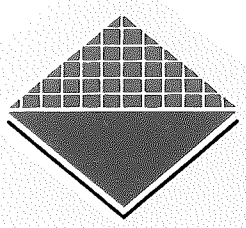
Management of incontinence

An information paper

Anthony Lea

June 1993



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Summary

- For persons aged 65 and over living in the community, the prevalence of urinary incontinence has been estimated at between 10 and 15%. Urinary incontinence affects up to 33% of patients in acute care hospitals and up to 60% in nursing homes.
- Primary care physicians need to be aware of the reluctance of patients to discuss and reveal their lack of continence. Some estimates suggest up to one-third of patients with incontinence do not seek help.
- Behavioural therapies, pharmaceutical treatments, surgery and bulking injections have all been successful in the management of urinary incontinence though there appear to be few data on their comparative effectiveness.
- Behavioural therapies are generally non-invasive and often successful for patients with adequate cognitive powers. The success of behavioural therapies, as applied in nursing homes, depends on the design of the protocols and the ability of management to motivate those who implement the program.
- Collagen implant treatment has shown promising results, although there is a need for data to establish long-term outcomes. Collagen implant treatment has the advantage of being a one-day procedure, and surgery is not precluded should the implantation fail.
- Several surgical procedures and prostheses are available for treatment of fecal incontinence.
- Urinary and fecal incontinence cause major distress for patients and have considerable cost implications for hospitals and nursing homes. Home carers have considerable difficulty coping with the incontinent elderly, which may be a contributing factor in their decision to place the elderly person concerned in institutional care.
- There remains considerable scope for research on incontinence and its management, and on the costs and effectiveness of available treatments.

Introduction

This information paper has been prepared as a consequence of the work done on an Institute project reviewing health technologies used in care of the elderly. Incontinence is a prevalent, costly and under-reported condition in the elderly which may be rectified or ameloriated.

Incontinence is the involuntary loss of urine or feces of a sufficient severity to cause social and/or hygienic consequences. Urinary incontinence affects all age groups and is a major problem in management of elderly patients.

Urinary incontinence can be caused by pathological, anatomical or physiological factors affecting the urinary tract as well as factors outside it.[1] Many of these factors can be reversed. They include infection, atrophic vaginitis, acute confusional states, restrictions in mobility, fecal impaction, medical conditions that cause polyuria and nocturia, and side effects of drugs.

Types of incontinence

Rowe et al.[2] list the most common forms of urinary incontinence as stress incontinence, urge incontinence, overflow incontinence and a mixed form of the other types.

Stress incontinence results from dysfunction of the bladder outlet; this leads to leakage when intra-abdominal pressure is raised above urethral resistance by coughing, bending, sneezing or lifting heavy weights. The volume of urine leakage is generally modest for each occurrence, and, in uncomplicated cases, post-void volume is low.

Urge incontinence occurs when patients sense the urgent desire to void before loss of control results. Rowe et al. report that, in most cases, uninhibited bladder contractions contribute to the incontinence. Urine loss is moderate in volume and occurs over intervals of several hours. Post-void residual volume is low at intervals of several hours. Rowe et al. describe causes such as central nervous system lesions resulting from stroke or demyelinating disease—which impair inhibition of bladder contraction. Other causes include local factors such as urinary tract infections or bladder tumours which may also inhibit the contraction of the bladder. In many cases of urge incontinence, no specific etiology can be identified.

Overflow incontinence results when the bladder cannot empty normally and becomes over-distended leading to frequent urine loss which may, in some cases, be nearly continuous.

Many of the elderly may suffer from incontinence derived from a mixed etiology. The term 'functional incontinence' is applied to cases where other factors such as immobility or severe cognitive impairment result in the incontinence, rather than deficiencies in the lower urinary tract.

Drug-induced incontinence

O'Connell et al.[3] state that antihypertensive agents, diuretics, sedatives, antidepressants, lithium and antiparkinsonism drugs may all cause incontinence in women. They counsel that when a diuretic agent is desirable, fast-acting agents such as frusemide should be avoided.

Dwyer and Teek[4] studied the effects of prazosin, a commonly prescribed antihypertensive that lowers blood pressure through a reduction in peripheral vascular resistance by selectively blocking postsynaptic alpha-1 adrenergic receptors in arteriolar smooth muscle. They found that of 58 women taking prazosin who were incontinent, 45 found that their incontinence improved or was cured by withdrawal of the drug. The incidence of genuine stress incontinence was also significantly higher in women taking prazosin than in a non-prazosin group. Dwyer and Teek report that the incidence of previous bladder neck surgery in this group was over 50%.

Other hypotensive drugs such as reserpine, alpha-methyldopa and phenoxybenzamine have also been reported as causing urinary incontinence, and Dwyer and Teek consider that the newer drugs that inhibit the alpha-1 adrenergic receptors such as doxazosin and terazosin should also be considered to have this side effect. The ACHPR Clinical Practice Guideline[1] lists groups of pharmaceutical preparations that may induce transient incontinence.

Prevalence of incontinence

Studies in Australia suggest that between 4 and 6% of the population suffers from incontinence. For persons aged 65 and over living in the community, the prevalence of urinary incontinence has been estimated at between 10 and 15%.[5] Urinary incontinence affects 20 to 33% of patients in acute care hospitals and between 40 to 60% of patients in nursing homes.[6,7]

Fonda[7] describes the results of a study of 1,659 cases of whom 333 were short-stay patients. Of the 1,326 nursing home patients, 23% were independently continent. Twenty-six per cent and 11% of these groups respectively were dependently continent. Fonda found that only 5.3% of the incontinent short-stay patients and 4.4% of incontinent nursing home patients were judged to be psychologically impaired or physically dependent in various aspects of daily living.

