrated, person- and caregiver-centered care models, in which caregivers are equipped and empowered to participate in managing UI in people with diabetes, thereby improving outcomes for both patients and their support networks.

Despite the high prevalence and clinical burden of UI in individuals with T2D, many patients continue to receive inadequate care, often relying on symptomatic strategies such as absorbent products. As highlighted by the expert panel, this reliance is largely driven by structural barriers, including limited access to specialist care, economic constraints, and poor integration across healthcare levels. However, evidence suggests that optimized absorbent technologies may offer protective clinical benefits, particularly in preventing incontinence-associated dermatitis (IAD), a familiar yet underrecognized complication. In institutionalized older adults, the use of high-performance diapers with improved skin protection features resulted in complete resolution of IAD in 67% of cases within three weeks, even without changes to existing skincare routines (48). These findings reinforce the importance of including such strategies in multidisciplinary management plans, particularly when access to specialized interventions is limited.

In addition to their dermatological benefits, absorbent products may also help address some of the psychosocial challenges associated with UI, another key concern emphasized in this position statement. The panel recognized the need for interventions that reduce stigma, promote autonomy, and support emotional well-being. In this regard, a large cross-sectional study involving over 179,000 older adults in China found that diaper use was associated with improved emotional stability, greater outdoor participation, and reduced feelings of social isolation and uselessness (49). Users reported a 70% lower risk of feeling unneeded, especially among those maintaining social activity. While absorbent products should not replace evidence-

based medical management, their integration as part of a broader, person-centered strategy may help bridge gaps in care, especially in contexts marked by system fragmentation and limited caregiver support, as highlighted by the expert panel in this statement.

The findings of this position statement are further strengthened by evidence demonstrating the clinical value of multidisciplinary care in managing complex urogynecological conditions, including UI in women with comorbidities such as T2D. The West of Scotland (WoS) Regional Urogynaecology MDT exemplifies how interdisciplinary collaboration, comprising urogynaecologists, urologists, physiotherapists, continence nurses, and support staff, can improve patient outcomes, especially when traditional, organ-specific approaches fall short. In this study, 41.7% of patient cases had their management plans altered after MDT discussion, and over one-third reported improvement or resolution of their condition following tailored interventions (50). This aligns with the panel's emphasis on engaging a broader healthcare team, including nurses, geriatricians, pelvic floor therapists, and endocrinologists, as a critical component of personalized, effective care for individuals living with both diabetes and UI.

There are several limitations to our study. This position statement is based on a scoping review of heterogeneous studies, which varied in design, population characteristics, definitions of urinary incontinence, and measurement methods. The quality and methodological rigor of the included studies were not formally assessed, in line with scoping review methodology, which may limit the strength of inferences. Most studies focused on women, particularly postmenopausal or older adults, resulting in limited evidence regarding UI in men with type 2 diabetes. Furthermore, the majority of data were derived from high-income countries, which may reduce the applicability of findings to low- and middle-income settings. The expert panel's recommendations are also contextualized to the Colombian healthcare system and may not be directly generalizable to other regions without adaptation to local contexts.

Future research should address the following key questions: What are the longitudinal causal relationships between T2D, metabolic control, and the onset or progression of UI? How effective are pharmacological and non-pharmacological interventions specifically tailored for individuals with both T2D and UI, in terms of symptom improvement, quality of life, and cost-effectiveness? What sex-specific mechanisms underlie UI in men with T2D, and how should management strategies be adapted accordingly? How can integrated care models, combining endocrinology, geriatrics, urology/urogynecology, nursing, and psychosocial support, be implemented and scaled in low- and middle-income countries? What role can technology-based tools (e.g., telehealth, mobile applications, artificial intelligence) play in the early detection, self-management, and follow-up of UI in people with T2D?

## Conclusions

This comprehensive analysis highlights the need for multidisciplinary approaches in managing UI among individuals with diabetes, emphasizing metabolic control, patient education, and individualized interventions to improve overall health outcomes.

Urinary incontinence is a highly prevalent and debilitating condition, especially among older adults and postmenopausal women with diabetes, yet it remains underdiagnosed and undertreated. The lack of healthcare provider awareness, financial barriers, and fragmentation of healthcare services contribute to poor UI management and increased patient burden. Addressing healthcare integration, caregiver support, and economic accessibility is essential to improving the management of UI in this vulnerable population.

