Review of the evidence

**KNGF Guideline**

for Physical Therapy in patients with Stress urinary incontinence

Supplement to the Dutch Journal of Physical Therapy
Volume 121 · Issue 3 · 2011
In the context of international collaboration in guideline development, the Royal Dutch Society for Physical Therapy (Koninklijk Nederlands Genootschap voor Fysiotherapie, KNGF) has decided to translate its Clinical Practice Guidelines into English, to make the guidelines accessible to an international audience. International accessibility of clinical practice guidelines in physical therapy makes it possible for therapists to use such guidelines as a reference when treating their patients. In addition, it stimulates international collaboration in the process of developing and updating guidelines. At a national level, countries could endorse guidelines and adjust them to their local situation if necessary.
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A.1 Objective of the KNGF Guideline on Stress (urinary) Incontinence

The objective of the guideline is to describe the ‘best possible’ physical therapy management (in terms of efficacy, efficiency and patient-centeredness) of adult patients with SUI, based on current scientific, professional, and societal opinions. The treatment described in the Guideline is intended to achieve a full recovery, or the greatest degree of recovery that is attainable if a full recovery is not possible, including the prevention of residual complaints and/or recurrence.

Research has shown that there is currently a great deal of variation in the diagnostics and treatment of urinary incontinence, in terms of treatment goals, interventions and the amount of physical therapy care provided. Hence, the present Guideline explicitly intends to:

- improve the care being delivered, based on current scientific opinion, and increase the uniformity and quality of care;
- define and clarify the tasks and responsibilities of the various professions involved, and stimulate collaboration between them;
- assist physical therapists in the process of making decisions on whether to treat patients and in the implementation of diagnostic and therapeutic interventions.

A.2 Target Group

The present guideline is intended for physical therapists involved in the diagnostics and treatment of patients with urinary incontinence. These physical therapists must have proven specific knowledge and understanding of this group of patients, and have a suitable attitude towards them. Under current Dutch law (Medical treatment Agreement Act [WGBO] and Individual Health Care Professions Act [Wet BIG]), KNGF regards internal examinations and treatments as ‘special procedures’ (including palpation via the vagina or anus or introducing an electrode into the vagina or anus), which means that they are subject to special precautionary conditions.
Registered pelvic physical therapists are allowed to perform internal examinations and treatments with a patient’s explicit consent, after the latter has been fully informed of the proposed treatment and possible alternatives. We recommend that the patient’s consent to undergo special procedures be confirmed in writing, in a signed informed consent form.

Any physical therapist who wants to perform internal examinations and treatments must have the required skills and qualifications. The relevant professional requirements are listed in a document entitled Beroeps Competentie Profiel (BCP) Bekkenfysiotherapeut (professional competence profile for pelvic physical therapists). The important aspect in the context of the present guideline is that any physical therapist who is not a registered pelvic physical therapist and who is asked to treat a client with symptoms associated with the health problem of SUI should ask themselves whether they are sufficiently qualified and able to provide the patient with suitable care. The therapist should check his/her own competencies against the professional requirements for pelvic physical therapists described below.

### Professional requirements for pelvic physical therapists

**General knowledge and skills**

- Being able to provide patients presenting with pelvic floor and bladder problems with education and treatment.
- Being able to help patients identify and train their pelvic floor muscles and the other muscle groups with which the pelvic floor interacts in everyday bodily functions.
- Having attended training courses and passed the corresponding exams on performing internal examinations of the pelvic floor muscles, for the purpose of providing relevant physical therapy diagnostics and effective feedback about the functions (contraction, endurance, relaxation, and coordination) of the pelvic floor muscles.
- Being able to use electrostimulation and feedback equipment, or devices like vaginal cones or rectal balloons. These devices are particularly used to help patients identify muscle groups or functions they may be unaware of and use them effectively.
- Being able to optimize a patient’s physical fitness insofar as this has been affected by the complaint, and to provide ADL advice.
- Being able to advise and assist patients in regaining control over the filling and voiding/evacuation of their bladder (for instance through bladder training in case of mixed urinary incontinence) and rectum.
- Being able, if necessary, to advise patients about supportive devices such as pelvic belts.
- Being able to provide effective care, in terms of prevention, education, coaching, counseling, and treatment, for the following complaints:
  - involuntary loss of urine and/or feces;
  - compelling desire to pass urine and/or to defecate;
  - abnormally frequent micturition;
  - having to strain to defecate;
  - consequences of prolapses of the bladder, uterus, or intestines;
  - pain in the lower abdomen or around the anus or genitals;
  - sexual problems relating to pelvic floor dysfunction;
  - before and after lower abdominal surgery (including gynecological, urological, and colorectal surgery);
  - pelvic floor pain and lower back pain during the pregnancy and childbirth period (with management for healthy pregnant women focusing on the prevention of pelvic pain and pelvic floor dysfunction);
  - pelvic pain and lower back pain not caused by pregnancy or childbirth.

### Specific knowledge and skills of the pelvic physical therapist

- Since pelvic floor dysfunctions can be associated with complaints of pain in the pelvic and lower back regions, it is very important for physical therapists to have specific expertise with regard to the diagnostics for these regions.
- The same goes for the relation between organ dysfunctions (bladder, rectal, and sexual dysfunctions) and dysfunctional pelvic floor muscles and associated muscle systems. The extensive knowledge and skills of the pelvic physical therapist enable them to evaluate the patients’ specific problems and to diagnose and treat their complaints.

The pelvic physical therapist:

- must ensure that a suitable treatment room is available, which meets the requirements formulated in the guidelines and offers the patient sufficient privacy;
- knows how to keep the treatment room in good condition by implementing the necessary maintenance work, repairs, hygienic waste disposal and cleaning, or delegating these tasks to others;
- is able to collaborate (interact) with patients, their partners and/or parents or guardians and/or legal representatives, the referring doctors, and fellow physical therapists and other medical or paramedical professionals (multidisciplinary approach);
- is aware of the potential emotional/sexual tensions between therapist and client, keeps clear of the boundaries of this area of tension and respects the client in this regard; in view of the intimacy and the physical and emotional sensitivity of the abdominal/pelvic area, the pelvic physical therapist’s attitude should be one of particular insight, attention, and care;
- operates within the legal framework of the relevant Dutch legislation (WBG0) and acts in accordance with the recommendations for due care in special and restricted interventions issued by KNGF and the guidelines for hygiene in interventions in the pelvic floor area issued by NVFB.

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1 Throughout this text, ‘pelvic physical therapist’ refers to a registered pelvic physical therapist.
Pelvic physical therapists have attended supplementary courses to specialize in the treatment of complaints of the entire abdominal, pelvic, and lower back areas. The muscles of the lower back, abdomen, and pelvis play a role in posture and movement. In addition, these muscles have important tasks in miction, coitus, and defecation. Thanks to the supplementary courses, pelvic physical therapists have special expertise in external examination and treatment. The KNGF executive committee advises physical therapists to leave ‘internal procedures in the pelvic floor area’ to registered pelvic physical therapists.

Any group treatments and counseling must be preceded by an individual intake procedure, involving history-taking and physical examination, during which the patient is also informed about possible alternatives. If, after consultations with the physical therapist and the referring doctor, the patient decides to exercise in a group setting, the treatment must be evaluated at least once in an individual session.

A.3 Urinary incontinence
The concepts and definitions used in this guideline are derived from the conceptual framework developed by the International Continence Society (ICS) and the International Urogynecological Association (IUGA).

**Conceptual framework**
ICS/IUGA defines urinary incontinence as the ‘complaint of involuntary loss of urine’.

- **stress (urinary) incontinence**: the complaint of involuntary loss of urine on effort or physical exertion (e.g. sporting activities), or on sneezing or coughing (they also suggest using the term ‘activity-related incontinence’ when talking to patients, to avoid confusion with psychological stress);
- **urgency (urinary) incontinence**: the complaint of involuntary loss of urine accompanied by or immediately preceded by urgency;
- **mixed (urinary) incontinence**: the complaint of involuntary loss of urine associated with urgency and also with effort or physical exertion, or on sneezing or coughing;
- **urgency: the complaint of a sudden, compelling desire to pass urine, which is difficult to defer.**

The present KNGF Guideline is intended for the treatment of adult patients with SUI and those patients with mixed incontinence who predominantly experience involuntary loss of urine at moments of increased intra-abdominal pressure, such as on sneezing or coughing or on physical exertion (i.e. those with SUI as the predominant form of incontinence).

Patients with mixed incontinence experience involuntary loss of urine both at moments of increased intra-abdominal pressure and loss of urine associated with or immediately preceded by a sudden compelling desire to pass urine. In the latter case, the desire to pass urine (urgency) is accomplished by loss of urine without there being any increased intra-abdominal pressure. Strictly speaking, the term mixed incontinence should not be used for those cases where involuntary loss of urine at moments of increased intra-abdominal pressure is immediately followed by urgency which is not followed by micturition. This form of incontinence, which is accompanied by ‘stress-induced urgency’, is regarded as SUI in the present guideline.

All other forms of incontinence are beyond the scope of this guideline. A guideline on urgency (urinary) incontinence and evidence-based statements on the diagnostics and treatment of fecal incontinence are currently being developed.

ICS/IUGA make a distinction between urinary incontinence as a symptom (i.e. a subjective indication of a disease or disorder or a change in health status perceived by the patient) and urinary incontinence as a sign (a phenomenon observed by a care provider, including the verification and quantification of symptoms). SUI as a symptom is revealed by history-taking, when a patient reports involuntary loss of urine at moments of increased intra-abdominal pressure. SUI is regarded as a sign if passage of urine through the urethra is observed at moments of increased intra-abdominal pressure.

If urodynamic examination does not reveal any detrusor activity, the disorder is referred to as urodynamic SUI. Since both family physicians and physical therapists (if patients contact a physical therapist directly) establish the diagnosis of SUI by means of pattern recognition and do not use urodynamic examination, this KNGF Guideline uses the term SUI for ‘any SUI whose presence has been established.’

The health problem perceived by the patient involves more than just the loss of urine. Urinary incontinence nearly always has adverse effects on the patient’s quality of life, including reduced social participation; patients feel lonely and unhappy, stigmatized, and hampered in nearly all activities of daily living, including their sexual relationships. The way in which patients perceive and experience the consequences of urinary incontinence is important as this experience is part of the health problem. Even minor incontinence can have considerable effects on a person’s quality of life.

**Clinical questions**
The following clinical questions were used to guide the drafting of the present guideline:

- How important is SUI as a health problem?
- What etiological factors are involved in the development of SUI?
- How is SUI diagnosed and how reliable, valid, and feasible in routine practice is the diagnostic process in physical therapy?
- What are the prognostic factors and which of them are modifiable by physical therapy?
In addition to scientific evidence and consensus among team members. All members of the guideline development team declared that they had no conflicting interests with regard to developing the KNGF Guideline. The guideline was developed over the period from September 2005 to June 2010.

A.6 Werkwijze werkgroep

The previous guideline was updated in accordance with the Dutch document called ‘Methode voor Richtlijnontwikkeling en Implementatie’ (method for guideline development and implementation), which offers practical recommendations for a strategy to collect the relevant literature, including the selection of search terms, sources to be consulted and the period covered by the search. 29–32 The document also offers recommendations on reporting the criteria used to include or exclude publications and on indicating the level (strength) of the evidence underlying the recommendations in guidelines.

An efficient updating process was achieved by evaluating and adjusting the previously formulated clinical questions on the basis of the results of an evaluation of the 1998 SUI guideline, in terms of process, outcome, and the experiences of therapists and patients. The updated clinical questions were then used as a basis for a supplementary literature study. The recommendations for the physical therapy process are based on the available scientific evidence. This evidence was discussed with the entire guideline development team and summarized, with an indication of the levels of evidence. If no scientific evidence was available, the recommendation was formulated on the basis of consensus among the team members. 29–32

In addition to scientific evidence and consensus among team members, some other considerations were also used in formulating the recommendations. 29 Recommendations were formulated from the perspectives of clinical relevance, safety, the patient, resource availability (including funding), and organization of care, as well as from the legal and ethical perspectives.

After the draft guideline had been completed, it was sent to external experts and representatives of professional associations (acting as an external advisory group) to ensure coordination and consensus with other professions and organizations and/or with other existing monodisciplinary or multidisciplinary guidelines. Efforts were also made to coordinate the policies used by family physicians and physical therapists, on the basis of the national collaboration agreement between family physicians and physical therapists regarding the care for patients with involuntary loss of urine (Landelijke Eerstelijns Samenwerkingsafsprak Incontinentie voor Urine). 25–32

A.7 Validation by intended users

The updated guideline will be validated during the implementation campaign, with a cohort study to evaluate whether therapists adhere to the guideline, using web-based electronic patient files. Such files can be used to record the interventions by individual physical therapists, and to monitor and support the therapeutic process, by generating feedback on the interventions from the files and then using the feedback to evaluate the process on the basis of quality indicators.

A.8 Structure, products, and implementation of the guideline

The KNGF guideline consists of three components:

- The actual KNGF Guideline on Stress (Urinary) Incontinence (Practice Guidelines), which will be published as a supplement to the Nederlands Tijdschrift voor Fysiotherapie (Dutch Journal of Physical Therapy).
- A Review of the Evidence, explaining the choices that were made in producing the guideline, which will be made available through the KNGF website (www.fysionet.nl) and the website of the Centre of Evidence Based Physiotherapy (CEBP) in Maastricht (see www.cebp.nl/www.PEDro.au).
- A summary chart (flowchart).

This three-part structure was chosen for didactic reasons and to improve the practical suitability of the guideline. The Practice Guideline, Review of the Evidence and the Flowchart can be read as independent documents.

The guideline is being introduced and disseminated using a standardized implementation strategy. 25–32

A.9 Literature search

The process of selecting and evaluating the relevant literature was prepared by the project team (NB, BB, and EH). The results of this preparation stage were then discussed with the entire guideline development team. The scientific evidence to support the epidemiological data, the etiology and the diagnostic process was gathered from publications identified through supplementary searches, covering the 1998–June 2010 period, in the following databases: MEDLINE, EMBASE, CINAHL, PEDro, the Cochrane database, the CEBP database, and the DocOnline database of the Dutch Institute of Allied Health Care’s documentation center in Amersfoort.