The prevalence of incontinence rates reported from the USA are between 15 and 30% for community dwelling older persons, of whom 20–25% may be considered as severe cases.[2] Fifty per cent or more of nursing home patients in the USA were also considered to be incontinent. In Canada, an estimated 4–5% of people under 65 years of age and about 10% of persons over the age of 65 suffer from urinary incontinence.[8] In a survey of adult females conducted in the UK, symptoms of stress incontinence were identified in 22%, urge incontinence in 10% and a mix of symptoms in 14%.[9] Thomas et al.[10] found a prevalence rate for incontinence of 11.6% and 8.9% in women and men over 65 years of age respectively.

Fonda[7] found that fecal incontinence occurred in 14 and 42% of short- and long-stay groups respectively in Australian nursing homes. In 95% of cases this condition coexisted with urinary incontinence.

Mortensen and Humphreys[11] quote frequencies of people over the age of 65 years in the UK who reported fecal incontinence in a postal survey as 4 per 1,000 for males and 13 per 1,000 for females. Fecal incontinence, though being less prevalent than urinary incontinence, is often the deciding factor in placing the elderly in nursing home care. The condition is reported to occur in 20% of residents of nursing homes in the USA.

Diagnosis and assessment

Missed diagnosis or under-reporting of incontinence is common. Cotton[12] reports that 11 out of 12 sufferers do not mention the problem to their physician. The elderly patients presenting are embarrassed, afraid and either do not want or are apprehensive about surgery. Cotton also reports that many physicians express little interest in incontinence. Rowe et al.[2] believe that evaluation should be tailored to the individual, taking into account clinical, cognitive, functional and residential status of elderly persons. Proper diagnosis and active case finding are imperative.

Rowe et al. advocate an evaluation which includes a thorough medical history, as well as urological, gynecological and neurological assessments. Details on frequency, duration, volume and type of incontinence should be validated using a voiding diary. Further information on associated illnesses and previous operations should be obtained. A physical examination, including abdominal, rectal and pelvic findings as well as mobility, dexterity and neurological observations, should be conducted. Rowe et al. stress the need for emphasis on mental status and recommend a provoked full-bladder stress test be conducted.

The National Institutes of Health's consensus conference report[2] details the following tests that must be used selectively in the assessment of elderly patients:

- cystometrogram
- electrophysiological sphincter testing
- ultrasound evaluation of the bladder or kidneys
- cystourethroscopy
- uroflometry
- video urodynamic evaluation
- urethral pressure profilometry.

Treatments for urinary incontinence

Pharmaceutical treatments

The drugs used in the treatment of urinary incontinence include anticholinergics, direct smooth muscle relaxants, calcium channel blockers, imipramine, and estrogens.

Anticholinergics affect the micturition reflex and produce a competitive blockage of muscarinic receptors at postganglionic parasympathetic receptor sites.[13] This action results in an inhibition of the detrusor contraction and may produce increased bladder capacity.[2] A reduction in the amplitude of involuntary contractions may also result. Drugs prescribed include propantheline, emepronium carageenate and oxybutynin. Anticholinergics produce side effects including dry mouth, dry eyes, blurred vision, drowsiness, constipation, confusion and urinary retention. They are contraindicated in patients with uncontrolled glaucoma.

Smooth muscle relaxants such as flavoxate and dicyclomine work directly on the bladder muscle.

Calcium channel blockers limit the availability of calcium ions required for the contractile process and can decrease the contraction of the unstable bladder.[13] Rowe et al.[2] state that the efficacy of these formulations have not been rigorously studied for the treatment of urge incontinence in comparison with other agents. Sourander[13] reports that these drugs have been shown to decrease detrusor instability. However, the clinical use of calcium channel blockers is limited. Side effects of calcium channel blockers can occur in the beginning of treatment and are related to the vasodilatation caused by these drugs.[13]

Imipramine has an anticholinergic effect in addition to direct muscle relaxant and muscle local anaesthetic effects. Rowe et al.[2] report postural hypotension and sedation as potential side effects as well as those associated with the anticholinergic activity of this compound. Sourander cautions the need to watch for cardiac side effects, conduction and arrhythmias.

Alpha-adrenergic agonists (norephedrine, ephedrine and phenylpropanolamine) are used in the treatment of stress incontinence. These compounds produce smooth muscle contraction at the bladder outlet and may improve incontinence.

Estrogen therapy has been shown to improve the treatment of women with menopausal urge incontinence; improvements have also been noted for urgency and frequency. Estrogen therapy counteracts a loss of urethral collagen after menopause and maintains smooth muscle tone.[13] Beisland et al.[14] state that both locally and systematically administered estrogen has an effect on urethral pressure parameters. Long-term use of estrogen may have other benefits, as well as risks such as the chance of endometrial neoplasms.

Sourander[13] reports on the performance of the relatively new drug, terodiline, which is used for the treatment of frequency, urgency and motor urge incontinence. Terodiline is almost completely absorbed from the gastrointestinal tract and has a long serum half-life which allows a once-a-day administration schedule. The method of action is a combined anticholinergic and calcium antagonistic effect. Sourander reports that the side effects of terodiline are mainly those associated with the anticholinergics. The channel blocking effect has no selectivity for the cardiovascular system, thus interaction with other calcium antagonists does not occur.