## Authors' contributions

Alex Ramirez-Rincón: Conceptualization, Funding acquisition, Project administration, Writing – review & editing; Carlos E. Builes-Montaño: Conceptualization, Funding acquisition, Project administration, Writing – review & editing; Juan F. Sierra Carvajal: Writing – review & editing;

Geraldine Altamar-Canales: Writing – review & editing; Diana C Henao-Carrillo: Writing – review & editing; Nicolas Coronel-Restrepo: Writing – review & editing; Juan C. Restrepo-Medrano: Writing – review & editing.

## Ethical implications

This study did not involve direct research with patients, human participants, or animals. As a systematic review and position statement, it was based exclusively on the synthesis of published scientific literature and the contributions of multidisciplinary experts. Accordingly, no specific ethical considerations were identified.

## Funding

Festina Lente support was funded by the Asociación Colombiana de Endocrinología, Diabetes y Metabolismo. This work was funded by the Asociación Colombiana de Endocrinología, Diabetes y Metabolismo, thanks to an unrestricted educational grant from Essity.

## Conflicts of interest

The authors declare the following conflicts of interest: AHRR has received consulting and speaking fees from Novo Nordisk, AstraZeneca, Sanofi, Novartis, Eli Lilly, Medtronic, Abbott, Böehringer Ingelheim, and Bayer. GAC has received consulting and speaking fees from Alpina, Amgen, Abbott, AstraZeneca, Boehringer Ingelheim, Boydorr, CELAN, Euroetika, Gedeon, Eli Lilly, Merck, Novo Nordisk, and Sanofi, as well as from Universidad del Bosque; she has also received research funding from Boydorr, CELAN, Universidad del Bosque, and Universidad del Valle. DCHC has received consulting and speaking fees from Novo Nordisk, Abbott, and Sanofi. NCR has received consulting and speaking fees from Novo Nordisk, Boehringer Ingelheim, AstraZeneca, Recordati, and Ipsen. CEBM has received consulting and speaking fees from Sanofi, Novo Nordisk, Novartis, Recordati Rare Diseases, Janssen, Chiesi, Abbott, and Boehringer Ingelheim and is a shareholder from Festina Lente. The remaining authors report no conflicts of interest.

## Acknowledgements

Festina Lente provided methodological support. Festina Lente was responsible for medical writing and editorial assistance. The authors assume full responsibility for the content and conclusions expressed in this manuscript.

Data statement

No data was collected in the development of this manuscript.

## References

[1] Batmani S, Jalali R, Mohammadi M, Bokaee S. Prevalence and factors related to urinary incontinence in older adults women worldwide: A comprehensive systematic review and meta-analysis of observational studies. BMC Geriatr. 2021;21(1):212. https://doi.org/10.1186/s12877-021-02135-8

[2] Milsom I, Coyne KS, Nicholson S, Kvasz M, Chen CI, Wein AJ. Global prevalence and economic burden of urgency urinary incontinence: A systematic review. Eur Urol. 2014;65(1):79-95. https://doi.org/10.1016/j.eururo.2013.08.031

[3] Murukesu RR, Singh DKA, Shahar S. Urinary incontinence among urban and rural community dwelling older women: Prevalence, risk factors and quality of life. BMC Public Health. 2019;19(Suppl 4):529. https://doi.org/10.1186/s12889-019-6870-6

[4] GBD 2021 Diabetes Collaborators. Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: A systematic analysis for the Global Burden of Disease Study 2021. Lancet. 2023;402(10397):203-234. https://doi.org/10.1016/S0140-6736(23)01301-6

[5] Menke A, Rust KF, Fradkin J, Cheng YJ, Cowie CC. Associations between trends in race/ethnicity, aging, and body mass index with diabetes prevalence in the United States: A series of cross-sectional studies. Ann Intern Med. 2014;161(5):328-335. https://doi.org/10.7326/M14-0286

[6] Arksey H, O'Malley L. Scoping studies: Towards a methodological framework. Int J Soc Res. 2005;8(1):19-32. https://doi.org/10.1080/1364557032000119616