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In addition, literature references from the studies thus identified were used to trace further relevant publications. The scientific evidence is briefly summarized below for each topic, including the levels of evidence according to the EBRO (Evidence–Based Guidelines Platform) list developed under the auspices of the Dutch Cochrane Center and the Dutch Institute for Healthcare Improvement (CBO).30 This list indicates the scores (levels) to be used to evaluate the methodological quality of publications for the purpose of guideline development, and the other aspects – in addition to scientific evidence – that are important for formulating recommendations, such as: achieving general consensus, efficiency (costs), resource availability, the required expertise and training, organizational aspects, and efforts to harmonize the guidelines with other monodisciplinary or multidisciplinary guidelines.

The methodology that the development team used to formulate its recommendations is presented in Table 1. A survey of all recommendations from the present guideline is included as Supplement 1 in the Practice Guideline.

Table 1. Levels of evidence: classification of methodological quality of individual studies.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>diagnostic accuracy of study</th>
<th>damage/side-effects*, etiology, prognosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>systematic review of at least two independent A2 level studies</td>
<td>study comparing with a reference test (‘gold standard’) with predefined cut-off values and independent assessment of the outcomes of the test and the gold standard, based on a sufficiently large sample of consecutive patients, all of whom have undergone the index and reference tests</td>
<td>prospective cohort study with sufficient sample size and follow-up, effectively controlled for confounding and with effective measures to prevent selective follow-up</td>
</tr>
<tr>
<td>A2</td>
<td>randomized, double–blind, comparative clinical trial of good quality and sufficient sample size</td>
<td>study comparing with a reference test, not meeting all criteria mentioned under A2</td>
<td>prospective cohort study, not meeting all criteria mentioned under A2, or retrospective cohort study</td>
</tr>
<tr>
<td>B</td>
<td>comparative study not meeting all criteria mentioned under A2</td>
<td>study comparing with a reference test, not meeting all criteria mentioned under A2</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>non–comparative study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>expert opinion</td>
<td></td>
<td></td>
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</tbody>
</table>

* This classification is only relevant for situations where controlled trials are impossible due to ethical or other considerations. If controlled trials are an option, the classification for interventions is to be used.

Level of conclusions

<table>
<thead>
<tr>
<th>conclusion based on:</th>
<th>recommendations based on the level of the conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 study at A1 level or at least two independent A2 level studies</td>
<td>It has been demonstrated that...</td>
</tr>
<tr>
<td>2 one study at A2 level or at least two independent B level studies</td>
<td>It is plausible that...</td>
</tr>
<tr>
<td>3 one B or C level study</td>
<td>There are indications that...</td>
</tr>
<tr>
<td>4 expert opinion</td>
<td>In the opinion of the guideline development team, ...</td>
</tr>
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</table>
A.10  Epidemiological data
A.10.1  Urinary incontinence in women
Depending on the definition used and the population investigated, the prevalence of urinary incontinence ranges from one quarter to over half of all adult women. The prevalence increases with increasing age; research has shown that it ranges from 11 to 55% among older women.31 In the Netherlands, the prevalence appears to be lower among ethnic (Moroccan and Antillean) minorities.32 Muijsenbergh and Lagro-Janssen concluded, however, that urinary incontinence is a serious problem of everyday life among Moroccan and Turkish minorities, partly as a result of religious beliefs emphasizing bodily cleanliness.33 These women often concealed the problem because of feelings of shame, the time-consuming repeated efforts to keep their body clean and the fact that they felt they were not being taken seriously by their family doctor. This may have resulted in underreporting, which may have distorted prevalence figures.

Sandvik et al. developed an instrument to measure the severity of the incontinence problem, in order to find out what proportion of the population seeks professional help. They found that about 20% of the people with incontinence problems were sufficiently worried by the problem to seek professional help.34 This percentage was found to rise with advancing age, and was also higher among women with concomitant other urogenital problems.35 Research has shown that about 50% of the women below the age of 65 years with urinary incontinence had SUI, while 14% had urgency (urinary) incontinence and 36% had mixed incontinence.36 Older women appear to be more likely to have urgency (urinary) incontinence or mixed incontinence.37 Incidence figures have also been found to depend on the definition used and the population investigated. Reported annual incidence rates (numbers of new cases) of urinary incontinence range from 1 to 11%, and the annual remission rate from 6 to 11%.38

A.10.2  SUI in women
Prevalence
Prevalence figures for SUI among women as reported in most studies range from 10 to 40%.38 A large cross-sectional study of urinary incontinence among women (27,936 Norwegian women) found a gradual increase in prevalence with age in the group aged 30–65, with a peak between 45 and 50 years, followed by a slight decline continuing into advanced age.37 The severity of SUI showed a steady increase with age.37 The proportion of SUI among women with urinary incontinence ranged from 50% among those aged 20–25 to 65% among those aged 45–49 years, then declining to less than 40% (among those aged 65–69) and to about 30% among women aged 85–90. The proportion of mixed incontinence was slightly less than 30% among those aged 20–49 years, then rose to just below 50% among those aged 70–75 and eventually fell slightly to about 40% among those aged 80–90 years (figure 1).37 Dutch data from 2010 show comparable values.39 The prevalence of urinary incontinence in the Netherlands in the year 2000 was about 57% among those aged 45–70; 29% of them had stress urinary incontinence, 6% had urgency urinary incontinence and 23% mixed urinary incontinence.40

Figure 1. Prevalence of urinary incontinence among Norwegian women, summarized by age and by type of incontinence.
SUI = stress (urinary) incontinence; UUI = urgency (urinary) incontinence; MUI = mixed urinary incontinence.
Source: Hannestad et al., 2000.37
Incidence
The annual incidence of SUI in 2005 ranged from 7-11%; the annual remission rate from 5-9%. A study by Samuelson et al. found an annual incidence of 2.9% and a remission rate of 6.8%. They found an annual net increase in the prevalence of this type of incontinence of 0.8%. They concluded from the relatively large number of spontaneous remissions that SUI among young and middle-aged women is not always a chronic disorder, but rather a dynamic condition.

A.10.3 Urinary incontinence in men
Depending on the definition used and the population investigated, the prevalence of urinary incontinence among all adult men is less than 10%. Research has shown that the prevalence rises with age: prevalence figures among older men range from 3.7% to 31%. Research has also shown that SUI among men generally occurs only as a result of internal sphincter deficits due to surgery, radiation therapy or neurological disorders. Family practice data show a very low prevalence of SUI among men younger than 65 years (usually after transurethral resection of the prostate (TURP) or radical prostatectomy), the estimated prevalence being 0.9-5%. Hunskaar et al. found the prevalence of urinary incontinence after radical prostatectomy for prostate cancer ranged from 5% to over 60%.

The natural course of urinary incontinence after radical prostatectomy can be determined from the percentage of patients reporting to perceive leakage, a percentage that has been found to fall from 50% at 3 months after the operation to 20% at 12 months. The differences between the incidence and prevalence data have been attributed to differences in the definition of incontinence (in terms of severity and frequency), differences in the methods and timing of evaluation, and inter-observer differences. In addition, different surgical techniques may lead to different incidence rates.

The study by Hunter et al. showed that 10% of the men who had undergone TURP for benign prostate enlargement were still using incontinence pads after 3 months; no longer-term data about the use of incontinence products are available.

The problem of urinary incontinence among men appears to alleviate over time, both after TURP and after radical prostatectomy: Hunskaar et al. found a decrease and stabilization within 1-2 years after surgery, with a small percentage of the men remaining continent for urine.

A.11 Costs
The costs of incontinence care are high and continue to rise. Figures from a project on the use of medication and devices (Genees-en hulpmiddelen Informatie project, GIP), carried out by the Dutch Health Care Insurance Board CVZ, reveal the costs of absorptive materials and medications to treat urinary incontinence outside hospitals. In 2003, the costs of incontinence pads amounted to 102.2 million Euros, since when they rose by 46% to 149.5 million in 2007. Over the same period, the costs of medications for urinary incontinence almost doubled, from 8.4 million to over 16.4 million Euros (Table 2). The huge increase in costs in 2006 was caused by the introduction of a new health insurance reimbursement scheme in the Netherlands in January of that year. The cost figures for 2002-2005 are based only on patients in the former state social health insurance system, and hence represent a considerable underestimation of the real figures, as they do not include the costs reimbursed by private health insurers.

A.12 Problem definition
This KNGF guideline is intended for the target group of adult patients with SUI. This includes those patients with mixed incontinence for whom stress urinary incontinence is the dominant form of incontinence. All other forms of incontinence are beyond the scope of this guideline.

SUI refers to involuntary loss of urine at moments of increased intra-abdominal pressure, such as sneezing, coughing and physical exertion. The loss of urine is the result of a dysfunction of the continence mechanism, which is the physical manifestation of the health problem.

Whether physical therapy can contribute to a reduction of this health problem depends on the modifiability of the factors underlying the dysfunction of the continence mechanism.

Understanding how the incontinence arose may help to understand the nature of the underlying ‘disorder’ and/or the disease process that is responsible for the dysfunctional continence mechanism. And an understanding of the underlying disorder and/or the disease process that is responsible provides insight into the biological recovery potential and the modifiability of the incontinence problem.

A.12.1 Continence
Two mechanisms play a role in SUI, mechanisms which normally collaborate to ensure urinary continence:

1. an intrinsic urethral closure mechanism which involves the tunic mucosa, the tunic spongiosa and the tunic muscularis;
2. a supporting external mechanism, provided by the function of the pelvic floor (not only the muscles, but also the entire connective tissue skeleton).

The thickness of the mucous membrane, the tunic mucosa, and the degree of swelling of the tunic spongiosa, determine the

Table 2. Costs (in Euros) of incontinence products (A05 in the IS09999 classification) and pharmaceuticals used to treat urinary incontinence in the Netherlands (ATC code: G04BD) for the 2003-2007 period.

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>incontinence products</td>
<td>102,226,000</td>
<td>109,495,000</td>
<td>113,403,000</td>
<td>145,346,000</td>
<td>149,465,000</td>
</tr>
<tr>
<td>urinary antispasmodics</td>
<td>8,392,100</td>
<td>9,173,200</td>
<td>11,552,600</td>
<td>14,017,900</td>
<td>16,410,200</td>
</tr>
</tbody>
</table>

intrinsic diameter of the urethra, and are responsible for about one third of the pressure in the urethra. The tunica muscularis, which consists of an inner layer of smooth muscle fibers and an outer layer of striated muscle fibers, actively contributes to the intrinsic urethral closure mechanism through its muscle tone. At normal body posture and normal position of the pelvis, increased intra-abdominal pressure (IAP) causes increased urethral closure pressure, as a result of increased activity of the smooth muscle fibers in the urethral wall, elicited by sympathetic stimuli. Contraction of the pelvic floor muscles during physical exertion provides active extrinsic support for the urethral closure mechanism and prevents the bladder neck and the urethra from moving downward or backward, so that increased IAP on the pelvic floor results in the urethra being compressed.

The literature offers few studies on the individual contributions that the intrinsic and extrinsic components of the urethral closure mechanism make toward the total urethral closure pressure. De Boer et al. reported that 60% of the urethral closure pressure during physical exertion is determined by the intrinsic urethral closure mechanism, and 40% by active extrinsic support by the pelvic floor muscles. Van Loenen and Vierhout reported that the levator ani muscle contributes 33–50% to the urethral closure mechanism. Delancey suggested a 33% contribution. Other sources report that no quantitative distinction can be made between the contributions made by the various components to the closure pressure, though they do mention these components. Maintaining the urethral closure pressure at rest involves active as well as passive mechanisms.

The urinary continence mechanism in men combines the activities of the detrusor muscle tissue (smooth muscle), the trigonum and the urethral ‘sphincters’ (striated muscle), each of which has its own histological characteristics. The urethral closure mechanism can be divided into two components, an inner layer of smooth muscle in the wall of the proximal urethra, which is a continuation of the fibers of the detrusor muscle, and a second component, consisting of a striated external urethral sphincter, also known as rhabdosphincter, which surrounds the membranous urethra.

In men, this striated muscle does not actually constitute a real sphincter that completely surrounds the urethra, as there are hardly any striated fibers on the dorsal side of the urethra, as should be the case with a fully circular sphincter. While the fibers of the external urethral sphincter or rhabdosphincter have their insertion dorsal to the central tendon of the perineum, these fibers cover the anterior surface of the prostate in a crescent shape just above the verumontanum, forming an omega shape under the verumontanum, surrounding the anterior and lateral aspects of the membranous urethra, with no fibers on the dorsal side. In this context, Strasser et al. stated that the existence of a urogenital diaphragm in men, and of a strong circular external urethral sphincter completely encircling the urethra caudal to the apex of the prostate, cannot be confirmed. Striated muscle fibers run in a cranial direction from the bulb of the penis to the base of the bladder along anterior and lateral aspects of the prostate and the membranous urethra. The external urethral sphincter consists of 50–100% slow muscle fibers, which are unlikely to be involved in sudden powerful contractions. Just as in women, the total urethral closure mechanism consists of an intrinsic and an extrinsic closure mechanism. In addition to the intrinsic components described above, there is an external urethral closure mechanism, consisting of the puboperineal muscle fibers of the anteromedial part of the levator ani muscle. These puboperineal muscle fibers form a kind of crescent-shaped ‘hammock’ underneath the urethra. The levator ani muscle does not support the proximal urethra. The puboperineal muscle fibers are responsible for rapid closure. Contraction causes effective intra-urethral compression, resulting from the simultaneous contraction of the external urethral sphincter (which is omega-shaped) and the puboperineal muscle fibers, which form an open circle or crescent surrounding the external urethral sphincter, leaving a hiatus at the anterior side of the urethra.

Several mechanisms are involved during increased intra-abdominal pressure. The principle is the same as at rest, but this time supported by the additional contraction of the sphincter and pelvic floor muscles. The striated urethral sphincter and the pelvic floor muscles play a role especially in the middle third part of the urethra. Turner–Warwick makes a distinction between a proximal and a distal urethral closure mechanism. The proximal closure mechanism depends on effective transmission of the abdominal pressure to the bladder neck, which remains closed as a result of continuous contraction of smooth muscle fibers. The distal closure mechanism depends on increased tone of the pelvic floor muscles and the striated urethral sphincter. This increased tone represents an involuntary contraction of the pelvic floor. The increase in the toxicity of the pelvic floor muscles normally precedes the increase in intra-abdominal pressure, and the increased intra-abdominal pressure is normally the result of simultaneous contraction of the back and abdominal muscles, the diaphragm and the pelvic floor. The strict distinction between insufficient extrinsic support and insufficient intrinsic urethral closure as causes of stress urinary incontinence is an unduly simplified representation of reality. Both closure mechanisms may well dysfunction simultaneously.