Constantinou[15] has reported a controlled double-blinded crossover study to evaluate the treatment of detrusor instability with thiphenamil hydrochloride. In the study, patients were required to maintain a diary and urodynamic measurements were also conducted throughout the study; bladder capacity, sensations, stability and pressure/flow measurements were obtained. The results showed that the frequency,

as recorded in the patients' diaries, decreased significantly ($0.01<p<0.025$) and that the patients on thiphenamil hydrochloride reported that they were significantly drier during the treatment period. Evaluation of the urodynamic data demonstrated a significant decrease in detrusor voiding pressure. However, no changes were observed in the flow rate, capacity, urethral resting or opening pressure or bladder work.

Surgical interventions for incontinence

Surgery is an effective treatment for pure stress incontinence.[2] The literature on the success of surgical procedures does not use standardised methods of reporting outcomes.[1] In the USA there are variations in how the complications are reported and how the evaluation data on patients who are lost to the studies are handled.

A variety of surgical techniques are used in the treatment of urinary incontinence:

- transvaginal or transabdominal suspension of the bladder neck;
- sling procedures;
- placement of artificial sphincters;
- intermittent and indwelling catheterisation;
- bladder augmentation and isolated bowel segments; and
- prostatectomy when incontinence is due to prostatic enlargement.

The ACHPR Clinical Practice Guideline[1] counsels that surgical treatment should only be performed after a precise, focused assessment. Such an evaluation should include an objective confirmation of the diagnosis, an estimation of surgical risk, a correlation of anatomic and physiological findings with the surgical plan and an estimation of the impact of the proposed surgery on the patient's quality of life. This guideline also states that 'successful surgery requires proper patient selection, a process not always well described in surgical series'.

Suspension of the bladder neck procedures

Urethral sling procedures have been used for incontinence caused by prostatectomy, hypermobility and intrinsic sphincter deficiency. Sling procedures pass a ribbon of fascia, or artificial material is passed beneath the urethra. The sling, fixed to the anterior body wall, serves to elevate and compress the urethra—thus restoring continence.

When the patient's urinary incontinence has caused an anatomic obstruction with an adequately contracting detrusor, the best treatment is surgery. Two types of procedures can be used to relieve the obstruction. One of these options is the needle bladder neck suspension in which patients with an obstruction can be relieved by cutting of the suspending sutures. The other option is uretholysis or cutting the adhesions that fix the urethra to the pubic bone, with or without repeating the bladder neck suspension.

Variations to this procedure are used to correct urethral hypermobility and are all performed through the vaginal approach, and most utilise small suprapubic skin incisions.[1] Anchoring tissues adjacent to the urethra and bladder neck are held by suspending sutures.

Anterior vaginal repair includes some degree of the dissection of the anterior vaginal wall from the overlying bladder base and urethra and application of the pubocervical fascia. The extent of the dissection and extent and location of the elevating sutures vary substantially among these techniques.

Retropubic suspension procedures include different techniques performed through a low abdominal incision. They have in common the elevation of the lower urinary tract

within the retropubic space.[1] The Marshall-Marchettic-Kantz procedure and the Bursch colposuspension procedure differ according to the structures used for the elevation.

Artificial sphincters

A small proportion of patients with incontinence due to an incompetent urethral sphincter will be suitable for treatment using an artificial sphincter.[16] A commonly used device is the AMS800, comprising a wraparound cuff, balloon reservoir and pump connected in a fluid filled system by detachable tubing.

When activated, the sphincter produces a constant occlusive force on the urinary tract. The cuff is deflated when micturition is desired. Major complications requiring removal and reinsertion of the prosthesis include cuff erosion, infection and mechanical misfunction. Overall infection rates of 3.8–6% and revision surgery rates of as much as 32% have been reported. Revision surgery is successful in 70–100% of cases, depending on the cause of the misfunction. Overall success for achieving continence has been reported to be as high as 93%.

Durrani et al.[17] reviewed 57 patients who underwent implantation of a Kaufman prosthesis for urinary incontinence, all but one of these following prostatic surgery. Although many of the patients required revision or adjustments after the initial implantation, 55 % of the cases eventually had a satisfactory outcome. They suggest that this simple and relatively inexpensive device can still play a useful role in the treatment of patients with mild and moderate stress incontinence following prostatectomy. Craggs, Chaffey and Mundy[18] have reported some preliminary findings on the use of a new hydraulic sphincter for controlling urinary incontinence.

Catheterisation

The use of catheters in the treatment of urinary incontinence can be divided into three subcategories:

- intermittent catheterisation
- indwelling catheters
- subrapubic catheters.

Intermittent catheterisation is a procedure whereby a catheter is inserted through the urethra every three to six hours for bladder drainage. The ACHPR Clinical Practice Guideline[1] states that non-sterile, clean intermittent catheterisation is a safe and effective therapy either on a short-term or long-term basis for persons with urinary incontinence that may be derived from a number of etiologies.

Indwelling urethral catheters are closed, sterile systems. Patients being monitored for fluid balance, the severely impaired or the acutely ill are suitable for treatment with indwelling catheters. The period of catheterisation should not exceed two to four weeks.[1] Long-term use of indwelling catheters is also a significant source of bacteriuria and urinary tract infection. Bacteriuria develops in most persons within two to four weeks of catheter insertion. Patients with indwelling catheters in US nursing homes have three times the mortality of the non-catheterised patients in these institutions.[1,19,20] Indwelling catheters also cause a large number of additional complications including obstruction, stones, urethral erosion, pain, bladder spasms and chronic renal inflammatory changes.[1]

Suprapubic catheters involve percutaneous or surgical introduction of the catheter into the bladder through the anterior abdominal wall. These catheters are used as an alternative to long-term urethral catheter use in men and for short-term use following gynecologic urologic surgery.

