New horizons: urinary incontinence in older people

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Abstract

Urinary incontinence is a common complaint in older people, and is associated with significant impact on the individual, their carers and the wider healthcare system. As the numbers of frail elderly people increase, so will the burden of incontinence. This review examines recent developments in research into the aetiology, physiology, pathology and treatment of urinary incontinence and lower urinary tract symptoms in older people, and explores potential future developments which might reduce or ameliorate both urinary incontinence and its effects on frail older people. These include increasing understanding of the importance of central control of continence, the role of the urothelium as a sensory organ, novel targets for pharmacological treatments and surgical and invasive interventions.

Keywords: urinary incontinence, over active bladder, frailty, old age, ageing

Introduction

Urinary incontinence (UI), the complaint of any involuntary loss of urine [1], is common, distressing and under-reported. Older people have a higher prevalence of symptoms [2, 3], are less likely to receive evidence-based care [4], and are less likely to seek healthcare [5] than younger people.

Lower urinary tract symptoms (LUTS) and UI are highly prevalent in the general population. The multinational EPIC study found that >60% of 19,000 men and women aged 40 and over had at least one lower urinary tract symptom, the commonest of which was nocturia. However, if the definition of nocturia was changed from the current ICS definition of ‘1 or more’ voids per night to ‘more than one’, then the prevalence of LUTS fell to 20% in men and 24% in women [2]. The prevalence of both LUTS and UI rises with age (Figure 1). In women, a peak incidence of UI is seen around the time of menopause, whereas in men there is a steady increase in prevalence with age [3].

Many prevalence studies on LUTS/UI concentrate on the presence or absence of symptoms, without considering the impact of those symptoms on the individual. The Leicester MRC Continence Study examined the ‘felt need’ of LUTS/UI, as well as the presence and frequency of symptoms [6]. While 26% of responders reported clinically significant symptoms, 3.8% found these symptoms bothersome and only 2.4% both bothersome and socially disabling. However, in those over 80 years old, the rate of bothersome and socially disabling symptoms was higher; 10% of men reported their symptoms to be bothersome and ~6% of men and women had symptoms that were both bothersome and socially disabling. The EpiLUTS Study, using a similar cohort to EPIC, investigated by an email survey the impact of symptoms of those reporting symptoms, >70% were bothered at least ‘sometimes’ by their LUTS and of those reporting that they ‘sometimes’ had urgency with fear of leakage, only 15% reported that they were ‘quite bothered’ by this [7].

Older people are less likely than younger people to discuss incontinence with their doctor. Only around half of older people with incontinence seek help for their symptoms [8]. The commonest reasons for not seeking help are mild symptoms, and a belief that incontinence is a normal part of ageing [9, 10].

Both LUTS and UI have a negative impact on quality of life, although these effects are complex. Data suggest that severity of incontinence has a greater impact on quality of life than the subtype [11, 12]. The correlation between objective markers of disease severity, and quality of life is poor and the impact of UI on QOL does not change with age [13]. There is a moderate correlation between the amount of urine leakage, as measured by pad tests, and quality of life but little
or no correlation between urodynamic variables and quality of life measurements. [14]

Incontinence and LUTS are highly stigmatising conditions. Sufferers report embarrassment at making frequent trips to the toilet, fear of odour, fear of appearing unclean and, in men, a fear of being seen as impotent [15]. UI is not only more common in older people, it is also more severe, and is associated with sequelae not seen in younger patients with incontinence, such as increased risk of falls and fractures [16] and hospitalisation [17]. Incontinence is a true ‘geriatric giant’ [18]; in a typical older person, incontinence is the end result of multiple underlying risk factors, pathophysiologies and modifiers. As such, although some older incontinent patients will benefit from single interventions, in many cases more complex, multicomponent interventions will be required to ameliorate the burden of symptoms.

Needless to say, there is a dearth of evidence from clinical studies relating to older people and especially, the frail elderly. The usual biases in recruitment to pharmacological trials have only recently begun to be purposively addressed in the field of urgency incontinence and surgical studies addressing the needs of older people are rare. Regardless of these limitations, what does the future hold for clinical advances in the management of incontinence for older people? This review examines the current state of the science and highlights some potential areas of investigation which may eventually be of benefit to older people.

Advances in the basic science of bladder function

Central control of continence

There is increasing interest in urgency incontinence in older people as being a reflection of alteration of central control as much as an end-organ disease. Functional PET scanning in young, healthy volunteers shows that the periaqueductal grey matter (PAG), pons and ventral and dorsal portions of the pontine tegmentum are active during bladder filling [19]. Functional MRI studies in older people suggest that failure of activation in areas of the brain relating to continence, such as the orbitofrontal regions and the insula may lessen the ability to suppress urgency [20], and patients with multiple sclerosis who have lesions in the PAG are more likely to have urinary symptoms than those without [21]. There is a known association between vascular risk factors and LUTS [22], and the presence of white matter hyperdensities within periventricular and subcortical regions of the brain is associated with functional and cognitive impairment, an increased incidence of urinary urgency and detrusor overactivity on cystometry and a difficulty in maintaining continence [23, 24], but whether the incidence of incontinence can be altered through aggressive vascular risk factor control is not known. There may be potential for mid-life interventions, particularly diet and lifestyle, to have an impact on late life disease [25].