A.12.2 Etiological factors

Etiological factors (risk factors) are factors that can promote the development of a health problem. The team has identified the etiological factors for the development of SUI in women by means of a systematic review of the literature, including only prospective cohort studies. We excluded cohort studies which described the etiological factors for urinary incontinence without specifying the type of incontinence. Thirty-nine studies were found to meet the inclusion criteria. These studies were first evaluated in terms of quality, using the EBRO criteria (Table 3), after which the results of this evaluation were summarized. The etiological factors identified from these studies are listed in Table 4, by level of evidence.

The etiological factors for SUI that have been identified give rise to the following argumentation. Involuntary loss of urine on straining or effort, or on sneezing or coughing arises if the functional resilience of the pelvic floor is insufficient to resist the resulting increased pressure. In this sense, SUI can be regarded as a dysbalance between strain and resilience, which may be due to increased strain and/or decreased resilience. In the context of continence, the functional resilience of the pelvic floor is determined by a combination of anatomical characteristics and physiological functions.
<table>
<thead>
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<th>3</th>
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<td>1st vaginal delivery / 2nd vaginal delivery</td>
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<td>12,570</td>
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<td>3,302</td>
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<td>x</td>
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<td>x</td>
<td>x</td>
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<td>Danforth et al., 2009</td>
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<td>NHS and NHS II / age 37–79 years / type 2 diabetes</td>
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<td>x</td>
<td>x</td>
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<td>Dalloso et al., 2006</td>
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<td>LMRCIS / age 40+ diet and lifestyle</td>
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<td>x</td>
<td>x</td>
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<td>NHS / age 30–55 years / physical activity</td>
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<td>x</td>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>A2</td>
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</table>

1 = reproducible inclusion/exclusion criteria.
2 = reproducible description of etiological factors.
3 = follow-up including at least 80% of participants.
4 = analysis adjusted for confounders.
5 = reproducible description of outcome measures.
6 = level of evidence (A, B, C, D); quality levels: A2 = meeting all 5 criteria; B = meeting 4 of 5 criteria; C = meeting ≤ 3 criteria.
BMI = body mass index; LMRCIS = Leicestershire MRC Incontinence Study; NHS = Nurses Health Study; NSHD = National Survey of Health and Development; SWAN = Study of Woman’s Health Across the Nation.
**Table 4. Conclusions about etiological factors involved in the development of SUI in women.**

<table>
<thead>
<tr>
<th>It has been demonstrated that:</th>
<th>level</th>
<th>authors</th>
</tr>
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<tr>
<td>SUI before pregnancy</td>
<td>...there is an increased risk of SUI after the pregnancy if SUI was present before the pregnancy.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
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<tr>
<td>SUI during pregnancy</td>
<td>...there is an increased risk of SUI after the pregnancy if SUI was present during the pregnancy.</td>
<td>A2</td>
</tr>
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<td></td>
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<td>B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
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<tr>
<td>vaginal delivery</td>
<td>...there is an increased risk of developing SUI after vaginal delivery.</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
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<tr>
<td>elective cesarean section</td>
<td>...the risk of developing SUI after an elective cesarean section is smaller than after a vaginal delivery.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>age</td>
<td>...the risk of developing SUI rises with the age of the mother at the time of her first delivery.</td>
<td>A2</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>3 months after delivery</td>
<td>...if a woman has SUI 3 months after giving birth, there is an increased risk that she will also have SUI later on.</td>
<td>A2</td>
</tr>
<tr>
<td></td>
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<td>B</td>
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<tr>
<td>BMI &gt; 25</td>
<td>...the risk of developing SUI increases with increasing BMI (&gt; 25).</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
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<tr>
<td>BMI &gt; 30</td>
<td>...there is a high risk of developing SUI among obese women (BMI &gt; 30).</td>
<td>A2</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
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<tr>
<td>waist circumference</td>
<td>...the risk of SUI increases with each additional centimeter of waist circumference.</td>
<td>A2</td>
</tr>
<tr>
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<td></td>
<td>B</td>
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<tr>
<td>body weight</td>
<td>...the risk of developing SUI in adult women increases with increasing body weight.</td>
<td>A2</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Physical Activity</td>
<td>... the risk of developing SUI decreases with the frequency of moderate-intensity physical activity.</td>
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<td>-----------------------------------------------------------------------------------------------------------------</td>
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<td>Ethnicity</td>
<td>...Caucasian women have a higher risk of developing SUI than other ethnicities.</td>
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<td>Weight Increase</td>
<td>...weight increase during pregnancy increases the risk of developing SUI after the delivery.</td>
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<td>Episiotomy</td>
<td>...there is an increased risk of developing SUI after episiotomy.</td>
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<tr>
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<td></td>
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<td>...there is an increased risk of developing SUI after forceps delivery.</td>
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<td>C</td>
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<td>Vacuum Extraction</td>
<td>...there is an increased risk of developing SUI after vacuum extraction.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
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<tr>
<td>Prolonged Pushing Stage</td>
<td>...women who were continent during pregnancy are at increased risk of SUI developing if they go through a prolonged pushing stage (≥ 1 hour).</td>
<td>A2</td>
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<td>Primipara</td>
<td>...women who have had a child are at increased risk of SUI.</td>
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<tr>
<td></td>
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<tr>
<td>Multipara</td>
<td>...women who have had more than two children are at increasing risk of SUI with further births.</td>
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<td>C</td>
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<td>Menopause</td>
<td>...the risk of developing SUI decreases after menopause.</td>
<td>A</td>
</tr>
<tr>
<td></td>
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<td>B</td>
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<td>Carbonated Drinks</td>
<td>...women who consume carbonated drinks are at increased risk of developing SUI.</td>
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<td>There are indications that:</td>
<td>age ...the risk of developing SUI increases with increasing age.</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>pregnancy ...SUI may develop as a result of pregnancy.</td>
<td>C</td>
</tr>
</tbody>
</table>
### Review of the evidence

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
<th>Level</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>relaxin</td>
<td>...a high serum relaxin level in early pregnancy reduces the risk of developing SUI.</td>
<td>B</td>
<td>Kristiansson et al., 200188</td>
</tr>
<tr>
<td>pudendus block</td>
<td>...there is an increased risk of developing SUI after a pudendus block during vaginal delivery.</td>
<td>C</td>
<td>Dimpfl et al., 199274</td>
</tr>
<tr>
<td>smoking</td>
<td>...smokers are at increased risk of developing SUI.</td>
<td>B</td>
<td>Torrisi et al., 200786</td>
</tr>
<tr>
<td>coughing</td>
<td>...women who frequently cough are at increased risk of developing SUI.</td>
<td>B</td>
<td>Torrisi et al., 200786</td>
</tr>
<tr>
<td>painful joints</td>
<td>...women who have painful joints are at increased risk of developing SUI.</td>
<td>B</td>
<td>McGrother et al., 200697</td>
</tr>
<tr>
<td>multiple sclerosis</td>
<td>...women with multiple sclerosis are at increased risk of developing SUI.</td>
<td>B</td>
<td>McGrother et al., 200697</td>
</tr>
<tr>
<td>urinary tract infections</td>
<td>...women who frequently have urinary tract infections are at increased risk of developing SUI.</td>
<td>B</td>
<td>McGrother et al., 200697</td>
</tr>
<tr>
<td>educational level</td>
<td>...women with a low educational level are at greater risk of developing SUI.</td>
<td>B</td>
<td>Kuh et al., 199996</td>
</tr>
</tbody>
</table>

**There is conflicting evidence that:**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
<th>Level</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>cesarean section</td>
<td>...the risk of developing SUI is greater after a cesarean section because of arrest of labor than after a vaginal delivery.</td>
<td>C</td>
<td>Eftekhar et al., 200666; Mason et al., 199978</td>
</tr>
<tr>
<td>prolonged pushing stage</td>
<td>...there is an increased risk of developing SUI after a prolonged pushing stage of delivery.</td>
<td>B</td>
<td>Arya et al., 200181; Viktrup et al., 199271</td>
</tr>
<tr>
<td>birth weight</td>
<td>...the risk of developing SUI is greater after delivery of a child with a birth weight of over 4000 g than after delivery of a smaller child.</td>
<td>B</td>
<td>Arya et al., 200181; Viktrup et al., 199271; Krue et al., 199987</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>Eftekhar et al., 200666; Groutz et al., 199976</td>
</tr>
<tr>
<td>hysterectomy</td>
<td>...there is an increased risk of developing SUI after hysterectomy.</td>
<td>A2</td>
<td>Heliövaara–Peippo et al., 201093</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>Engh et al., 200693; Altman et al., 200390</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>Gustafsson et al., 200692</td>
</tr>
<tr>
<td>second parturition</td>
<td>...women who have had a second child are at increased risk of SUI.</td>
<td>C</td>
<td>Mason et al., 199998; Yip et al., 200383</td>
</tr>
<tr>
<td>diabetes</td>
<td>...women with diabetes are at increased risk of developing SUI.</td>
<td>A2</td>
<td>Danforth et al., 200995</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Waetjen et al., 200798</td>
</tr>
</tbody>
</table>
The functional resilience of the extrinsic supportive mechanism depends on the condition of the pelvic floor muscles and ligaments, as well as on the integrity of the physiological control loops that enable a person to contract their pelvic floor muscles at the right moment. The functional resilience of the intrinsic urethral closure mechanism depends on the integrity of the urethra, the tunica mucosa, the tunica spongiosa and the tunica muscularis, as well as the integrity of the physiological control loops that are needed to contract the urethral sphincter and keep up its tonicity.

Factors affecting the condition of the pelvic floor

The functional resilience of the pelvic floor is lower among Caucasian women than among African-American women. A major cause of dysfunction of the supporting extrinsic mechanism is weakness of the pelvic floor muscles and ligaments, which partly depends on the condition of the pelvic floor muscles and the connective tissue skeleton. If the pelvic floor muscles contract insufficiently or too late, there may be inadequate active support for the urethral closure mechanism during exertion, leading to an abnormal downward movement of the pelvic floor and hypermobility of the urethra and bladder neck. This abnormal downward movement is associated with loss of the urethrovaginal angle, which means that the intra-abdominal pressure cannot be transferred to the urethra, so the intra-urethral closure pressure cannot rise sufficiently. Other factors affecting the functional resilience of the pelvic floor include poor physical condition and general nutritional and health status. This may be related to smoking and overweight as etiological factors.

Pregnancy also affects the condition of the pelvic floor. The resilience of the connective tissue skeleton changes under the influence of hormonal changes. Such hormonal influences (especially that of estrogens) are also involved in menopause, with loss of supportive tissue around the urethra reducing the functional resilience of the intrinsic urethral closure mechanism.

Functional integrity, and hence functional resilience, can also be reduced by damage to the pelvic floor muscles, the connective tissue skeleton and the innervation of the pelvic floor. Vaginal delivery may also affect the functional integrity of the pelvic floor. Muscle and/or nerve fibers in the pelvic floor may be damaged during delivery, as may the endopelvic fascia. A prolonged pushing stage, vacuum extraction or forceps delivery may further contribute to this. If cesarean section is applied due to arrested labor, there is a high risk that the pelvic floor has already been damaged, whereas in elective cesarean section, the pelvic floor is usually undamaged. Giving birth to a heavy child (> 4000 g) and the number of vaginal deliveries a woman has had may also adversely affect the functional resilience of the pelvic floor. Other factors reducing the functional integrity of the pelvic floor, apart from delivery, include trauma to the pelvic floor or surgery in the pelvic floor area. In patients with diabetes, the functional integrity may be affected by neuropathy, affecting the condition of the pelvic floor.

The use of catheters also increases the risk of damaging the urethral sphincter and hence the intrinsic urethral closure mechanism. Age is probably another risk factor, as cumulatively acquired changes in resilience have to be added to the dynamic variability of the condition and resilience of the pelvic floor. An interesting finding is that the incidence and prevalence of SUI decrease after menopause, whereas those of urgency (urinary) incontinence actually increase. The severity of reported SUI and mixed urinary incontinence rises with postmenopausal age, however.

Factors affecting the strain on the pelvic floor

Increased strain on the pelvic floor appears to increase the risk of its functional resilience being exceeded. Pregnancy – i.e. bearing a child – may contribute to a higher strain on the pelvic floor. The risk of SUI is also increased by chronically raised intra-abdominal pressure, as in obesity and chronic constipation. It is essential to identify etiological factors, as the prognosis depends on the nature of the dysfunction of the continence mechanism. Etiological factors may give clues as to the modifiability of the underlying process by physical therapy.

Based on the above considerations, the guideline development team has formulated the following recommendation:

Identifying etiological factors

The therapist should systematically identify etiological factors, in order to assess the nature of the dysfunction of the continence mechanism.

Etiological factors for SUI in men

The search for possible causes of the development of SUI in men has shown that SUI nearly always results from sphincter dysfunction due to surgery, radiation treatment or neurological disorders. Before the year 2000, there is hardly any mention in the scientific literature of SUI in men after prostatectomy. A man was then called incontinent if he lost any urine; incontinence was defined as a loss of control, and its severity was measured by asking about the number of incidents he experienced and the number of pads he used, and/or was assessed by means of a 24-hour pad test. Van Kampen et al. evaluated urinary incontinence after prostate surgery among 489 patients: 216 patients had undergone TURP because of benign prostatic hyperplasia, 98 had undergone transvesical prostatectomy (TVP) and 175 had undergone radical prostatectomy for localized prostate carcinoma. Among the patients treated with TURP, 19% were incontinent immediately after catheter removal and 0.5% were still incontinent after 15 months; the corresponding figures after TVP were 15% and 1%, respectively. The percentages after radical prostatectomy were considerably higher: 66% were incontinent immediately after removal of the bladder catheter, and 2% were still incontinent after 15 months. Van Kampen et al. also established the type of incontinence. Immediately after catheter removal, 38% of the patients who had undergone TURP had SUI, while 25% had urgency urinary incontinence and 21% had mixed urinary incontinence. The corresponding figures after TVP were 50%, 28% and 21%, respectively, and after radical prostatectomy 82%, 13% and 5%, respectively.