Periurethral bulking injections

The injection of sterile materials such as polytetrafluroethylene (PTFE) or collagen into the lining of the urethra and bladder neck can provide additional compression and hence improve continence. Collagen implantation may be performed as an outpatient procedure, lasting approximately 30 minutes using a local anesthetic.

Candidates for periurethral injections to augment bladder-outlet pressure are patients with a primary incompetent proximal urethra in whom the disorder of sphincteric function is secondary to either surgery or trauma.[21]

The bladder neck and proximal urethra are open at rest in the absence of a detrusor contraction and this may be detected radiographically and/or urodynamically.[22] The leak point pressure (LPP) is, from a practical point of view, the way to determine the urethral opening pressure and the extent of urethral may be obtained. Appell[22] states the contraindications for this form of treatment would be active, untreated cystitis or urethritis or known hypersensitivity to bovine collagen.

Since bulk enhancing agents increase pressure on the urethra and reduce urethral size and thereby establish additional resistance to urine flow, the patient selection, evaluation and diagnosis of bladder incompetence are no different for those patients considered for pubo-vaginal sling or artificial urinary sphincters.[22]

Commercially available products include:

- Polytef (Mentor), an extremely thick paste that is a sterile mixture of PTFE particles, glycerin and polysorbate; and
- Contigen (Collagen Corporation), a sterile, non-pyrogenic solution of highly purified bovine dermal collagen cross-linked with glutaraldehyde and dispersed in phosphate buffered saline. Contigen can be injected transurethrally or periurethrally.

A preliminary report[23] has given some details of the results of the injection of Macroplastique (polydimethylsiloxane) particles for the treatment of urinary incontinence. The report is based on experience, at Victoria Infirmary, Glasgow, and details the success of the treatment of 132 women with stress incontinence with textured silicone particles suspended in a liquid gel. The injections were made periurethrally using standard endoscopic equipment with a hand-held ratchet and piston system, and an average of 4.4 mL was delivered over a total of 182 injections.

Safety

Injection of PTFE has been used for the treatment of vocal cords, the lower esophageal sphincter and the urinary sphincter for a number of years.[24] This material has consistently promoted local inflammatory responses and foreign body granulomas. In addition, locally injected PTFE particles have been found to migrate into pelvic lymph nodes, kidneys, spleen, lung, the subarachnoid space of the brain stem, and the cerebral hemispheres.

Smart[25] reports one significant complication in a series of 28 patients treated with Polytef injection, when a 49-year-old woman formed a large pelvic cyst arising from the site of her injection three years previously. The patient's incontinence had recurred and she was satisfactorily treated by cyst removal and colposuspension. The cyst wall was histologically benign, the fluid containing PTFE particles.

Collagen implants have been widely used in cosmetic treatments and in the treatment of glottic insufficiencies and have a low incidence of adverse reactions.

In a trial on collagen implants for the treatment of urinary incontinence, De Lustro et al. [24] found that 1.9% of patients demonstrated sensitivity to the skin challenge test and excluded these persons from treatment. Of the 144 persons treated with the

collagen injections, one demonstrated a localised inflammatory response after treatment; analysis of the patient's serum on pre-skin challenge showed the presence of antibodies to bovine collagen.

De Lustro et al. report that the development of antibodies did not correlate with the number of injections or total volume of material injected and did not adversely affect treatment efficacy. Four of the patients showing antibodies to bovine collagen reported adverse effects. Two had mild urinary tract infections that were unrelated to the implant material. Another patient suffered an unrelated lichen planus skin rash; however, no skin rash or reaction was demonstrated at the injection or skin challenge site. One patient showed local hypersensitivity at the site of injection and had temporary retention problems which were relieved by intermittent self-catheterisation.

Eckford and Abrams[26] found eight complications out of a series of 25 patients who had undergone para-urethral collagen injections. In two cases the patients were not able to tolerate the procedure under local anesthesia; in three cases there was urinary retention requiring intermittent catheterisation for up to 72 hours. One case of presumed bacteraemia and hypothermia and a further case of urinary tract infection (coliform) were also found. The remaining case re-presented with a vaginal abscess and was unable to pass urine. The abscess ruptured spontaneously; however, the patient's incontinence returned.

The brief on Macroplastique injections[23] notes that some of the side effects found in the study by Buckley were transient dysuria, frequency and hematuria, which were observed in virtually all patients for one or two days. In addition, four patients had voiding problems that required intermittent catheterisation.

Behavioural therapies

Behavioural therapies are low-risk interventions that decrease the frequency of urinary incontinence in most individuals when provided by knowledgeable health care professionals.[1] All these techniques involve education of the person concerned and the provision of positive reinforcement for effort and progress. Such techniques have no reported side effects and should be recommended for motivated and cooperative patients. The behavioural techniques include:

- bladder training
- habit training
- prompted voiding
- pelvic muscle exercises
- biofeedback
- vaginal cone retention
- electrical stimulation.

Biofeedback, vaginal cone retention and electrical stimulation may be used in conjunction with the other four behavioural techniques.

Bladder training

Bladder training consists of an education component, voiding schedule and a continuing positive reinforcement program. The education program can consist of written, visual and verbal instructions that address the physiology and pathophysiology of the lower urinary tract. The voiding program uses a progressively increased interval between mandatory voidings designed to help distend the bladder and to increase voiding volumes. Two main strategies exist if the patient is unable to delay voiding between schedules; the first is to restart the program from the last voiding and the second is to disregard the unscheduled void and continue the

program with no alteration. This form of training has been used to manage urinary incontinence due to bladder instability and may also be used to control stress incontinence.[1]

Habit training

Habit training is scheduled toileting which is designed to keep the person dry by providing advice to void at regular intervals. Attempts are made to match the person's voiding habits; however, no effort is made to motivate the individual to delay voiding or resist the urge.