Central neurotransmitters involved in the maintenance of continence include gamma-aminobutyric acid, opioid peptides, adenosine and dopamine [26]. There is a strong correlation between Parkinson’s disease and UI, but treatment of PD with l-dopa has an unpredictable effect on LUTS [27].

Urothelium

The urothelium was until recently considered as a passive barrier, existing merely to separate urine from person. Recent research has revealed the urothelium as a complex sensory organ, responding to stretch, cold and chemical influences, and expresses numerous receptors and ion channels, including receptors for acetylcholine [28], purines [29], several types of transient receptor potential (TRP) channel [30] and β3 adrenoreceptors [31]. The urothelium responds to stretch during bladder filling, neural innervation of the bladder, bladder pain and substances in the urine, including bacteria [32]. The urothelium is also active in producing neurotransmitters and mediators, including adenoaine triphosphate (ATP), neurotrophins, nitric oxide and cytokines [33]. Desensitising the bladder with intravesical agents such as resiniferatoxin and capsaicin reduces the sensation of urgency through the blockade of the vallinoiod TRP channel TRPV1 [33], TRPV4−/− knockout mice have enlarged bladder capacities and evidence of dysfunctional voiding [34].

Given the known rise in prevalence of overactive bladder (OAB) symptoms in older people, there is considerable interest in the changes seen in the ageing bladder. These include increased collagen content, changes to gap junctions, increased space between myocytes, and changes in the sensitivity of sensory afferents [35]. In the normal ageing bladder, ATP-dependent detrusor contraction rises with age, whereas cholinergic contraction declines [36], and the number of M3 receptors declines [37]. As the understanding of both signalling and function of the normal and ageing bladder develops, new targets for pharmacological therapies may emerge.

General management of incontinence in older and frail older people

UI in the elderly is associated with frailty [17], and many of the risk factors are unrelated to the urinary tract [38]. The
maintenance of continence is reliant on not only on a functional lower urinary tract and pelvic floor, but also on sufficient cognition to interpret the desire to void and locate a toilet, adequate mobility and dexterity to allow safe and effective walking to the toilet, and an appropriate environment in which to allow this. In frail older people, the current gold standard intervention to achieve an improvement in continence and increased spontaneous independent toileting is prompted voiding with functional incidental training but the intensity of intervention in reported studies makes sustainability difficult to achieve [39]. Current recommendations suggest a 3-day trial and reversion to check and change should there be less than a 20% improvement in wet checks or toileting [40]. Exercise, with or without pelvic floor muscle exercise, has been shown to be effective at reducing the burden of incontinence and nocturia in a variety of settings, from community to nursing homes [41, 42] and there has been an increasing interest in multicomponent interventionsin nursing home residents. However, the minimal frequency and intensity of intervention required to maintain continence is unknown and deserves further investigation. For the community-dwelling elderly, exercise appears to be increasingly attractive as an intervention with plentiful evidence of additional benefit for health and well-being beyond improvement in continence and relief of LUTS. We still have no evidence which guides management of nocturnal enuresis in older people and the extent to which management of other conditions associated with incontinence might benefit lower urinary tract disorders.

**Stress urinary incontinence**

Stress incontinence, the complaint of involuntary loss of urine during coughing, sneezing or exertion, is more common in women than men, with risk factors including genetics, parity, obesity and smoking. The minimally invasive mid-urethral sling procedures, such as the tension-free vaginal tape, are safe and effective in older women [43], and can be performed under local anaesthetic, often as a day case procedure [44]. Since their introduction in the mid-1990s, the number of more invasive surgical procedures performed has dropped by ~90%. In Australia, the proportion of older women receiving mid-urethral slings is increasing [45], this is not the case in the UK (Figure 2); and the reasons for this are unknown. The use of mid-urethral slings in men is a viable option for the treatment of post-prostatectomy incontinence, although the evidence for their use is mainly from observational studies with very little robust RCT data to support them [46]. There is clear potential here for older people to benefit from less invasive surgery for incontinence and the opportunity for collaborative care with geriatricians in the post-operative phase of rehabilitation is obvious.