Although incontinence after prostatectomy is often regarded as an unequivocal concept, this has proved to be incorrect. Much urodynamic research has been done to identify the specific causes of this type of incontinence. Ficazolla and Nitti evaluated incontinence after prostatectomy among 60 patients, and found sphincter deficiency in 90% of them.
A study by Groutz et al. found sphincter deficiency as the most common urodynamic finding in 88% of the patients. Detrusor instability was found in 33% of the patients, but was the main cause of incontinence in only 7%. Kielb and Clemens reported similar findings. They found SUI due to sphincter deficiency in 95% of 146 patients with incontinence after prostatectomy, as assessed by urodynamic examinations. Detrusor instability was also found in 17% of this group. Hunskaar et al. found a prevalence of urinary incontinence after radical prostatectomy for prostate cancer ranging from 5% to over 60%. The differences between the incidence and prevalence data have been attributed by various authors to differences in the definition of incontinence, differences in the methods and timing of evaluation and inter-observer differences. In addition, different surgical techniques have been found to result in different incidence rates. The prevalence of urinary incontinence after TURP for benign enlargement of the prostate is lower than that after radical prostatectomy. Hunter et al. found that 10% of the men were still using incontinence products 3 months after the surgery. The problem of urinary incontinence in men appears to improve over time, both after TURP and after radical prostatectomy: the number of men who are still incontinent decreases, and the severity of the incontinence stabilizes 1-2 years after surgery. Several authors have reported that a small proportion of men remain incontinent for urine. Review studies by Palmer, Hunter, Cambio, Lourenco and Bauer show that men undergoing TURP or radical prostatectomy are at increased risk of developing SUI. Stress (urinary) incontinence in men occurs almost exclusively in cases where the condition of the pelvic floor is traumatically affected as a result of prostatectomy, whether transurethral or radical.

Conclusion about etiological factors for the development of SUI in men (level 1)

- It has been demonstrated that prostatectomy increases the risk of developing SUI.

Quality of the studies identified: A (Hunter et al., 2007; Cambio et al., 2006; Lourenco et al., 2008, and Bauer et al., 2009) and D (Palmer et al., 2000).

A.12.3 Prognostic factors

Prognostic factors are (a) factors that determine the course of a health problem, whether favorable or unfavorable, and (b) factors that influence the chances of recovery in general as well as the chances of recovery after a particular intervention. A systematic review of the literature was used to identify the prognostic factors for the course of and recovery from SUI. This review included only cohort studies reporting prognostic factors and differentiating between types of incontinence. We excluded cohort studies describing the prognostic factors for the course of and recovery from urinary incontinence without specifying the type of incontinence.

Nine studies were found to meet the inclusion criteria. These studies concerned only the prognosis of incontinence in women. Their methodological quality was assessed using the EBRO criteria (Table 5); the results of this assessment are presented in Table 6.

Unfavorable prognostic factors for SUI in women

If prognostic factors are considered from the point of view of strain versus resilience, SUI can be regarded as a disturbance of the dynamic balance, in which the strain (intravesical pressure) exceeds the limits of resistance (the urethral closure pressure, the cooperation between continence-promoting mechanisms, and all intrinsic and extrinsic factors). Factors indicating a low resilience level or a higher level of strain can be regarded as unfavorable prognostic factors for recovery.

The systematic review of the literature shows that the following factors are indicative of low resilience, and can therefore be regarded as unfavorable prognostic factors:

- Protracted delivery process;
- SUI during pregnancy and during the first three months after delivery;
- Severity of the SUI;
- Previous conservative treatment for SUI with unfavorable outcome;
- Severe overweight (BMI > 30) imposing an additional strain on the continence mechanism;
- Co-morbidity (e.g., chronic obstructive pulmonary disease, COPD);
- Urethral hypermobility;
- Presence of prolapse > stage 2;
- Menopause;
- Severe psychological stress (yellow flag);
- Perception of low (physical) resilience.

Etiological factors can be regarded as unfavorable prognostic factors if they partly determine the moment when strain exceeds resistance. In this perspective, severe overweight, a factor which contributes to the development of SUI, can be regarded as an unfavorable prognostic factor. Hence, it is plausible to assume that a combination of overweight and SUI means that treatment of the SUI is only useful if the patient’s weight status is addressed as well.

Conclusion about identifying prognostic factors

- In the opinion of the guideline development team, prognostic factors should be systematically identified and included in the treatment plan.

In the team’s opinion, the treatment should also address any modifiable factors, in collaboration with other professionals if appropriate (multidisciplinary approach).

Prognostic factors for SUI in men

No published studies were found that had investigated factors influencing the recovery from SUI in men and that met our quality criteria. The main causes of SUI in men are TURP and radical prostatectomy. The prognosis after these interventions is relatively favorable, as the problem of urinary incontinence appears to decrease over time, with a reduction and stabilization of complaints within 1-2 years after surgery, and only a small percentage of men remaining incontinent. Different surgical techniques may lead to different prognoses; a possible difference in incidence has been attributed to this. Exercise therapy for men with SUI after prostatectomy may influence the rate of recovery.
Assessment of the quality of the studies investigating prognostic factors

<table>
<thead>
<tr>
<th>Study Authors</th>
<th>n / cases</th>
<th>cohort</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burgio et al., 2003120</td>
<td>60</td>
<td>RCT</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>n.a.</td>
<td>x</td>
<td>C</td>
</tr>
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<td>Cammu et al., 2004121</td>
<td>447</td>
<td>PC</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>A2</td>
</tr>
<tr>
<td>Hendriks et al., 2010122</td>
<td>267</td>
<td>PC</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>A2</td>
</tr>
<tr>
<td>Lagro-Janssen et al., 1994123</td>
<td>66</td>
<td>PC</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>-</td>
<td>x</td>
<td>C</td>
</tr>
<tr>
<td>Siu et al., 2003124</td>
<td>214</td>
<td>PC</td>
<td>x</td>
<td>x</td>
<td>-</td>
<td>-</td>
<td>x</td>
<td>C</td>
</tr>
<tr>
<td>Theofrastous et al., 2002125</td>
<td>95</td>
<td>RCT</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>-</td>
<td>x</td>
<td>C</td>
</tr>
<tr>
<td>Truijen et al., 2001126</td>
<td>104</td>
<td>RC</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>B</td>
</tr>
<tr>
<td>Viktrup et al., 200112</td>
<td>278</td>
<td>PC</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>A2</td>
</tr>
<tr>
<td>Wilson et al., 1987127</td>
<td>60</td>
<td>RCT</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>-</td>
<td>x</td>
<td>C</td>
</tr>
</tbody>
</table>

**RCT** = randomized controlled trial; **PC** = prospective cohort study; **RC** = retrospective cohort study; **n.a.** = inadequate;

<table>
<thead>
<tr>
<th>a</th>
<th>number of cases &gt; 100; b = prospective cohort.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = reproducible inclusion and exclusion criteria;</td>
<td></td>
</tr>
<tr>
<td>2 = reproducible description of the prognostic factors;</td>
<td></td>
</tr>
<tr>
<td>3 = follow-up of ≥ 80% of participants;</td>
<td></td>
</tr>
<tr>
<td>4 = analysis adjusted for confounders;</td>
<td></td>
</tr>
<tr>
<td>5 = reproducible description of outcome measures;</td>
<td></td>
</tr>
<tr>
<td>6 = level of evidence (A, B, C, D). Quality level: A2 = meeting all 7 criteria; B = meeting 6 of 7 criteria; C = meeting ≤ 5 criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Conclusions on prognostic factors for SUI in women.

**It has been demonstrated that:**

...the chances of recovery decrease with increasing severity of the SUI.

- **A2** Cammu et al., 2004121; Hendriks et al., 2010122
- **C** Burgio et al., 2003120; Siu et al., 2003124, Wilson et al., 1987127

...the chances of recovery are smaller for women who have previously had conservative treatment for SUI with unfavorable outcome.

- **A2** Hendriks et al., 2010122
- **C** Burgio et al., 2003120

...the chances of recovery are smaller for women who are severely overweight.

- **A2** Hendriks et al., 2010122
- **Truijen et al., 2001126**

**It is plausible that:**

...the chances of recovery are smaller for women with a prolapse (> stage 2).

- **A2** Hendriks et al., 2010122

...the chances of recovery are smaller for women who have gone through a protracted delivery.

- **A2** Hendriks et al., 2010122
<table>
<thead>
<tr>
<th>Event</th>
<th>Level</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>...the chances of recovery are smaller for persons affected by severe psychological stress.</td>
<td>A2</td>
<td>Hendriks et al., 2010[^22]</td>
</tr>
<tr>
<td>...the chances of recovery are smaller for persons feeling physically unwell.</td>
<td>A2</td>
<td>Hendriks et al., 2010[^22]</td>
</tr>
<tr>
<td>...the chances of recovery are increased by a higher level of motivation for and adherence to a pelvic floor training program.</td>
<td>B</td>
<td>Truijen et al., 2001[^126]</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Lagro-Janssen et al., 1994[^23]; Siu et al., 2003[^124]</td>
</tr>
<tr>
<td>...the chances of recovery are smaller for women who have had SUI during pregnancy and during the first three months after delivery.</td>
<td>A2</td>
<td>Viktrup et al., 2001[^72]</td>
</tr>
<tr>
<td>...the chances of recovery are smaller for women with SUI who are suffering from co-morbidities (e.g. COPD).</td>
<td>A2</td>
<td>Hendriks et al., 2010[^122]</td>
</tr>
<tr>
<td>...the chances of recovery are smaller for women with SUI who have a low educational level.</td>
<td>A2</td>
<td>Hendriks et al., 2010[^122]</td>
</tr>
<tr>
<td>...the chances of recovery are smaller for women around the time of the menopause.</td>
<td>A2</td>
<td>Hendriks et al., 2010[^122]</td>
</tr>
<tr>
<td>...the chances of recovery are greater for young women than for older women.</td>
<td>A2</td>
<td>Hendriks et al., 2010[^122]</td>
</tr>
<tr>
<td></td>
<td>C−</td>
<td>Burgio et al., 2003[^20]; Theofrastous et al., 2002[^125]</td>
</tr>
<tr>
<td></td>
<td>C+</td>
<td>Wilson et al., 1987[^127]</td>
</tr>
<tr>
<td>...the chances of recovery are smaller for women who have undergone hysterectomy.</td>
<td>A2</td>
<td>Hendriks et al., 2010[^122]</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Theofrastous et al., 2002[^25]</td>
</tr>
<tr>
<td>...the chances of recovery are smaller for women with a positive stress test upon the first forced coughing.</td>
<td>A2</td>
<td>Cammu et al., 2006[^121]</td>
</tr>
<tr>
<td>There are indications that:</td>
<td>level</td>
<td>authors</td>
</tr>
<tr>
<td>...the chances of recovery are smaller for women with urethral hypermobility.</td>
<td>B</td>
<td>Truijen et al., 2001[^126]</td>
</tr>
<tr>
<td>There is conflicting evidence that:</td>
<td>level</td>
<td>authors</td>
</tr>
<tr>
<td>...the chances of recovery are smaller for women who have undergone previous surgery in the pelvic region.</td>
<td>A2</td>
<td>Hendriks et al., 2010[^122]</td>
</tr>
<tr>
<td></td>
<td>B+</td>
<td>Truijen et al., 2001[^126]</td>
</tr>
<tr>
<td></td>
<td>C+</td>
<td>Wilson et al., 1987[^127]</td>
</tr>
<tr>
<td>...the chances of recovery decrease with increasing number of completed pregnancies.</td>
<td>A2+</td>
<td>Hendriks et al., 2010[^122]; Theofrastous et al., 2002[^25]</td>
</tr>
<tr>
<td></td>
<td>C−</td>
<td>Hendriks et al., 2010[^122]; Theofrastous et al., 2002[^25]</td>
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</table>
A.13 Referral versus direct access to physical therapy

In the Netherlands, direct access to physical therapy (i.e. without referral from a doctor) has been allowed by law since 1 January 2006. Since that date, patients have had the option of presenting directly to a physical therapist. Therapists collaborate with family physicians and medical specialists through reciprocal referrals, after consultation with and consent from the patient. If some of the necessary medical data are missing, the physical therapist should contact the patient’s family physician or specialist. In the Netherlands, patients are usually referred to physical therapy by their family physician or a medical specialist (such as a urologist or gynecologist). If the patient was referred, the physical therapist should proceed as described in Section A.13.1 above. If the patient presents to a physical therapist at their own initiative, the therapist must proceed as described in Section A.13.2, and must screen for ‘red flags’.

Family physicians have the choice of referring a patient to a pelvic physical therapist, a general physical therapist with proven competence regarding this problem or a continence nurse. The national agreement document on collaboration between family physicians and physical therapists on the management of incontinence (LESA) states that 7% of all patients with incontinence problems are referred by their family physician to a physical therapist. It is unclear, however, whether this relates to pelvic physical therapists or general physical therapists.

A family physician only refers a patient to a physical therapist if they expect that physical therapy will help resolve the patient’s presenting complaint, or aspects of it. Family physicians can only refer correctly if they are sufficiently aware of the treatments that can be provided by physical therapists. Hendriks has shown that many family physicians feel they do not know enough about what physical therapy can do. Teunissen et al. reported similar findings regarding urogynecological problems, such as urinary incontinence. The LESA agreement might change this situation, as it describes what pelvic physical therapists and general physical therapists with proven knowledge and competence regarding pelvic floor problems can offer. A committee of experts of the Dutch Health Care Insurance Board also concluded in its report on incontinence (Attentie voor incontinentie) that some family physicians lacked the necessary time and specific knowledge, and recommended that family physicians refer their patients directly to a pelvic physical therapist or a continence nurse, rather than giving instructions about pelvic floor muscle training and bladder training themselves.

In the committee’s opinion, treatment by a pelvic physical therapist offers good chances of improvement for patients with incontinence, and is easily accessible, not stressful and considerably cheaper than long-term use of absorptive materials. Direct access to physical therapy reduces the burden of work for family physicians. In addition, pelvic physical therapists can devote more time and attention to patients. They think in multidisciplinary terms and can easily refer their patients to other disciplines, using short referral lines.

Little evidence is available about the policies of medical specialists regarding referral of patients with SUI to physical therapists, although pelvic floor muscle training for patients with SUI is mentioned as the treatment of first choice in the NVU (Dutch society of urologists) guideline on stress incontinence in women and in the NWOG (Dutch society of obstetricians and gynecologists) guideline on urinary incontinence, unless the patient has a severe prolapse or serious intrinsic sphincter damage.

Urologists may refer men to a pelvic physical therapist (working in primary care) before surgery, since SUI in men occurs nearly exclusively after surgical intervention. The pelvic physical therapist then helps to make the patient aware of his pelvic floor, teaches him to contract and relax his pelvic floor muscles correctly and teaches him pelvic floor muscle exercises. This may improve the physical condition of the patient’s pelvic floor, creating favorable conditions for postoperative recovery, and ensuring that the patient knows how to do the exercises as soon as he is allowed to start them. After the operation, the patient may at first be treated by a pelvic physical therapist working at the hospital, but a pelvic physical therapist working in primary care may also become involved. However, not all urologists are convinced of the value of pelvic floor muscle exercises for this group of patients.