Prompted voiding

As a supplement to habit training, prompted voiding attempts to teach the incontinent person to discriminate his or her incontinence status and to request toileting assistance from caregivers. There are three main elements to prompted voiding;[1] the person is monitored on a regular basis and asked whether they are wet or dry, the person is then prompted to try to use the toilet, and the individual concerned is praised for remaining dry or attempting to toilet.

Pelvic muscle exercises

Pelvic muscle exercises, or Kegel exercises, strengthen the voluntary periurethral and pelvic muscles. The contraction exerts a closing force on the urethra and hence increases urethral resistance in addition to increasing the support to the pelvic visceral structures. These exercises can be performed by contracting the perivaginal muscles and the anal sphincter without contracting abdominal, buttock, or inner thigh muscles.[1,2] Health care providers must teach patients the correct method of contracting and identifying the muscle by palpation and verbal feedback. The contractions should be sustained for a period of up to ten seconds followed by an equal period of relaxation. These exercises should be performed about 30–80 times per day for at least six weeks, perhaps longer for the elderly.

Vaginal cones

Vaginal cones, or Femina cones, are used as part of a structured program in which women are given a set of cones of equal volume but increasing weight and instructed to insert the cones intravaginally and to attempt to retain these weights by contracting their pelvic muscles for periods up to 15 minutes. This exercise is performed twice daily and the sustained contraction used to retain the cone increases the strength of the pelvic muscles. The weight of the cone is assumed to provide feedback as to the required pelvic muscle contraction.[1,12]

Biofeedback

Biofeedback uses electronic or mechanical instruments to relay information, through auditory or visual means, to patients about their physiologic activity. The instruments provide electromyography (EMG) data and measures of manometric indices of pelvic, abdominal muscle and detrusor activity. Biofeedback should be used in conjunction with other behavioural therapies. Successful application of biofeedback is also dependent upon the knowledge and skill of the health care provider.[1]

Electrical stimulation

Electrical stimulation involves stimulation of the pelvic viscera, the pelvic muscles, or the nerve supply to these muscles.[1] Stimulation of the afferent fibres facilitates storage by modifying bladder sensation, and stimulation of the efferent fibres to the detrusor muscle can induce bladder contraction. Electrical stimulation may also be used to inhibit detrusor overactivity by influencing the sacral micturition reflex arc. Electrical stimulation has been used to manage both bladder and urethral dysfunction in both neurologically and non-neurologically impaired persons. The adverse reactions associated with electrical stimulation are pain and discomfort.

Treatments for fecal incontinence

The prevalence of fecal incontinence in the Australian population is unknown, and as is the case with urinary incontinence, this condition would be under-reported or the diagnosis missed through poor communication between the doctor and patient. In a postal survey in the UK, the frequency of people over the age of 65 years reporting fecal incontinence was 4.9 per 1,000 males and 13 per 1,000 for females.

Management of fecal incontinence includes modification of diet, use of medication and surgical repair. A low-residue diet and anti-diarrhoea medication is successful in 30% of patients, but is less effective in those who are incontinent to liquid or solid stool.

In 60–70% of patients, incontinence is restored by post-anal repair; however, incontinence of flatus often still exists. Yoshioka and Keighley[27] found that with a median follow-up of five years, although 81% of patients had improved continence, 60% still had feelings of urgency, 76% still leaked feces and 52% continued to wear pads after the operation.

Farouk et al.[28] investigated the restoration of fecal continence following rectopexy for those patients who had suffered a full rectal prolapse. They found that the internal anal sphincter frequency did improve following surgery, although the recovery of this facility was not complete because the results for the surgery patients were significantly lower than for the controls. The resting anal pressures of the patients following surgery were also significantly lower than the operation, but this difference was not considered significant. Farouk et al. state that improvement of anal sphincter function and anorectal sensation after rectopexy contributes to restoration of continence.

New surgical procedures for fecal incontinence include anterior repair, anterior and posterior repair, gracilis muscle transposition, electrical stimulation of a gracilis neosphincter and insertion of artificial sphincters.

Baeten et al.[29] investigated the treatment of fecal incontinence by dynamic graciloplasty which consisted of a two-stage surgical procedure. The first stage consisted of transposing the gracilis muscle around the anal canal. A period of six weeks was allowed to elapse before the second operation in which electrodes were inserted into the site of the lowest threshold of the transposed gracilis and connected to an implantable electrical stimulator, which was placed in a subcutaneous pocket in the lower abdomen. The muscle was stimulated immediately after implantation, with intermittent stimulation over a period of eight weeks. This procedure was considered as a conditioning period. Patients were evaluated before and after the two procedures using anal manometry, electromyography, defecography and retention times for a phosphate enema pack. Muscle changes were studied by immunohistochemistry.

After implantation of the stimulator, the frequency of defecation decreased from a mean of eight episodes per day to three. The ability to postpone defecation increased from 12 seconds to 40 minutes.

Four of the ten patients experienced complications from the procedure. There was also improvement in ability to contract the anal canal, and an increase in retention time for an enema pack from 22 seconds to 281 seconds. Baeten et al. conclude that treatment with dynamic graciloplasty is much more successful than graciloplasty alone because it offers the opportunity for prolonged muscular contraction, which allows the transposed gracilis to function effectively as a sphincter.