[7] Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, *et al.* PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. Ann Intern Med. 2018;169(7):467-473. https://doi.org/10.7326/M18-0850

[8] Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JP, *et al.* The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: Explanation and elaboration. BMJ (Clinical research ed). 2009;339:b2700. https://doi.org/10.1136/bmj.b2700

[9] McMillan SS, Kelly F, Sav A, Kendall E, King MA, Whitty JA, *et al.* Using the nominal group technique: How to analyse across multiple groups. Health Serv Outcomes Res Methodol. 2014;14(3):92-108. https://doi.org/10.1007/s10742-014-0121-1

[10] Bourne L. Making projects work: Effective stakeholder and communication management. 1st ed. New York: Auerbach Publications; 2015.

[11] Varga-Atkins T, Bunyan N, Fewtrell R, McIsaac J. The nominal group technique – A practical guide for facilitators. University of Liverpool; 2011.

[12] Murphy MK, Black NA, Lamping DL, McKee CM, Sanderson CF, Askham J, *et al.* Consensus development methods, and their use in clinical guideline development. Health Technol Assess. 1998;2(3):1-88. https://doi.org/10.3310/hta2030

[13] Jackson S, Scholes D, Boyko E, Abraham L, Fihn S. Urinary incontinence and diabetes in postmenopausal women. Diabetes care. 2005;28(7):1730-1738. https://doi.org/10.2337/diacare.28.7.1730

[14] Lewis CM, Schrader R, Many A, Mackay M, Rogers R. Diabetes and urinary incontinence in 50- to 90-year-old women: A cross-sectional population-based study. Am J Obstet Gynecol. 2005;193(6):2154-2158. https://doi.org/10.1016/j.ajog.2005.07.095

[15] Lifford K, Curhan G, Hu F, Barbieri R, Grodstein F. Type 2 diabetes mellitus and risk of developing urinary incontinence. J Am Geriatr Soc. 2005;53(11):1851-1857. https://doi.org/10.1111/j.1532-5415.2005.53565.x

[16] Brown JS, Vittinghoff E, Lin F, Nyberg LM, Kusek JW, Kanaya AM. Prevalence and risk factors for urinary incontinence in women with type 2 diabetes and impaired fasting glucose: Findings from the National Health and Nutrition Examination Survey (NHANES) 2001-2002. Diabetes care. 2006;29(6):1307-1312. https://doi.org/10.2337/dc05-2463

[17] Ebbesen M, Hannestad Y, Midthjell K, Hunskaar S. Diabetes and urinary incontinence – prevalence data from Norway. Acta Obstet Gynecol Scand. 2007;86(10):1256-1262. https://doi.org/10.1080/00016340701625347

[18] Viktrup L, Yalcin I. Duloxetine treatment of stress urinary incontinence in women: Effects of demographics, obesity, chronic lung disease, hypoestrogenism, diabetes mellitus, and depression on efficacy. Eur J Obstet Gynecol Reprod Biol. 2007;133(1):105-113. https://doi.org/10.1016/j.ejogrb.2006.05.003

[19] Danforth K, Townsend M, Curhan G, Resnick N, Grodstein F. Type 2 diabetes mellitus and risk of stress, urge and mixed urinary incontinence. J Urol. 2009;181(1):193-197. https://doi.org/10.1016/j.juro.2008.09.007

[20] Ebbesen M, Hannestad Y, Midthjell K, Hunskaar S. Diabetes related risk factors did not explain the increased risk for urinary incontinence among women with diabetes. The Norwegian HUNT/EPINCONT study. BMC Urol. 2009;9:11. https://doi.org/10.1186/1471-2490-9-11

[21] Izci Y, Topsever P, Filiz T, Cinar N, Uludağ C, Lagro-Janssen T. The association between diabetes mellitus and urinary incontinence in adult women. Int Urogynecol J Pelvic Floor Dysfunct. 2009;20(8):947-952. https://doi.org/10.1007/s00192-009-0888-8

[22] Phelan S, Kanaya A, Subak L, Hogan P, Espeland M, Wing R, *et al.* Prevalence and risk factors for urinary incontinence in overweight and obese diabetic women: Action for health in diabetes (look ahead) study. Diabetes Care. 2009;32(8):1391-1397. https://doi.org/10.2337/dc09-0516