It is expected that recent developments in pelvic physical therapy will lead to a gradual increase in the number of referrals to pelvic physical therapists. These developments include further specialization, acquired competencies based on competency profiles, higher quality training courses, scientific evidence about effective treatments, and more effective provision of information to referring doctors and patients about what pelvic physical therapists can and cannot do.

A.13.1 Referral

A letter of referral from a Dutch family physician or medical specialist must include the following patient data:

- date of referral and personal details (date of birth, gender, address, insurance details);
- diagnosis or presumptive diagnosis of SUI, severity of urine loss and the patient’s perception of this urine loss;
- diagnostic findings: whether the patient is able to voluntarily or involuntarily contract or relax their pelvic floor muscles, and, if possible, some indication of the functioning of the pelvic floor muscles;
- the presence and stage of prolapse and/or other urogynecologically relevant problems of the small pelvis;
- the information from the patient’s micturition diary;
- any previous interventions;
- possible causative (risk) factors and prognostic factors, such as rupture during vaginal delivery, damaged pudendal nerve, diabetes mellitus, psychological condition, prior urogynecological surgery, etc.;
- use of medication (i.e. drugs that may relate to the incontinence and may affect the treatment outcome).

These are details that the physical therapist will require for an effective intervention. The purposes include the identification of possible local or general factors that can influence the prognosis by adversely affecting the recovery and adjustment processes, and assessing whether these factors can be modified by physical therapy. It goes without saying that this can have consequences for the choice of strategy and the outcome of the treatment. If the patient’s family physician is unable to provide the necessary information about the patient’s pelvic muscles, as he or she feels insufficiently competent to do so, he or she should refer the patient directly to a pelvic physical therapist and involve the therapist in the diagnostic process.
A.13.2 Direct access to physical therapy

In view of the introduction of direct access to Dutch physical therapists, the guideline development team decided to add a screening process to the systematic approach described in this guideline. The screening process includes the following components: presentation, identifying the problem, screening for pathology that requires urgent medical attention and informing the patient of the results of the screening process and giving them advice. The screening process involves asking specific questions and doing tests or using other diagnostic procedures to decide whether the patient exhibits a pattern of signs and symptoms that is compatible with the physical therapist’s area of competence.

In the context of this guideline, the purpose is to establish whether a patient who presents directly to a pelvic physical therapist is actually suffering from SUI. The pattern of SUI is characterized by loss of urine while straining or on effort, coughing or sneezing, without a sense of urgency and without pain, as well as by certain patient characteristics (age, sex, how the incontinence developed, etiological factors, course of the problem, and factors influencing this course). If the pelvic physical therapist interprets the information as constituting a pattern that is compatible with stress (urinary) incontinence, they can decide to accept the patient for treatment.

If the pattern of symptoms and signs does not seem familiar to the pelvic physical therapist, or if the pattern of SUI is familiar but the patient shows one or more symptoms that deviate from this familiar pattern, or the course of the problem is unusual, or if the therapist finds one or more ‘red flags’, he or she should inform the patient of these findings and advise them to contact their family physician or another doctor. Red flags are data, symptoms and signs that require special attention, as they may indicate serious disease. In the presence of red flags, further analysis of the health problem is beyond the physical therapist’s competence. Examples of red flags include the absence of an explanation for the patient’s incontinence, pain, loss of blood, signs of inflammation, infections and other alarming signs such as fever, perspiring (especially nocturnal), signs of general malaise and severe weight loss. The therapist should also inform the patient if the findings do not suggest any red flags (i.e. the pattern of signs and symptoms fits in with the normal pattern for SUI). In screening a patient with complaints of urinary incontinence, medical patient data are essential to exclude other causes, such as urinary tract infections. The Dutch national agreement between physical therapists and family physicians about the management of urinary incontinence (LESA) states that ‘after screening, the further procedures of physical therapy diagnostics and treatment must not be started until after the therapist has consulted the patient’s family physician’. This position implies that true direct access is no longer possible, since treatment can only be started after contact with the patient’s family physician.

In the opinion of the guideline development team, the requirement of contacting the family physician if a patient presents with incontinence problems in general is justified if essential medical data is missing, but that this procedure is unnecessary in cases of clear SUI without indications of red flags, and leads to unnecessary delays of treatment.

Conclusion about direct access (level 4)

- In the opinion of the guideline development team, it is unnecessary to contact the family physician of a patient presenting directly to a physical therapist with a clear case of SUI, without indications of red flags, and the therapist can start the diagnostic process for physical therapy immediately.

B Diagnostic process

The description of the diagnostic process for physical therapy in this Review of the Evidence is based on systematic review studies by the International Consultation on Incontinence ICI² by Martin et al.,¹³⁵ and Neumann et al.,¹⁶ as well as guideline M6 of the Dutch College of General Practitioners (NHG),¹⁷ the guidelines by NVU¹ and NVOG¹ and the LESA agreement.¹⁸

In addition, we evaluated and analyzed guidelines on urinary incontinence from other countries to compare the diagnostic process (Management of urinary incontinence in primary care⁹ by the Scottish Intercollegiate Guidelines Network, SIGN; Conservative Management of Urinary Incontinence¹⁰; the clinical practice guideline of the Society of Obstetricians and Gynaecologists of Canada, SCOG; and Urinary incontinence: the management of urinary incontinence in women,¹¹ the clinical practice guideline by the National Collaborating Centre for Women’s and Children’s Health).

In addition to examining the nature and severity of the health problem, the physical therapist’s diagnostic process (supplemented by information from the prior screening procedure or the referral letter) is intended to provide as specific an answer as possible to the question whether and how the underlying disorders and/or any unfavorable prognostic factors are amenable to modification by physical therapy, since this information will be used to formulate a specific treatment plan.

The severity of the SUI as a health problem is assessed on the basis of the ICF categories (impairments, limitations, and restrictions of participation).²⁴

B.1 History-taking

The pelvic physical therapist takes the patient’s history to establish the type of incontinence, to estimate the magnitude of urine loss and its impact (in terms of the duration of the incontinence, the use of absorbptive products, and the consequences of the incontinence for everyday life), and to identify any underlying disorders and any relevant factors that may contribute to the involuntary loss of urine (use of medication and alcohol, abnormal fluid intake, limitations and co-morbidity).

It is important for the pelvic physical therapist to describe the urinary incontinence in any specific situation on the basis of a number of relevant factors, such as the type of urinary incontinence, its frequency and severity, precipitating factors, social impact, effects on hygiene and quality of life, measures taken to control the loss of urine and the patient’s expressed care requirement or preference.¹¹²

Together with physical examination, history-taking constitutes the basis of the therapeutic process. The history-taking procedure also offers an opportunity to build a relationship of trust between therapist and patient. The treatment room must be suitable for this purpose, which means it must be enclosed and soundproof.
History-taking involves medical, paramedical, communicative, and attitudinal aspects. It should preferably have a goal–oriented and systematic character. The pelvic therapist’s history-taking process relates to the domains of urology, gynecology, obstetrics, proctology, orthopedics (lower back, pelvis, and hips), sexology, fluid and nutrient intake, and psychological condition, and must be goal–oriented, systematic, and as complete as possible.

B.1.1 Establishing the type of incontinence

The type of incontinence will become clear during history-taking, and can if necessary be confirmed using the Incontinence Questionnaire (3IQ) test. The diagnosis of SUI needs to be confirmed or established, depending on the way the patient presented to the therapist, i.e. after referral or through direct access. A presumptive diagnosis of SUI can be established using one of the recently developed short questionnaires for primary care, which allow rapid and valid distinction of the main types of urinary incontinence, viz. SUI and urgency (urinary) incontinence.\textsuperscript{132,137,138} The 3IQ test is a useful measurement instrument, which can establish the presence of SUI with a sensitivity of 0.86 (95% CI = 0.79–0.90) and a specificity of 0.60 (95% CI = 0.51–0.68), and can establish urgency (urinary) incontinence with a sensitivity of 0.75 (95% CI = 0.69–0.84).\textsuperscript{138}

\textbf{The 3IQ test}

1. During the last 3 months, have you leaked urine (even a small amount)?
   - Yes (please continue with questions 2 and 3) or no (questionnaire completed).
2. During the last 3 months, did you experience any involuntary loss of urine: (check all questions that apply)
   - when you were performing some physical activity, such as coughing, sneezing, lifting, or exercise?
   - when you had the urge to empty your bladder, but you could not get to the toilet fast enough?
   - without physical activity and without a sense of urgency?
3. During the last 3 months, did you experience involuntary loss of urine most often: (check only one)
   - most often with physical activity
   - most often with the urge to empty your bladder
   - when you were performing some physical activity, such as coughing, sneezing, lifting, or exercise?

Definitions of type of urinary incontinence are based on responses to question 3:
- Most often with physical activity $\rightarrow$ stress only or stress predominant urinary incontinence
- Most often with the urge to empty the bladder $\rightarrow$ urge only or urge predominant (urinary) incontinence
- Without physical activity or sense of urgency $\rightarrow$ other cause
- About equally as often with physical activity as with a sense of urgency $\rightarrow$ mixed (urinary) incontinence.

The guideline development team recommends using the 3IQ test to establish the type of incontinence.

\textbf{Conclusion about history-taking or urodynamic examination in the diagnostic process (level 1)}

- It had been demonstrated that the diagnosis of SUI in women can be established either by history-taking or by urodynamic examinations, with very similar results.
- Quality of the studies identified: A (Martin et al., 2006\textsuperscript{137}).
1. the nature of the underlying disorder, by identifying the presence of etiological factors for SUI, and
2. the prognostic factors that influence the course of SUI and the recovery process, viz.:
   • local factors that may adversely affect the recovery and adjustment processes, whether relating to reduced resilience or increased strain on the pelvic floor, or both;
   • general factors that may adversely affect the recovery process, that is, factors relating to the patient’s poor physical condition.

B.1.4 Identifying the patient’s illness beliefs
The fourth goal of history-taking is to identify the patient’s own ideas and views about their incontinence, its possible causes and consequences, the chances of recovery and what they can do about it themselves, what can be done by the therapist and what contribution or role can be expected of others. Such ideas and views (‘illness beliefs’) can often have a favorable or adverse effect on the prognosis in terms of recovery, and may partly determine the type of intervention that can be used. For instance, what patients can do about the problem by themselves is usually determined by their own views about the problem, and unrealistic ideas may impede a natural recovery process.144,146

Conclusion about identifying illness beliefs (level 3)
• There are indications that identifying illness beliefs affects the degree of modifiability of the health problem.

Quality of the studies identified: C (Ogden et al., 2000; Cameron et al., 2003).149

B.1.5 Considerations on the care provider’s competence
An important aspect of history-taking is to enable the physical therapist to assess the extent to which the patient’s health problem is compatible with the therapist’s competencies, that is, whether the information obtained in the history-taking is such that the therapist feels he or she is sufficiently qualified to provide this patient with the best possible care. The key factor in this respect is the complexity of the health problem.

Physical therapists must reflect on the actions they intend to take, what they intend to examine, whether they are able to perform an internal examination, and if they are unable to do so, whether they will still be able to sufficiently assess the patient’s pelvic floor muscle function. At the same time, other aspects may also need to be taken into consideration. For many patients, their pelvic floor is an emotionally sensitive area, and although sexual abuse is not more common among patients with urinary incontinence than among continent women, it may present a major complicating factor for treatment.

B.2 Physical examination
The physical examination consists of inspection at rest and during movement, palpation and functional examination, and has the following objectives:
• assessing the level of voluntary and involuntary control over the pelvic floor;
• assessing pelvic floor muscle function;
Palpation

• Palpation enables the therapist to ascertain whether the patient is able to voluntarily contract their pelvic floor muscles.
• The therapist can also determine whether there is an inward movement of the urethra, whether the levator muscle tightens around the palpating finger and whether there is symmetrical contraction of the pelvic floor muscles in both the antero- posterior and lateral directions.
• Palpation enables the therapist to assess the degree of contraction. Since quantifying the contraction of pelvic floor muscles is difficult and there is no validated scale for this, the Pelvic Floor Clinical Assessment Group of the ICS recommends using only the terms ‘absent’, ‘weak’, ‘normal’ and ‘strong’ to describe the degree of contraction of the pelvic floor muscles.
• Palpation can also give an impression of the endurance of the pelvic floor muscles.
• Palpation can be used to count the number of rapid repeats of a contraction (explosive strength).
• Palpation can also be used to assess the degree of relaxation of the pelvic floor muscles after contraction.

Palpation during coughing

• Palpation can be used to ascertain whether there is involuntary contraction of the pelvic floor muscles during coughing.
• Palpation can be used to assess whether there is a downward movement of the perineum during coughing.
• Palpation can also be used to assess whether there is any loss of urine during coughing.

Palpation during straining

• Palpation enables the therapist to ascertain whether the patient involuntarily relaxes their pelvic floor muscles during straining.
• It can also reveal if the patient paradoxically contracts their pelvic muscles during straining.

- normal pelvic floor muscles:
  - both voluntary and involuntary contraction and relaxation occur; the voluntary contraction is ‘normal’ or ‘strong’ and the voluntary relaxation is ‘complete’;
- overactive pelvic floor muscles:
  - no relaxation occurs; there is contraction even when relaxation is functionally needed, for instance during micturition or defecation;
  - symptoms: micturition dysfunction, loss of urine, obstructed defecation or dyspareunia;
  - signs: absence of voluntary pelvic floor muscle relaxation;
- underactive pelvic floor muscles:
  - no voluntary contraction occurs when it is appropriate;
  - symptoms: urinary incontinence, anal incontinence;
  - signs: pelvic organ prolapse and the absence of voluntary and involuntary contractions of the pelvic floor muscles;
tion can produce extra tension in the pelvic floor muscles.

addition, the fear of involuntary loss or urine during the examina-

of this muscle as a result of exorotation of the leg also increases

The pelvic floor is connected to the obturatorius internus muscle by

as well.

nning of this extension chain might imply poor pelvic floor function

thesis, and studying and analyzing its impact, requires further and

by emotional stress160 and has also been reported to occur in

women with complaints of vaginal pain.160 Increased stress during

pelvic floor examinations occurs in women with vaginismus.161 In

addition, the fear of involuntary loss or urine during the examination
can produce extra tension in the pelvic floor muscles.