Williams et al.[30] report the results of a series of operations on 20 patients with deficient sphincters and 12 patients in whom the anorectum had been excised or was congenitally absent. A neoanal sphincter was constructed with an electrically stimulated gracilis muscle and a totally implanted stimulator used to convert the muscle from a fast twitch to a slow twitch muscle. The first six patients had an external stimulator and the last 21 patients had the distal 2–3 vascular pedicles to the gracilis

divided four to six weeks before the transposition of the muscle. Williams et al. reported the occurrence of severe sepsis in nine patients (28%), in four of whom it was associated with muscle necrosis. In another group of four patients, there was movement of the electrode plate. However, no such movement was observed when the purpose-built plate was placed over nerve to the gracilis and sutured to the adductor brevis. Two patients suffered neuralgic-type pain which gradually abated over a few weeks.

Of the 20 patients with a deficient sphincter, 12 still had functioning neosphincters following the surgery, one died seven months after the procedure, another patient was still converting at the time of report and the operation was not successful for the remaining six. In the group of 12 patients in whom the sphincter mechanism was absent, eight still have functioning sphincters, three were still converting and the procedure failed for the remaining patient. Williams et al. found that once they adopted the vascular delay modification, the incidence of muscle necrosis decreased to zero, and believe that the neosphincters were not continent for flatus. However, all but one of this group were continent on solids. Five of the twenty patients had occasional episodes of incontinence to liquid stools. Williams et al. also found that those patients with functioning neosphincters showed significant neoanal canal pressures. If the stimulator was turned off, all patients were totally incontinent.

Mortensen and Humphreys[11] investigated the efficacy of three designs of anal continence plugs. The three plug types were all made of polyurethane sponge and wrapped in a water-soluble coat to reduce their size to that of a conventional suppository. Following insertion, the water-soluble coat dissolves and the plugs expand to their full size. Ten persons who were incontinent to both solids and liquids tested each type of plug for three consecutive weeks. In 82% of the periods during which the plugs were in place, no episodes of incontinence were recorded. The patients required a median of eleven plugs per week, and in 82% of cases insertion was as easy as for a suppository.

Modification of the AMS800 artificial sphincter to manage anal incontinence due to neurological disease has been reported.[31] Preliminary results suggest this approach could be a valid alternative to permanent colostomy in such patients.

Effectiveness of treatments for urinary incontinence

Outcomes of the varying pharmaceutical treatments have been derived from the ACHPR Clinical Practice Guideline,[1] and are presented in Table 1.

Table 1: *Effectiveness of pharmaceutical treatments*

Treatment	Cure %	UI Reduction %	Side effects %
Urge incontinence			
Propantheline	0–5	053	0–50
Oxybutynin	28, 44	9–56	6–66
Tricyclic antidepressants	31	20–77	0–70
Terodiline	18, 33	14–83	4–40
Stress incontinence			
Phenylpropanolamine	0–14	19–60	5–33
Quinestradol	0	89	0
Piperazine estrone	0	20	11
Estriol	0:14	0:29	11–28
Phenylpropanolamine + intravaginal or oral conjugated estrogen	0	Slight	0
Phenylpropanolamine and estriol	15; 64	37; 7	8–38
Noephedrine and estriol valerate	23	38	15

Only five adequately controlled trials of propantheline could be identified, three of which included only elderly nursing home patients.[1] Approximately 10% of participants were forced to withdraw from the trials owing to the severity of the side effects. The US Clinical Guidelines conclude that despite the lack of adequate controlled trials, there appears to be a consensus among experts that at least for less impaired patients, who can tolerate full doses, propantheline is effective and recommended.

The majority of studies performed on oxybutynin were performed on middle-aged outpatients and the only negative trial was performed on elderly nursing home patients. In 84% of cases, subjects receiving 5 mg oxybutynin four times per day experienced severe mouth dryness. However, oxybutynin is recommended for the treatment of detrusor hyperactivity. Oxybutynin has minimal effects on intraocular pressure among elderly patients without glaucoma. Patients with glaucoma can safely be treated with oxybutynin; however, the patient's ophthalmologist should be consulted before initiating treatment to ensure that the intraocular pressure is stable, and the patient should be evaluated after therapy is instituted.[32]

Limited data are available on trials on the calcium channel blocking agents with only one controlled trial on flunarizine being reported; these compounds are not recommended for general use for the treatment of detrusor overactivity.[1] The controlled trials indicate that terodiline will increase continence although side effects were noted in 20–60% of cases. Reports of its association with serious ventricular arrhythmia have resulted in its temporary withdrawal from the European market and may prevent its approval in the USA.[1] Despite the wide use of imipramine and other tricyclic agents, only a few controlled studies have been conducted; these indicate improved continence particularly through the night, and the ACHPR Panel, members have recommended imipramine and doxepin as being beneficial in the treatment of

incontinence.[1] Imipramine has also been associated with hip fractures in the elderly, possibly as a side effect of postural hypotension.

The panel of experts formed to prepare the ACHPR Clinical Guidelines concluded that the contribution to the treatment of urge incontinence was modest and complete dryness was uncommon. They also concluded, that these drugs should be used only in conjunction with a voiding schedule or behavioural intervention and only after other factors contributing to incontinence have been addressed.

Phenylpropanolamine results in few cures (0–14%) although 30–60% of patients experienced some improvement. Caution is recommended when treating patients with hypertension, hyperthyroidism, cardiac arrythmias and angina for incontinence with phenylpropanolamine.[1] Evidence suggests that estrogen therapy either administered orally or vaginally may benefit patients with both stress and urge incontinence. Estrogen should be given with a progestin and may also be beneficial for the prevention of osteoporosis, stroke and ischemic heart disease. Estrogen therapy is contraindicated when cancer of the breast, uterus and cervix are suspected. The studies on the combination of estrogen and alpha-adrenergic agonists are limited and the ACHPR Panel recommended that the combination therapy should be considered when initial single drug therapy fails. The use of imipramine for the treatment of stress incontinence with propranolol was not recommended.