The use of urethral bulking agents for SUI remains popular in older women and men post-prostatectomy, with between 50 and 80% of patients reporting improvement [47]. Traditionally, this has used autologous fat or inert substances such as carbon or silicone beads to increase the urethral wall thickness and thereby increase urethral closing pressure [47]. However, results are often disappointing and repeated injections are required. Techniques in development include the use of plasmid-loaded particles to encourage regrowth of functional urethra via the induction of basic fibroblast growth factor [48], and the injection of autologous stem cells. Early results are promising but there are few long-term data and no data in older people [49]. The use of autologous adipose tissue-derived stem cells in the management of sphincter

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**Figure 2.** Surgical treatments for SUI in Women from Hospital Episode Statistics [68].
incompetence does hold some promise, although the applicability of this technique to older people remains to be seen.

**Overactive bladder**

OAB is the clinical syndrome of urinary urgency, with or without UI, usually with frequency and nocturia, with no proven infection or other obvious pathology [1]. The majority of currently available drugs for the treatment of OAB act on the detrusor and urothelial muscarinic receptor to increase the storage capacity of the bladder [50]. Adherence to long-term treatment is poor, with high discontinuation rates [51], and there are few data on long-term benefits or harms [52]. Bladder antimuscarinics are associated with significant side-effects, including dry mouth (occurring in up to 80% of patients taking immediate-release oxybutynin [53]). Oxybutynin has been shown to cause memory impairment in healthy older people [54], but there are data suggesting an absence of harm for newer bladder antimuscarinics at therapeutic doses [55]. Newer pharmacological treatments targeted at other detrusor receptors have recently become clinically available. The first selective β3 agonist, mirabegron, is safe and effective in reducing incontinence and urinary frequency although data on older people are restricted to a pooled analysis of those over 65 years of age from registration trials [56, 57]. Intravesical botulinum toxin has been shown to be effective for OAB, and in lower doses those patients are associated with reduced incidence of voiding impairment [58]. Other molecular targets are being explored including the prostaglandin receptor EP1, TRPV channels and leptin [59]. An EP1 receptor antagonist has recently proved ineffective in improving LUTS [60]. Blockade of TRPV channels reduces urinary urgency [33] but, given the ubiquity of TRPV channels, development of a specific, targeted drug for OAB will be difficult to achieve. Animal models suggest that the adenosine A2A receptor may be a future treatment option for incontinence associated with Parkinson’s disease [26].

Phosphodiesterase 5 inhibitors have been shown to improve LUTS, most likely through actions on the prostate and bladder neck [61] and may prove useful for significant BOO [64]. Research into causes and potential treatment of unobstructed DU is required.

**Outflow tract obstruction**

Bladder outflow tract obstruction is most commonly seen in older men with benign prostatic enlargement (BPE) but is also seen in women following pelvic surgery, often for incontinence and prolapse. The trans-urethral resection of prostate (TURP) has long been the mainstay of surgical treatment for men with BPE. Holmium laser enucleation of the prostate appears to be superior to TURP in terms of length of stay in hospital, duration of catheterisation and blood loss although reports to date emanate from relatively few centres with experienced authors. The extent to which their results can be replicated in a more general practice is unknown [65], but the development of this technique may allow frail men to benefit from intervention.

**The artificial urinary sphincter**

The artificial urinary sphincter for the management of severe stress UI was first introduced in 1973. This implantable device comprises a reservoir, urethral cuff and control pump, which requires manual dexterity and reasonable cognitive function to operate. The requirement for surgical revision is up to 30% of implants [66]. Newer devices in development may provide more automated control systems and allow use in frail or more cognitively impaired people with severe stress or post-prostatectomy incontinence [67].

**Conclusions**

Where, then, are the new horizons in the treatment of incontinence for frail older people? There are gaps in our knowledge of the fundamentals of the ageing urogenital tract, as well as the prevalence and impact of incontinence in the elderly, particularly in men. Currently available drug treatments for OAB are poorly tolerated and often discontinued, newer agents may well be better tolerated, but have yet to be proven. Advances in our understanding of the signalling and function of the urothelium may provide alternative and more specific targets for drugs, but early trials of alternative agents have proved disappointing. Less invasive surgical treatments for SUI provide attractive options for management in older people and have been proved to be safe and effective, but are not yet utilised as much as they could be. Multicomponent interventions in nursing home populations are effective, but are complex, expensive, and are difficult to sustain in the long term. The most significant horizon is to raise the awareness of incontinence as a geriatric giant, and for patients and professionals to stop accepting incontinence as an inevitable part of ageing.
Key points

- Urinary incontinence is common, distressing, and under-treated in older people.
- Understanding of the role of the urothelium in the pathophysiology of LUTS may lead to potential treatment targets.
- The normal ageing of the urogenital tract remains poorly understood.
- Multicomponent interventions in the frail elderly are beneficial but implementation remains an obstacle to sustainable improvement.

Conflicts of interest

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References


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