Based on the above considerations, the guideline development team has formulated the following recommendation:

**Palpation**
The guideline development team recommends the use of the assessment procedure described in the practice guideline to evaluate the pelvic floor muscle function.

B.2.3 Impairments originating in other parts of the musculoskeletal system

The pelvic physical therapist should assess whether and to what extent other parts of the musculoskeletal system are hampering the function of the pelvic floor muscles. To this end, the therapist should inspect and observe:

- the patient’s sitting and standing posture (urethral angle, anorectal angle, abdominal pressure and toileting behavior);
- respiration (breath-holding and vocal behavior);
- movements (mobility and tonicity of the spinal column, abdominal and pelvic regions and movement patterns);
- abdominal, buttock and leg muscles (patients with fatigued pelvic floor muscles often show increased activity of other muscles).

In movements, muscles do not work in isolation, but work partly simultaneously and partly consecutively, as in a series (intermuscular coordination). The support and activate each other, or inhibit each other’s action. The pelvic floor participates in an extension chain, which is mainly formed by the extensor hallucis longus muscle, the biceps femoris muscle, the obturatorius internus muscle, the rectus abdominus muscle, the obliquus internus and externus muscles, the latissimus dorsi muscle and the cervical flexors. Various authors have stated that it is plausible that the functioning of the pelvic floor muscles cannot be evaluated without looking at this entire muscle chain.162,166 Proving this hypothesis, and studying and analyzing its impact, requires further and more detailed research. The hypothesis claims that poor functioning of this extension chain might imply poor pelvic floor function as well.

The pelvic floor is connected to the obturatorius internus muscle by fascia leaves on the left and right of the pelvis. Increased tonicity of this muscle as a result of exorotation of the leg also increases the tonicity of the pelvic floor, which suggests that the pelvic floor needs the exorotation chain to achieve the right tonicity. On the anterior side, the pelvic floor is connected to tendon tissue of the symphysis and fascia leaves of the abdominal muscles, while on the posterior side, it is connected to the tendon tissue of the os coccygis and the leaves of the thoracolumbal fascia. It is also connected to the gluteus maximus muscle. The pelvic floor muscles are part of the muscles that keep up the intra-abdominal pressure. There is a synergism between the deeper abdominal muscles and the pelvic floor muscles.164,165

The pelvic floor muscles not only contribute to continence, but also make an integrated contribution to the stability of the trunk and pelvis.166 In healthy persons, the intra-abdominal pressure is automatically regulated by feed-forward control of the transversus abdominis, in combination with the diaphragm and the pelvic floor muscles.164,166

Pool-Goudzwaard et al. reported a relationship between increased activity and prolonged contraction of the pelvic floor muscles in women with subacute and chronic lower back pain, to compensate for the loss of pelvic stability, and the development of pelvic floor dysfunctions that lead to SUI, due to excessive strain and a possible loss of motor control of the pelvic floor muscles.167 Smith et al. found a strong relationship between lower back pain on the one hand and incontinence and respiratory dysfunction on the other. As a possible explanation, they suggest a limited ability to sufficiently integrate trunk muscle function in the regulation of posture and respiration as well as continence.169

Assessing voiding posture and toileting behavior

So far, little research has been done into the role of voiding posture and toileting behavior in relation to SUI. Inadequate voiding posture and inadequate toileting behavior, such as abdominal straining while micturating, might have an unfavorable effect on the pelvic floor through the increased strain imposed on it, which could disturb the balance between strain and resistance. Postponing micturition and drinking too much fluid (> 2.5 l per 24 hours) could be regarded as increasing the strain on the pelvic floor due to increased bladder content (> 500 ml). Versprille-Fischer described the importance of a good voiding posture in relation to micturition and defecation, in which the pelvic floor plays an important role.160 Devreese et al. concluded that a posture with the trunk bent forward is the most favorable posture to enable micturition with a relaxed pelvic floor.160 Good voiding posture and relaxed pelvic floor and breathing create the optimal conditions for voiding the bladder and intestines. The therapist discusses with the patient what sitting or standing posture they normally use for voiding, to assess its suitability. If the posture is inadequate, a correct voiding posture becomes one of the goals of the physical therapy intervention.

Conclusion about functional examination (level 3)

• There are indications that inadequate breathing patterns, postural control, voiding posture, and toileting behavior may have an adverse impact on pelvic floor muscle function.

Quality of the studies identified: C (Smith et al., 2006169).
B.3.1 The PRAFAB questionnaire

The PRAFAB questionnaire (see Supplement XX in the Practice Guideline) measures the severity of the loss of urine in terms of the use of absorptive products (Protection), the magnitude of the loss of urine (Amount) and the number of times urine is lost (Frequency). In addition, it records the impact of the loss of urine in terms of more subjective aspects, such as the way the patient adjusts to the loss of urine in their everyday life (Adjustment) and the consequences of the incontinence for the patient’s self-image (Body image). The PRAFAB questionnaire thus combines key objective and subjective aspects of the incontinence problem. The questionnaire measures two separate domains by means of a ‘leakage severity scale’ and a ‘perceived impact scale’. The PRAFAB score allows persons with severe urinary incontinence to be identified. A comparison with the Incotest (48 hour pad test) shows that a PRAFAB score of 14 points or less can be used to distinguish between more or less than 2 g of urine lost per hour. Loss of more than 2 g of urine an hour is defined as severe urine loss.

The psychometric qualities in terms of reliability, validity and responsiveness of the PRAFAB questionnaire have been studied among women aged 18–67 years, and were found to be satisfactory. Research has also shown that the questionnaire can be used to record changes in the health status of individual patients, as the minimal change score on the instrument that corresponds to a clinically relevant change in the health problem has been determined. The minimal clinically relevant change in the overall score (minimal important change or MIC) for patients with < 2 g urine loss per hour (PRAFAB score < 14) is 3 points, while the MIC for patients losing > 2 g of urine an hour is 5 points. Although the overall PRAFAB score is a measure of the severity of the perceived health problem, the individual scores for the ‘urine loss’ and ‘impact’ items are also relevant. In diagnostic terms, these scores are part of the patient profile, comprising the severity of urine loss (impairments) on the one hand, and the limitations of activities and restrictions of participation and personal factors on the other. The Incontinence Severity Index (ISI)176 and the International Consultation on Incontinence Questionnaire (ICIQ)177 include questions relating to the same themes (symptoms of incontinence, amounts of urine lost, frequency and use of absorptive products) and can also be used to record the severity of the health problem. However, the Dutch versions of these two instruments have not yet been validated.

The severity of the loss of urine alone, however, has proved to be a poor predictor of possible limitations of activities, the psychosocial impact of SUI and the significance of the SUI for an individual’s perceived quality of life. Urinary incontinence nearly always has adverse effects on the patient’s quality of life, including reduced social participation; patients feel lonely and unhappy, stigmatized, and hampered in nearly all activities of daily living, including their sexual relationships. The practical discomforts associated with loss of urine, such as frequently having to change clothes or having to bathe more often, also have a negative impact on the quality of life.

The way in which patients perceive and experience the consequences of urinary incontinence is important as this experience is part of the health problem. Even minor incontinence can have considerable effects on the patient’s quality of life.

This is why recording the impact of the urinary incontinence on the patient’s quality of life is crucially important for an assessment of the effectiveness of interventions and therapeutic options, especially since these interventions and therapeutic options frequently fail to achieve complete recovery from urinary incontinence. Measuring the perceived impact of the loss of urine using extensive quality-of-life questionnaires is a rather time-consuming procedure in routine practice. In addition, the various questionnaires only measure specific aspects of quality of life (in addition to the severity of urine loss), making it difficult to choose the right instrument.
The advantage of the PRAFAB questionnaire is that it is short, and records both the severity of loss of urine and the perceived impact of the problem on the patient’s everyday activities and self-image. Moreover, research into the psychometric characteristics of the test has shown that improvements in PRAFAB scores correlate closely with the improvements in health status perceived by the patients themselves.172

Conclusion about the severity of the health problem (level 2)
- It is plausible that the PRAFAB questionnaire is a useful instrument to record the severity of the health problem at the start of therapy.

Quality of the studies identified: B (Vierhout et al., 2004; Mulder et al., 1990142;143).

Conclusion about assessing changes in the patient’s health status and the effect of physical therapy intervention (level 1)
- It has been demonstrated that the PRAFAB questionnaire is a suitable instrument to record changes in the patient’s health status and hence to record the effect of the physical therapy intervention on their health status.

Quality of the studies identified: A (Hendriks et al., 2007, 2008;172;173).

The aim of pad tests is to quantify the loss of urine by weighing the incontinence products (pads) used. This can be done by weighing the pads before and after a specified period of time (e.g. 24 or 48 hours). Such tests are usually done at the patient’s home, or before and after implementation of a protocol to provoke involuntary loss of urine (e.g. the 1-hour ICS pad test); this provocation test can also be used to distinguish between continent and incontinent women. This short pad test is (usually) done with a full bladder, just before a series of exercises. An increase in pad weight of > 1 g in the 1-hour ICS pad test and an increase of > 4 g in a 24-hour test are regarded as a positive test result.132 The intra- and inter-observer reliability values for the various short pad test vary widely.132 The test often produces a negative result particularly in women with mild incontinence. The clinical value of the 1-hour ICS pad test is limited.183

Pad tests measuring loss of urine over a longer period are more reliable. The correlation coefficient between the loss of urine measured by the 48-hour pad test and that measured by a standardized 1-hour pad test is 0.90.

Conclusion about pad tests (level 3)
- There are indications that the 24-hour pad test is the most useful of all pad tests, in view of its high reliability and the acceptable burden for the patient.

Quality of the studies identified: C (Staskin et al., 2005).

B.3.2 Pad tests

Based on the above considerations, the guideline development team has formulated the following recommendation:

PRAFAB questionnaire
The guideline development team recommends using the PRAFAB questionnaire to assess the changes in the patient’s health status and the effect of physical therapy intervention.

B.3.3 Patient-Specific Complaints (PSC)

The Patient-Specific Complaints (PSC) instrument can be used to determine the specific limitations experienced by individual patients.184 The PSC has been found to have good responsiveness for patients with low back pain.184 The PSC can be used to measure relevant and important changes in the pattern of complaints of individual patients. It enables therapists to determine a patient’s subjective functional status before and after treatment, making the instrument suitable for evaluation.185 The PSC enables the patient to indicate the main activities in which they feel restricted. Changes over time in the PSC score reflect changes in perceived health status, and hence indirectly in their quality of life. The restrictions experienced by the patient are best assessed with the Numeric Rating Scale—11 (NRS—11; range 0–10) rather than with a Visual Analog Scale (VAS; range 0–100 mm), as the NRS is easier and simpler for the patient to interpret.

Conclusion about assessing changes in the patient’s health status and the effect of physical therapy intervention (level 1)
- It has been demonstrated that the PSC can be used to determine the specific limitations experienced by individual patients, as well as to evaluate the treatment after an intervention.

Quality of the studies identified: B (Beurskens et al., 1999).

Based on the above considerations, the guideline development team has formulated the following recommendation:

Patient-Specific Complaints (PSC)
The guideline development team recommends using the PSC both to identify the health problem and to evaluate the effect of treatment.

B.3.4 Global Perceived Effect (GPE)

The guideline development team recommends the use of the Global Perceived Effect (GPE) instrument, in view of its simplicity and practicability (Practice Guideline, Supplement 5). Patients can use the GPE to indicate their general perception of the change...
or degree of improvement in their subjective health status. Research into the psychometric characteristics of the PRAFAB questionnaire for patients with urgency incontinence has used the GPE instrument to measure the subjectively perceived generic effects of treatment.

**Conclusion about the Global Perceived Effect (GPE) instrument (level 2)**

- It is plausible that the Global Perceived Effect (GPE) measurement instrument is useful to assess the change in or degree of improvement of the health problem as perceived by individual patients after treatment.

Quality of the studies identified: B (Hendriks et al., 2007; Jaeschke et al., 1989; Van der Roer et al., 2006; De Vet et al., 2006).

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**B.3.5 Micturition diary**

A micturition diary (bladder diary) provides information about a number of variables relating to micturition, involuntary loss of urine and activities during which the loss of urine takes place. The following variables are systematically recorded, preferably covering 3 consecutive days that are representative of the patient’s daily activity patterns (e.g., 2 working days and 1 weekend day): the times when fluids are consumed and the amounts consumed, the type of fluid consumed, the level of urge to empty their bladder, the quantity of urine voided and the times of micturition, the times when urine is involuntarily lost and the amounts of urine lost, and the activity/activities the patient was engaged in just before or during the loss of urine.

The physical therapist evaluates the micturition diary by scoring the following data: the frequency of micturition, the total volume of urine produced per day, the volume of urine produced at each micturition, the presence of (uncontrollable) urge just before the micturition, the distribution of urine production over a 24-hour period and the activity/activities the patient was engaged in just before or during the loss of urine.

The data from the micturition diary give the therapist information about the functional capacity of the patient’s bladder and their micturition behavior. The functional capacity of the bladder is normal (350–500 mL) in patients with SUI, but reduced in patients with urgency incontinence, as revealed by their tendency to produce small volumes (<100 mL) per voiding. SUI patients also usually have a normal (or nearly normal) micturition frequency (about 8 times per 24 hours), whereas patients with urgency incontinence usually have a much higher micturition frequency. Patients with SUI usually experience involuntary loss of urine during moments of increased intra-abdominal pressure, whereas those with an overactive bladder experience an uncontrollable urge to empty their bladder just before the involuntary loss of urine. Finally, patients with SUI usually lose fairly small volumes of urine (drops or trickles), whereas those with urgency incontinence may suffer much more substantial loss of urine.

A micturition diary covering 7 full days has been found to be a valid instrument to determine changes in the symptoms of urgency incontinence, for both men and women with urgency-predominant incontinence. A micturition diary covering a shorter period is just as reliable, and represents less of a burden to the patient, leading to better compliance. Not only can a micturition diary be used as a diagnostic instrument, but the physical therapist can also use the recorded data to give the patient specific advice on the timing of eating and micturition. Good toileting behavior will also promote continence. See Supplement 3 in the Practice Guideline for an example of a micturition diary.

**Conclusion about the use of micturition diaries (level 1)**

- It has been demonstrated that the physical therapist can derive information about the type of incontinence and about variables relating to micturition, involuntary loss of urine and activities during such urine loss by asking the patient to keep a micturition diary.