Iosif[33] reports that vaginal absorption of estrogens is very efficient with 0.5 mg of vaginal estriol producing equivalent peak serum levels of unconjugated estriol to those attained with 8–12 mg of estriol given orally. It is also stated that most elderly women find vaginal therapy difficult or unacceptable and prefer oral treatment. Iosif says that estrogen therapy relieves the symptoms of stress incontinence by causing proliferation and growth of the urethral mucosa and this has a positive effect on the 'urethral softness factor'. Increased urethral pressure, along with improved pressure transmission to the proximal urethra, play an important part in the alleviation of genuine stress incontinence. Zorzitto et al.[34] evaluated the effectiveness of propanthaline bromide in a long-term care institution. This study could only demonstrate a 17% reduction in incontinent episodes.

The effectiveness of the surgical treatments as measured in terms of the outcomes are presented in Table 2.

O'Connell et al.[3] consider that the combination of the concepts of anatomical urethral incontinence and a pubovaginal sling for management of intrinsic urethral incontinence represents an approach to this complex disorder that addresses both the anatomical urethral abnormality and the intrinsic urethral abnormality. These abnormalities can frequently coexist in patients who have failed previous procedures. The results of this study suggest that continence outcome for this difficult group of patients is encouraging, however, a larger series of patients is needed to further evaluate this combined approach.

Table 2: *Outcomes for the surgical treatments for incontinence*

Outcomes	Retropubic suspension	Needle suspension	Sling operation	Artificial urinary sphincter
Per cent cured	78	84	89	92
Per cent improved	5	4	6	4
Per cent cured/ improved	83	88	95	96
Per cent complications	20	20	31	32

The data available on the outcomes of the treatment of incontinence with collagen implants are shown in Table 3.

Table 3: *Effectiveness of GAX collagen injections*

Study	Number of patients	Cure %	Improve %	Failure %
Eckford andAbrams[26]	25	64	16	20
Shortcliffe et al.[35]	17	24[a]	29	47
Kieswetter et al.[36]	18	44	39	17
Appel et al.[20]	108 males	76[b]		24[c]
	115 females	95[b]		5[c]
Stricker and Haylen[39]	50	42	40	7[d]

(a) Cured or greatly improved
(b) Reported as being dry after 12 months
(c) Not stated whether these patients improved or failed the treatment
(d) One patient was awaiting further injections

Appell[20] noted the average dose required to treat females was 19.2 mL while the corresponding volume for males was 37.3 mL and as indicated in Table 3, the treatment was not as effective for males as it was for females. Stricker and Haylen[39] found for the first 50 female Australian patients, that the average volume injected was 14.4 mL over an average number of 1.9 applications. Eckford and Abrams[26] and Smart,[25] who was injecting Polytef paste, both noted that the success rate was higher for patients who had undergone surgery to treat their incontinence. Eckford and Abrams consider that this improved success rate in patients with previous incontinence surgery may result from these patients having a less hypermobile bladder neck consequent upon the scarring effect of their surgery tethering the bladder neck in a more stable position.

Eckford and Abrams[26] report that 17 of the 25 women in their study had the para-urethral injection under local anaesthesia. In Australia, 31% female patients have the procedure performed under local or regional anaesthesia (Stricker, personal communication).

The outcome data for the use of Polytef injections in the treatment of urinary incontinence are shown in Table 4.

Table 4: *Effectiveness of Polytef paste injections*

Outcome	ACHPR Clinical Guidelines[1]	Smart[25]
Per cent cured	59	42
Per cent improved	16	21
Per cent cured/ improved	75	63
Per cent complications	6	4

In addition to noting that women who had previous vaginal surgery experienced higher success rates, Smart[25] found the results were poor in patients for whom the Polytef was the first treatment or who had large cystoceles. As one of the selection criteria for this procedure, Smart did not inject any woman under 45 years of age as the long-term safety of this technique in younger patients is debatable at this stage. Smart subsequently performed culposuspension procedures on five of the patients for whom the PTFE injections failed. All five of these patients had the cytoscopic technique of injection and no difficulty was encountered. Smart also states that if the peri-urethral technique had been used, further surgery would have been more difficult. The consensus opinion expressed in ACHPR Clinical Guidelines is that

peri-urethral injections are less likely to succeed in patients who have undergone pelvic radiation therapy.

Table 5 lists the outcomes of the pelvic muscle exercise and bladder training techniques.

Table 5: *Outcome measures for behavioural techniques*

	Stress incontinence treatments		Urge incontinence treatment
Outcome	Pelvic muscle exercises	Bladder training	Bladder training
Per cent cured	12	16	12
Per cent improved	75	54	75
Per cent cured/ improved	87	70	87

Behavioural therapies usually offer the least invasive option. They also play an important role in the management of many patients and it has been shown in a number of clinical trials that the behavioural therapies reduce frequency of incontinence in patients both in the home and nursing homes. Ouslander[32] divides the behavioural therapies into two classifactions: patient-dependent therapies and caregiver-dependent therapies. Patient-dependent therapies require a functional, motivated patient and a skilled, enthusiastic therapist in order to be successful. Caregiver therapies depend on availability and motivation of caregivers to assist the patient with toileting and to avoid wetness.