[23] Doshi A, Van Den Eeden S, Morrill M, Schembri M, Thom D, Brown J. Women with diabetes: Understanding urinary incontinence and help seeking behavior. J Urol. 2010;184(4):1402-1407. https://doi.org/10.1016/j.juro.2010.06.014

[24] Phelan S, Kanaya A, Subak L, Wing RR, Hogan P, West D, *et al.* Weight loss improves and prevents urinary incontinence among women with type 2 diabetes: Results from the look AHEAD trial. Obesity. 2010;18:S47.

[25] Lee SJ, Karter AJ, Van Den Eeden S, Moffet HH, Cenzer I, Liu JY, *et al.* Glycemic control and urinary incontinence in older women with diabetes: The diabetes and aging study. J Am Geriatr Soc. 2011;59:S90.

[26] Devore E, Townsend M, Resnick N, Grodstein F. The epidemiology of urinary incontinence in women with type 2 diabetes. J Urol. 2012;188(5):1816-1821. https://doi.org/10.1016/j.juro.2012.07.027

[27] Zhang Y, Xu H, Xia Z, Wu B. Analysis of clinical interventional strategy for women with urinary incontinence complicated with diabetes mellitus. Int Urogynecol J. 2011;23:1527-1532. https://doi.org/10.1007/s00192-011-1572-3

[28] Bani-issa W, Fakhry R, Al Momani F. Urinary incontinence in Emirati women with diabetes mellitus type 2: Prevalence, risk factors and impact on life. J Clin Nurs. 2013;22(21):3084-3094. https://doi.org/10.1111/jocn.12176

[29] Breyer B, Phelan S, Hogan P, Rosen R, Kitabchi A, Wing R, *et al.* Weight loss reduces urinary incontinence in men with type 2 diabetes: Results from the look ahead trial. J Urol. 2013;189(4):e232-e233. https://doi.org/10.1016/j.juro.2013.02.1962

[30] Lee S, Karter A, Thai J, Van Den Eeden S, Huang E. Glycemic control and urinary incontinence in women with diabetes mellitus. J Womens Health. 2013;22(12):1049-1055. https://doi.org/10.1089/jwh.2012.4093

[31] Bani-Issa W, Almomani F, Eldeirawi K. Urinary incontinence among adult women with diabetes in Jordan: Epidemiology, correlates and perceived impact on emotional and social well-being. J Clin Nurs. 2014;23(17):2451-2460. https://doi.org/10.1111/jocn.12392

[32] Hsu A, Conell-Price J, Stijacic Cenzer I, Eng C, Huang A, Rice-Trumble K, *et al.* Predictors of urinary incontinence in community-dwelling frail older adults with diabetes mellitus in a cross-sectional study. BMC Geriatr. 2014;14:137. https://doi.org/10.1186/1471-2318-14-137

[33] Wang R, Lefevre R, Hacker M, Golen T. Diabetes, glycemic control, and urinary incontinence in women. Female Pelvic Med Reconstr Surg. 2015;21(5):293-297. https://doi.org/10.1097/SPV.0000000000000193

[34] Weinberg A, Leppert J, Elliott C. Biochemical measures of diabetes are not independent predictors of urinary incontinence in women. J Urol. 2015;194(6):1668-1674. https://doi.org/10.1016/j.juro.2015.06.074

[35] Mahishale A, Ambre P, Kantanavar K. Prevalence of urinary incontinence in males with type 2 diabetes mellitus. Diabetes Metab Syndr. 2019;13(5):2953-2956. https://doi.org/10.1016/j.dsx.2019.07.015

[36] Nazzal Z, Khatib B, Al-Quqa B, Abu-Taha L, Jaradat A. The prevalence and risk factors of urinary incontinence amongst Palestinian women with type 2 diabetes

mellitus: A cross-sectional study. Arab J Urol. 2020;18(1):34-40. https://doi.org/10.1080/2090598X.2019.1699340