Quality of the studies identified: A (Brown et al., 2003).

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**B.4 Analysis**

The aim of the diagnostic process in physical therapy is to provide as specific an answer as possible to the question whether and how the underlying disorder and/or any unfavorable factors can be modified by physical therapy. This answer is formulated partly on the basis of the information provided by the patient’s family doctor and/or specialist.

The analysis stage involves the explicit decision whether ‘physical therapy’ is the treatment indicated for a particular patient, based on the findings of the diagnostic process, supplemented by medical information. If the diagnosis of SUI has been correctly established, the physical therapist should use the PRAFAB score and/or the 24-hour pad test to determine the severity of the SUI (grades 1 and 2 or grades 3 and 4) (see Table 1).

**B.4.1 SUI in women**

Although surgery has been proposed as the most effective therapy
KNGF Guideline for Physical Therapy in patients with Stress urinary incontinence

Review of the evidence

Table 7. Gradation of SUI by severity of loss of urine.

<table>
<thead>
<tr>
<th>PRAFAB questionnaire</th>
<th>24-hour pad test*</th>
<th>use of absorptive products</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (mild)</td>
<td>&lt; 10 g</td>
<td>none</td>
</tr>
<tr>
<td>2 (moderate)</td>
<td>10−50 g</td>
<td>occasional</td>
</tr>
<tr>
<td>3 (severe)</td>
<td>50−100 g</td>
<td>continually, except when at rest day and night</td>
</tr>
<tr>
<td>4 (severe)</td>
<td>&gt; 100 g</td>
<td></td>
</tr>
</tbody>
</table>

* Incotest modified to 24-hour pad test.743

for women with severe forms of SUI (grades 3 and 4)195 and physical therapy in the form of pelvic floor muscle training (PFMT) as the therapy of first choice for women with moderate or mild forms of SUI (grades 1 and 2).195;196;197 The general recommendation is nevertheless to start with non-surgical therapy for all forms of SUI, including severe forms.195;200;201 The reason is that some patients benefit sufficiently from PFMT, so that surgical intervention can be avoided, even in the longer term.195;200;201 In addition, even if PFMT has insufficient effect and surgical intervention is called for, the exercises will have improved the patient’s physical condition by then, which has a beneficial effect on postoperative recovery and reduces the risk of postoperative complications.202;203 Norton et al.204 and Jarvis et al.203 recommend exercise therapy in preparation for surgery in the urogenital area, to prevent postoperative complications.

Another reason to be reticent about surgical intervention is that such surgery appears to be less successful in the longer term than was previously assumed.195;205;206 The high prevalence of SUI and the knowledge that an operation, which carries the risk of causing permanent damage to the pelvic floor, is not the most suitable option for all patients195;200;201 has resulted in renewed interest in conservative treatment of SUI.195;200;201;202

The analysis should be based not only on the severity of the loss of urine and the functionality of the pelvic floor muscles (expressed as the ability to correctly contract and relax these muscles, voluntarily as well as involuntarily), but also on the prognostic factors identified and whether they are modifiable by physical therapy. Prognostic factors that are hardly modifiable by physical therapy, such as severe prolapse (stage 3), partly determine the chances of a successful therapy. For those prognostic factors that are modifiable, the therapist must formulate explicit therapeutic goals, for instance to treat poor physical condition and overweight or poor pelvic floor muscles as perceived by the patient themselves.

It may be concluded that the severity of the SUI is important for the prognosis and the evaluation of the effect of the intervention, although the severity does not fully determine the physical therapist’s treatment strategy.

It may also be concluded that the nature of the underlying disorder remains unclear for most patients who are given a presumptive diagnosis of SUI. Hence, the pelvic physical therapist cannot predict in advance whether and to what extent the SUI will prove amenable to modification by physical therapy. This means that the treatment by the pelvic physical therapist is a ‘diagnostic’ treatment, and only the presence of factors that are presumed to have prognostic value can be used to estimate the possible modifiability of the problem.

In view of these prognostic factors, the following problem categories can be distinguished for women:

- **SUI with pelvic floor muscle dysfunction**:
  - The patient is unable to identify their pelvic floor muscles, has no awareness, cannot manage contraction or relaxation; shows no effective involuntary contraction of the pelvic floor muscles associated with increased abdominal pressure.
  - The patient is unable to identify their pelvic floor muscles, has no awareness, cannot manage contraction or relaxation; shows some involuntary contraction of the pelvic floor muscles associated with increased abdominal pressure, but the contraction is ineffective.
  - The patient is unable to identify their pelvic floor muscles, has no awareness, cannot manage contraction or relaxation, but shows effective involuntary contraction of the pelvic floor muscles associated with increased abdominal pressure.
  - The pelvic floor muscle tone is measurably too high, and the patient is unable to reduce this on demand (with or without voluntary tightening and with or without effective involuntary contraction associated with increased abdominal pressure).
  - The patient is able to tighten and relax their pelvic floor, but has no effective involuntary control over the pelvic floor during increased abdominal pressure.
  - The patient has both voluntary and involuntary control over their pelvic floor muscles, but their pelvic floor muscles are too weak.
  - The functioning of other parts of the musculoskeletal system, for instance in relation to respiration, voiding posture and toileting behavior, adversely affects the pelvic floor muscle function.

- **SUI without pelvic floor muscle dysfunction**.
- **SUI plus local and/or other (general) unfavorable prognostic factors** that may have adverse local or general effects on recovery and/or adjustment processes, and which may or may not be modifiable by physical therapy interventions.

### B.4.2 SUI in men

Dysfunctional pelvic floor muscles are usually not a primary causative factor for SUI in men, although pelvic floor dysfunction may be a limiting factor for compensation of internal sphincter insufficiency due to surgical interventions. Dysfunctional pelvic floor muscles are more common among older men, possibly as a result of damage to muscle and/or nerve fibers in the pelvic floor area, for instance due to previous trauma or radiation treatment.
Patients may also not know how to contract their pelvic floor muscles or may actually generate too much muscle tension to prevent loss of urine. The ability to voluntarily contract and relax the pelvic floor muscles is a precondition for pelvic floor exercises. The problem categories that can be distinguished are the same as those for women.

C Therapeutic process

The general objective of the pelvic physical therapy intervention is to enable patients to adjust the physical resistance offered by their pelvic floor to the actual strains that occur (i.e. peaks in intra-abdominal pressure). This objective can be regarded as achieved if the patient reports fewer impairments and limitations, and fewer problems of participation, or improved functions, resumption of activities and recovery of participation.

The pelvic physical therapist tries to enable the patient to increase the condition of their pelvic floor by training the pelvic floor muscles (training to produce structure); in addition, the therapist tries to eliminate as much as possible the influence of factors impeding this adjustment process. Since the resistance offered by the pelvic floor muscles should ideally be equal to the strain, this means that the patient should not only work to improve the physical condition of their pelvic floor, but also continue their efforts to maintain this condition (‘use it or lose it’). This implies achieving a change in lifestyle, and an important part of the physical therapy interventions must be to support this change of patients’ lifestyle or behavior. In addition, it may be useful to improve the patient’s general physical condition, in order to reduce the influence of other diseases and disorders on the continence.

The therapy starts with the therapist explaining the nature of the patient’s problem to them and giving them information. The patient will be more motivated to start the therapy if they understand the normal anatomy and physiology, the influence of (mental) stress and relaxation on the functioning of the pelvic floor muscles and the way stress (urinary) incontinence develops.\textsuperscript{212} The therapist formulates the objectives of the physical therapy treatment in terms of reducing the impairment(s), limitation(s), and participation restrictions, in other words improving body functions, abilities, and social participation. Together with the patient, the pelvic floor physical therapist designs a treatment plan, based on the information obtained during the diagnostic process. It is important to formulate the treatment goals explicitly and to indicate how long it should take to achieve them. Determining the strategy and objectives of treatment is a joint effort by patient and therapist, each with their own interests, preferences and expectations. It is essential that the patient and the pelvic physical therapist both know what to expect from each other. The objectives focus on reducing the influence of unfavorable prognostic factors, many of which are linked to behavior that adversely influences health, that is, to lifestyle. The adverse influence of these factors on health in general and on the physical condition of the pelvic floor in particular can be reduced if the patient manages to adjust their own lifestyle. This makes the patient ‘trainable’ and makes functional improvement of the pelvic floor condition a potentially feasible goal for the physical therapy intervention.

As indicated in the above description of the analysis process, the presence of one or more of the factors presumed to have prognostic value does not enable the therapist to predict whether and to what extent the health problem of SUI can be modified by means of physical therapy. Hence, the therapy should be regarded as a ‘diagnostic therapy’ (6 sessions). The attainment or non-attainment of the objectives thus acquires a diagnostic significance. It may allow an underlying disorder that is not modifiable by physical therapy to be identified, and reveal the need for further evaluation of the problem.

Conclusion about the physical therapy intervention (level 4)

- In the opinion of the guideline development team, the physical therapist’s diagnostic process does not allow definitive conclusions as to whether and to what extent the health problem of SUI will be amenable to modification by physical therapy intervention, which implies that the physical therapy treatment must be regarded as a ‘diagnostic therapy’, which needs to be evaluated after 6 sessions.

The various therapeutic interventions used by pelvic physical therapists to treat adult patients with SUI include:

- information and advice;
- interventions to increase general physical condition;
- intervention to increase the functional condition of the pelvic floor:
  - practicing and controlling the pelvic floor functions (i.e. training the pelvic floor muscles to enable the patient to voluntarily contract and relax them, to increase their strength and endurance and to promote their involuntary contraction to support abdominal pressure increase);
  - training with the help of feedback;
  - training with the help of electrostimulation;
  - training with the help of vaginal cones.

C.1 Information and advice

In the process of taking a patient’s history, the pelvic physical therapist has identified their ‘illness beliefs’ about their health problem, and gained some impression of the patient’s ideas about the nature of the problem and its possible causes, how long the patient thinks it might last, their ideas about the ultimate consequences of the problem, whether the patient thinks they can be completely cured, and their ideas about what they will be able to do about it themselves, and what others could do for them. The emotions associated with the problem have also been assessed. Based on this information, the therapist should formulate a patient-specific education plan, as part of the physical therapy treatment plan. This plan includes specific subsidiary goals, for instance relating to the patient’s views and ideas. Achieving long-term success will require changing the patient’s behavior. Important instruments to achieve this are education and counseling, especially as regards changes relating to the pelvic floor and micturition behavior.

Depending on the patient’s ideas, preferences and expectations, the pelvic physical therapist should explain to them the following relevant concepts: SUI; the function of the bladder; where and how urine is produced; the relationships between kidneys, bladder, and pelvic floor; the relationship between pelvic floor, respiration, and posture; the possible causes of urinary incontinence; the potential consequences of incontinence; the influence of (mental) stress and relaxation on the physical condition of the pelvic floor; the relationships with other functional impairments in the pelvic floor region; etc.
The therapist should also explain about potential risk factors and prognostic factors in general, and the particular factors that are relevant in the patient’s specific case. Topics to be discussed include the possible relationships between incontinence, pregnancy, and delivery; prolapses and the hereditary factors that may be involved in them; lifting heavy objects; and the influence of overweight and general physical condition on the incontinence. For male patients, this should be supplemented with information about the relation between incontinence and surgical interventions. In addition, the therapist should discuss the relationships between SUI and smoking and the use of alcohol, coffee, and tea. The pelvic floor can only be effectively trained if the patient knows where the pelvic floor muscles are located, what their function is and how they can be contracted and relaxed, and what the effect is of the presence or absence of effective involuntary contraction associated with increased abdominal pressure. The pelvic physical therapist can make use of educational materials in the form of anatomical plates and phantoms.

The therapist should also discuss with the patient what sitting or standing posture they normally use for voiding. Tilting the pelvis forward results in a more vertical position of the urethra, while the bladder is lifted in a ventrocranial direction as the trunk is extended. Tilting the pelvis as a toileting exercise promotes the development of a suitable voiding posture. This can be demonstrated using anatomical plates and a model of the pelvis.

Based on the above considerations, the guideline development team has formulated the following recommendation:

Information and advice
The guideline development team recommends the use of anatomical plates and pelvic phantoms, as well as other educational materials such as lifestyle advice.

The pelvic physical therapist can use the information recorded in the patient’s voiding diary to discuss their micturition behavior and to offer specific advice on eating habits and micturition behavior (e.g. timing). Good toileting behavior will also promote continence.

In evaluating the information and recommendations given, the pelvic physical therapist can consider whether the patient has realistic views and expectations with regard to their complaints, and whether they are doing what they ought to do. Essential factors regarding behavioral change include: (i) the expected outcome of behavior (do the advantages for the patient outweigh the disadvantages) and (ii) the patient’s self-efficacy, that is, their perceived control over their behavior. Whether patients actually change their behavior will depend on 6 aspects of behavioral change. First of all, the patient must be receptive to information about behavioral change, must be able to understand the information and must be willing and able to change their behavior. Subsequently, they must actually start to implement the new behavior, continue to engage in it, and internalize it. The way patients cope with their problem can be improved by systematically discussing their views and attributions about their complaints, for instance using Leventhal’s classification (identity, cause, timeline, consequences, possible recovery [spontaneous or through treatment] and controllability of the complaints).

C.2 Interventions to increase general physical condition
The better someone’s physical condition and resilience, the less they will be affected by the consequences of illnesses or disorders. Improving a patient’s general physical condition is useful and is recommended for a wide range of disorders. KNGF stimulates the development of exercise programs for a range of patient groups. Since SUI can be regarded as a dysbalance between strain and resilience, it is plausible that improving the patient’s general physical condition will result in their being less affected by the SUI. A patient’s physical condition can be improved by exercising and/or training. Training can be defined in two different ways: ‘systematically practicing a particular sport’ and ‘practicing a particular skill’. In physical therapy, systematic practicing with ‘overload’ can be referred to as training. Practicing particular skills can be referred to as practicing. This means that practicing with overload and practicing particular skills can both be used in this context to improve the patient’s physical condition and resilience. Where this guideline refers to pelvic floor muscle training, the context should clarify whether this means ‘practicing with overload’ or ‘practicing the particular skill’. The latter may include practicing the correct way to contract and relax the pelvic floor muscles. If a patient is overweight (BMI > 25) or obese (BMI > 30), increasing their physical condition by means of training can reduce the level of overweight, and hence reduce the influence of overweight as an unfavorable prognostic factor.

Conclusion about increasing general physical condition
(level 4)

- In the opinion of the guideline development team, improving the general physical condition of persons with SUI will reduce the severity of their SUI.