The patient-dependent therapies consist of pelvic muscle exercises, bladder retraining, biofeedback and behavioural training and are not generally suitable for patients with significant cognitive or mobility problems.[32] The caregiver-dependent therapies include scheduled toileting, habit training and prompted voiding. Ouslander reports that scheduled toileting is the most commonly employed yet least efficient procedure. He also states that habit training involves a variable toileting schedule based on the patient's voiding pattern. Ouslander adds that in nursing home settings, it is difficult to reliably determine voiding patterns and to change staff behaviour in order to accommodate individualised toileting schedules.

When motivated staff implement prompted voiding properly, it has been shown that prompted voiding is highly effective. The frequency of incontinence during the day and evening hours is one-quarter to one-third of cases in nursing homes.[32] The best results for prompted voiding have been documented when the protocol is implemented between 7 a.m. and 7 p.m. McCormick et al.[37] investigated the use of bell pads as an aid to prompted voiding in a group of cognitively impaired incontinent residents. Their findings showed a 22% improvement (0.7 wet episodes per day) and a 17% improvement in the volume voided into a proper device.

McCormick et al. also stated that the subjects included in their study could hear and were at least 50% of the day in a wheelchair. They add that devices now exist so that persons can be alerted by flashing lights and such devices are now portable for ambulatory patients.

Lamhut, Jackson and Wall[38] studied the effectiveness of electrical stimulation on moderately to severely cognitively impaired female nursing home patients. They state that although electrical stimulation is a promising therapeutic modality which has been shown to be effective in community dwelling patients without significant neurological disease, it is not effective by itself in improving urinary incontinence in functionally impaired nursing home patients. They observed a tendency for electrical stimulation to worsen incontinence even though electrical stimulation is well tolerated in elderly nursing home patients.

Neurophysiological studies have demonstrated that electrical stimulation improves urinary continence by central inhibition of parasympathetic excitatory neurons in the pelvic nerve and activation of sympathetic inhibitory neurons in the hypogastric nerve.[38] The net result is an inhibition of sphincteric contractivity. The inhibitory pathways may be disrupted in patients with disorders of the central nervous system.

Some issues in use of treatments

A range of options for management of incontinence is available, and most of these appear to have achieved high rates of success. There appears to be less certainty regarding the comparative benefit of different types of treatment. Under-reporting and missed diagnosis of incontinence remain a problem. Sympathetic management is required, having regard to the patient's circumstances.

There appear to be no data on the comparative efficacy of drugs, behavioural and combination treatments in the elderly. Ouslander,[32] therefore, counsels that until controlled trials are conducted, treatment decisions should be individualised and will depend in large part on the characteristics and preferences of the patient and the preferences of the health care professional. He also states as a generalisation, that behavioural instructions are provided in addition to drug therapy.

Of the treatments available, behavioural therapies are generally non-invasive and as they produce a fair measure of success for patients with their cognitive powers intact, seem worth considering in many circumstances. These therapies, particularly the pelvic floor muscle exercises, have been shown to give good results for well-motivated patients. The success of the behavioural therapies, as applied in nursing homes, depends on the design of the protocols and the ability of the management to motivate those who implement the program.

Use of collagen implants appears to be a promising development, with the advantage that the procedure can be performed on a day-only basis, under local anesthesia if necessary. Data on long-term outcomes of this approach are still required.

A critical concept in geriatrics is the notion that the goal of treatment may be not to cure a problem, but to improve it, to prevent complications, and to provide comfort in all situations.[32] In the management of urinary incontinence, a complete cure can be achieved in some patients, although this is not a realistic goal in many. Setting realistic expectations among patients, families and caregivers is essential to successful management. Ouslander[32] notes that making toilet and toilet substitutes more accessible may be critical among incontinent geriatric patients with functional disabilities. Proper design of bathrooms and toilet facilities is helpful in promoting continence. The provision of a bedside commode or urinal to an elderly patient with a gait disorder may not only prevent nocturnal urinary incontinence, but prevent an unnecessary fall as well.

Ouslander also comments that it is not clear whether the potential benefits of regular toileting throughout the night-time hours are outweighed by the disruption of a nursing home resident's sleep. The success of prompted voiding depends on the abilities of those persons who are implementing the program. In the nursing home setting, these responsibilities are given to the nursing aides, and the success of the program will depend on how well the strategy is designed and the motivation of staff.

In one study, nursing home residents ranked being able to control their toileting activities as their most important activity of daily living. Being toileted regularly at times that were more likely to coincide with the times at which they more likely to void, rather than at the staff's convenience, contributed to their comfort even if full continence was not restored. Individuals derived a sense of control over an embarrassing problem.[40]

The staff of nursing homes may not see such behavioural interventions as being to their benefit. Colling et al.[40] found that many nursing staff preferred to maintain their current routines rather than adjust to the individual patient's needs because it took less time to change wet patients than to toilet them.

Urinary incontinence is a very common problem among the elderly and has large cost implications to hospitals and nursing homes. In a study in long-term care Canadian hospitals, Borrie and Davidson[41] found that the mean time spent each day in dealing with incontinent patients was 52.5 minutes which corresponded to a total annual cost of CAN$9,771. Home carers have considerable difficulty coping with the incontinent elderly and must be a contributing factor in their decision to place their relatives in institutional care. The condition is also widespread and distressing for those who are not in institutions.

Primary care physicians need to be aware of the reluctance of patients to discuss and reveal a condition which may be to them very personal and embarrassing. As many as one-third of patients with incontinence do not seek help, and some of these are severely affected.

There remains considerable scope for research on incontinence and its management and on the comparative costs and effectiveness of available treatments.

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