[37] Løwenstein E, Jepsen R, Andersen L, Laigaard J, Møller L, Gaede P, *et al.* Prevalence of urinary incontinence among women with diabetes in the Lolland-Falster Health Study, Denmark. Neurourol Urodyn. 2021;40(3):855-867. https://doi.org/10.1002/nau.24636

[38] Nazzal Z, Khatib B, Al-Quqa B, Abu-Taha L, Jaradat A. The prevalence and risk factors of urinary incontinence among women with type 2 diabetes in the north West Bank: A cross-sectional study. Lancet (London, England). 2021;398:S42. https://doi.org/10.1016/S0140-6736(21)01528-2

[39] Northwood M, Markle-Reid M, Sherifali D, Fisher K, Ploeg J. Cross-sectional study of prevalence and correlates of urinary incontinence in older home-care clients with type 2 diabetes in Ontario, Canada. Canad J Diabet. 2021;45(1):47-54. https://doi.org/10.1016/j.jcjd.2020.05.005

[40] Northwood M, Ploeg J, Markle-Reid M, Sherifali D. Home-care nurses' experiences of caring for older adults with type 2 diabetes mellitus and urinary incontinence: An interpretive description study. SAGE Op Nurs. 2021;7:23779608211020977. https://doi.org/10.1177/23779608211020977

[41] Northwood M, Ploeg J, Markle-Reid M, Sherifali D. The complexity of living with diabetes and urinary incontinence for older adults with multiple chronic conditions receiving home care services: An interpretive description study. Glob Qual Nurs Res. 2021;8:2333393621993452. https://doi.org/10.1177/2333393621993452

[42] Li C, Chung M, Liao C, Su C, Lin Y, Liao Y. Urinary incontinence and sleep quality in older women with type 2 diabetes: A cross-sectional study. Int J Environ Res Public Health. 2022;19(23):15642. https://doi.org/10.3390/ijerph192315642

[43] Fwu C, Schulman I, Lawrence J, Kimmel P, Eggers P, Norton J, *et al.* Association of obesity, metabolic syndrome, and diabetes with urinary incontinence and chronic kidney disease: Analysis of the national health and nutrition examination survey, 2003-2020. J Urol. 2024;211(1):124-133. https://doi.org/10.1097/JU.0000000000003761

[44] Li S, Zou J, Wang Z, Wang M, Yuan Y, Lv H. Correlation between insulin resistance and urinary incontinence in female patients with type 2 diabetes mellitus. Int Urogynecol J. 2024;35(2):431-440. https://doi.org/10.1007/s00192-023-05715-x

[45] Schlögl M, Umbehr MH, Habib MH, Wagg A, Gordon AL, Harwood R. Promoting continence in older people. Age Ageing. 2022;51(9):afac199. https://doi.org/10.1093/ageing/afac199

[46] Talley KMC, Davis NJ, Peden-McAlpine C, Martin CL, Weinfurter EV, Wyman JF. Navigating through incontinence: A qualitative systematic review and meta-aggregation of the experiences of family caregivers. Int J Nurs Stud. 2021;123:104062. https://doi.org/10.1016/j.ijnurstu.2021.104062

[47] Shogenji M, Yoshida M, Kakuchi T, Hirako K. Factors associated with caregiver burden of toileting assistance at home versus in a nursing home: A cross-sectional study. PLoS One. 2024;19(3):e0299721. https://doi.org/10.1371/journal.pone.0299721

[48] Beguin A, Malaquin-Pavan E, Guihaire C, Hallet-Lezy A, Souchon S, Homann V, *et al.* Improving diaper design to address incontinence associated dermatitis. BMC Geriatr. 2010;10:86. https://doi.org/10.1186/1471-2318-10-86

[49] Zhang Y, Fang D, Luo Y, Wang C, Wan L, Cao Y, *et al.* A large cross sectional study on diaper utilization and beneficial role in outdoor activity and emotions among incontinence elderly people. Sci Rep. 2024;14(1):6358. https://doi.org/10.1038/s41598-024-57055-5

[50] Ong HL, Sokolova I, Agur W. Impact of regional multi-disciplinary team on the management of complex urogynaecology conditions. Int Urogynecol J. 2023;34(9):2163-2169. https://doi.org/10.1007/s00192-023-05513-5.