Based on the above considerations, the guideline development team has formulated the following recommendation:

Improving general physical condition
The guideline development team recommends the inclusion in the treatment plan of interventions to improve the patient’s general physical condition.

C.3 Interventions to improve the physical condition of the pelvic floor muscles
C.3.1 Practicing and controlling the pelvic floor muscles
The goal of pelvic floor muscle training for patients with SUI is to improve their extrinsic support mechanism to such an extent that the pelvic floor provides enough support to prevent loss of urine associated with increased intra-abdominal pressure.

The evidence used to support the recommendations in this guideline is derived from systematic reviews by Berghmans et al., Hay-Smith et al., Hay-Smith and Dumoulin, Dumoulin and Hay-Smith, Shamiyan et al., and reviews by Bø et al. All reviews include results of a number of high-quality RCTs. The evidence supporting pelvic floor muscle
training (PFMT) for incontinence in men due to prostatectomy is based on the Cochrane reviews by Moore et al., And Hunter et al., and reviews by Van Kampen.

These reviews show that PFMT results in complete recovery, or at least considerable improvement of the health status, in women with SUI (evidence level 1) and to a reduction in subjective symptoms (level 1), and that this improvement can be objectively confirmed by urodynamic examination and a pad test (level 1). PFMT has also been found to result in objective improvement of the pelvic floor muscle function (level 1) and improvement of the patient’s quality of life (level 1). The reviews do not report any adverse effects or side effects of this form of training (level 1). The reviews show that PFMT to treat post-prostatectomy incontinence in men shortens the duration of the incontinence relative to no therapy or placebo (level 1).

Conclusions about pelvic floor muscle training (level 1)

- It has been demonstrated that pelvic floor muscle training is an effective treatment for women with SUI.
- Quality of the studies identified: A (Neumann et al., 2006; Berghmans et al., 1998; Bø et al., 2007; Wilson et al., 2005; Hay-Smith et al., 2001; Hay-Smith et al., 2005; Dumoulin et al., 2008; Shamiyeh et al., 2008).
- It has been demonstrated that pelvic floor muscle training reduces the duration of the incontinence in men with SUI after prostatectomy.
- Quality of the studies identified: A and A2 (Hunter et al., 2007; Van Kampen et al., 2007; Moore et al., 2001).

Other considerations

There are currently two relevant theories about the mode of action of PFMT. Both theories are supported by basic scientific research and case–control studies. These theories form the basis for the main conservative treatment strategies, such as PFMT. The first theory assumes that PFMT produces a kind of behavior modification, in that patients learn to voluntarily contract their pelvic floor just before and during an increase in intra-abdominal pressure, and to maintain this contraction to prevent downward movement of the pelvic floor (timing and coordination). The other theory assumes that PFMT enables patients to increase the strength of their pelvic muscles (strength training) over a longer period of time, thereby enhancing the ‘stiffness’ and structural support function of the pelvic floor (obviously only if it has been established that the patient does not have overactive pelvic floor muscles).

There is evidence to support both of these theories. The evidence for the first theory can be summarized as follows. During voluntary contraction of the pelvic floor muscles, just before and during an increase in intra-abdominal pressure, the pelvic floor moves inward and upward, and the urethra, vagina and rectum are buckled and compressed. Ultrasound and MRI studies have shown that the pelvic floor moves inward and upward, while the os coccygis moves in a forward, inward, and cranial direction. Miller et al. referred to this voluntary, stabilizing contraction as ‘the knack’, and showed that women with SUI who used the knack during moderately forceful or heavy coughing were able to reduce their involuntary loss of urine by 98.2% and 73.3%, respectively. Basic research and functional anatomy studies have also confirmed the ‘knack’ principle as an effective means of stabilizing the pelvic floor. So far, however, it remains unknown how much muscle strength is actually required to prevent the downward movement of the pelvic floor during coughing and other physical exertions. Sliker found no straightforward relation between muscle strength and effective involuntary contraction. It also remains unclear whether regularly practicing such stabilizing pelvic floor contractions during daily activities is enough to increase the muscle strength and whether this results in the required morphological changes in the pelvic floor. Nor has it been examined whether and to what extent the ‘knack’ can be used to reduce an SUI-associated prolapse or prevent it from worsening during an increase in intra-abdominal pressure. The effect may be due to coordination and timing rather than to absolute strength.

The evidence for the second theory can be summarized as follows. Kegel originally described PFMT as a physiological method to train patients in contracting their pelvic floor muscles. The rationale behind intensive PFMT for SUI is that effective and purposeful muscle strength training can improve the structural support function of the pelvic floor. Firstly, the muscle layer of the levatores ani muscles is permanently raised to a higher position within the pelvis; secondly, the resulting hypertrophy, and the associated greater stiffness of the pelvic floor, supports the supportive connective tissue. This prevents a downward movement of the pelvic floor during increased intra-abdominal pressure. This might mean that the apertures in the pelvis are narrowed and the pelvic organs show less movement during increased intra-abdominal pressure. If the pelvic floor is situated at a higher level, it is better able to respond in a coordinated manner to increased intra-abdominal pressure, and is thus better able to close the urethra. This is particularly important for women suffering from both prolapse and urinary incontinence.

Ultrasound studies have shown that the level at which the pelvic floor is situated is lower during pregnancy and after delivery than before. There is also a difference between continent and incontinent women in the anatomical position of the pelvic floor. Bernstein’s ultrasound study found a significant increase in muscle volume after training, although this was only an uncontrolled clinical study. In view of the lack of a control group in this study, there is a need for further research to definitively establish the presence of hypertrophy of the pelvic floor muscles after relevant training, as well as to establish whether this hypertrophy is the cause of the reduction of complaints or whether the hypertrophy is more the result of effective involuntary contraction. So far, there have been no RCTs, either for urinary incontinence or for prolapse, to assess the effect of PFMT on the tone of the pelvic floor muscles or the stiffness of the associated connective tissue, the position of the pelvic floor muscles within the pelvic cavity, the cross-sectional area of the pelvic floor or its neuro–physiological function.

In an uncontrolled ultrasound study, Balmforth et al. found a significantly higher position of the bladder neck, at rest as well as during a Valsalva maneuver and during contraction, after a 4- to 6-week supervised pelvic floor muscle training program. Although these findings support the above theories about the mode of action of PFMT, they have not yet been confirmed in high-quality RCTs. A number of studies have found that patients no longer had involuntary loss of urine during physical activities after completing the training program. This effect is most likely caused by improved involuntary muscle function (i.e. the second theory) rather than merely the ability to voluntarily contract the pelvic floor.
The diagnostic process, more specifically the testing of the pelvic floor muscles, has to show whether and to what extent the patient is able to contract and relax their pelvic floor muscles effectively and purposefully, and whether the involuntary contraction associated with increased intra-abdominal pressure is effective. If the patient persistently shows incorrect or ineffective contraction and relaxation of the pelvic floor muscles (in the sense of incorrect coordination, strength or timing), it may be useful to make use of feedback, digital vaginal/anal palpation by the physical therapist or by the patient themselves, or ultrasound imaging. If the patient is unable to contract their pelvic floor muscles or if these muscles are overactive, it might be useful to have the patient feel the contraction by means of electrostimulation, although there is as yet little evidence to support this.

The main objective of pelvic floor muscle training is to achieve optimal pelvic floor function, or to attain a situation that approximately matches optimal function as closely as possible. This implies that the process of stopping involuntary loss of urine will be simple and quick for some patients, while others may not achieve complete remission of the problem.

If exercise therapy is indicated, and the patient has no specific preference for individual therapy, group therapy might be an option. A study by Janssen et al. found both methods to be equally effective, even at 9 months after the completion of the therapy. Research into factors that might predict the effect of group therapy is important, as it might help to correctly select those patients who will actually benefit from group therapy. If patients are highly motivated for therapy, their prognosis for partial or complete recovery is favorable. For these patients, training the pelvic floor muscles is an effective method to reduce involuntary loss of urine in SUI.

A precondition for effective improvement through training is that the pelvic floor muscles are always contracted correctly, with reinforcement provided by a high-frequency, intensive, and prolonged training program. Although there is as yet no definitive agreement about the most effective training program, in terms of the number, frequency, and intensity of the exercises, or about the minimum duration of such training programs, there is increasing evidence from RCTs for the effectiveness of the pelvic floor muscle training program introduced by Bø et al., both for individual therapy (in the initial stages) and for group training sessions (in later stages).

The evidence suggests that PFMT based on modern and accepted principles of training physiology is effective. The results of five different RCTs show that a program with the following specifications and parameters is effective for the prevention and treatment of SUI in women: 8-12 voluntary maximal pelvic floor muscle contractions during 6-8 seconds, combined with 3-4 rapid pelvic floor contractions during 1-2 seconds. The quality of these contractions depends on their direction (inward and upward, as described above). They should be carried out at home 2-3 times a day, on 3-5 days a week. The individual training program is first carried out once a week at the physical therapist’s treatment room, and then continued as group sessions for 6 months, of course only if the patient meets the requirements for group training.

One of the quality criteria for training programs is the dose-response relation. Different research studies have reported wide variations in the dosages of different training programs (in terms of type of exercise, frequency, duration, and intensity).
Dose-response relations have been found for all kinds of training results of intensive versus less intensive training. Bø et al. showed that training sessions supervised by a physical therapist led to significantly better results than individual exercises at home. Their study combined individual instructions and teaching patients the correct way to contract by means of palpation of the pelvic floor, with 6 months of muscle strength training in groups. The participants were randomized into two groups. The first group engaged in an intensive training program consisting of a combination of 7 individual sessions supervised by a physical therapist, a 45-minute weekly group training program and 3 series of 8-12 maximal contractions a day. The other group followed the same program, except for the weekly intensive group sessions. The intensive training group had significantly better results, both as regards the increase in muscle strength and as regards the reduction of involuntary loss of urine. Sixty percent of the participants in the intensive group reported little or no involuntary urine loss after the program, compared to just 17% in the less intensive group. A significant reduction of the loss of urine, as measured by means of pad tests with standardized bladder content, was only found in the intensive group. This study shows that a huge difference in results may be expected depending on the intensity and follow-up of the training program offered, and that little effect is to be expected if patients train without careful supervision or with insufficient intensity. Three other RCTs and 1 non-randomized study reported similar results of intensive versus less intensive training. Dose-response relations have been found for all kinds of training regimes. This means that one of the reasons for disappointing outcomes of physical therapy treatment in some clinical studies may be insufficient training stimulus and low dosage. If a low-dosage program is used in one of the arms of an RCT comparing its effect with that of other intervention methods, the effect of the PFMT can be expected to be smaller. A PFMT exercise program consists of short and longer exercises, as type I as well as type II muscle fibers need to be trained using overload strategies. Type-II muscle fibers can be trained by having the patient perform powerful contractions (75-90% 1 RM) lasting 1-2 seconds, in 3-5 series with 8-12 repeats; type-I muscle fibers are trained by means of longer contractions (50% 1 RM) lasting 5-15 seconds, in 3-5 series of 10-50 repeats. In building up strength, it is important to first increase the amount of exercise, and increase the intensity later. The therapist must be careful to prevent excessive overload. Improving the absolute strength and endurance of the pelvic floor muscles does not in itself guarantee the correct functioning of the continence mechanism. The latter requires a development from isolated voluntary contractions to a fully automatic use of the pelvic floor, even during multiple complex activities in various initial postures.

Although the literature pays little attention to functional pelvic floor training, most experiential experts regard functional training as an essential component of the training program. The effect of exercise therapy obviously depends on the patient’s compliance. Any effect will depend on regular practice, at sufficient intensity and frequency. The more frequent the training and the longer it is kept up, the greater the chances of recovery from incontinence. Exercises that the patient should do at home after being instructed by the pelvic physical therapist constitute an essential component of the training program. It is also essential that both the patient and the therapist are sufficiently motivated, if the PFMT is to be successful.

Conclusion about practicing and controlling functions (level 2)

• It is plausible that the effect of training the pelvic floor muscles is partly determined by the training frequency and the duration of the training period.

Quality of the evidence found: B (Glazener et al., 2001; Reilly et al., 2002).

Conclusion about reducing overweight (level 3)

• It is plausible that reducing overweight by adopting a healthy lifestyle and engaging in exercise will contribute to the success of specific programs to train the pelvic floor muscles.

Quality of the studies identified: B (Hunskaar, 2008).

Conclusion about prognostic factors (level 4)

• In the opinion of the guideline development team, improving the patient’s general physical condition by means of exercise training will contribute to the success of specific programs to train the pelvic floor muscles.

The effect of a training program is partly determined by the extent to which patients actually comply with the program. Alewijnse et al. claimed that compliance is facilitated by intensive supervision during the therapy, by improving the patient’s self-efficacy, by the use of ‘reminders’, by working according to guidelines and by giving the patient explicit feedback about the extent to which the therapeutic goals have been met.

* Haddow et al. (2005) already recommended this on the basis of expert opinion, and the guideline development team agrees with their view.
Biofeedback is defined as a group of experimental procedures using an external sensor to assess a bodily process, usually with the intention of altering the variable being measured. Biofeedback is not a therapy in itself, but can be used in the treatment of patients with SUI to give them an indication of the activity of their pelvic floor muscles, at rest, in contraction and in relaxation, the strength of individual contractions of the pelvic floor muscles (EMG), the strength of the contracting pelvic floor muscles (pressure measurement) or the way in which certain muscles contract and the direction of contraction (ultrasound). Biofeedback for patients with SUI is only used in combination with pelvic floor muscle training. Training with the help of biofeedback has been studied in systematic reviews by Neuman et al., Hay-Smith, and Berghmans and the reviews by Bø et al. and Wilson et al. All reviews include results of a number of high-quality RCTs. The guideline development team evaluated the effect of biofeedback for incontinence in men due to prostatectomy on the basis of the Cochrane reviews by Moore et al., as well as reviews by Van Kampen. These reviews show that a combination of PFMT with biofeedback is an effective therapy for patients with SUI, although the combination is no more effective than pelvic floor training alone (level 1).

Conclusions about biofeedback (level 1)

- It has been demonstrated that a combination of pelvic floor muscle training and biofeedback for the treatment of SUI is no more effective than pelvic floor muscle training alone. Quality of the studies identified: At (Neuman et al., 2006; Berghmans et al., 1998; Bø et al., 2007; Wilson et al., 2005; Hay-Smith et al., 2001; Hay-Smith et al., 2006; Dumoulin et al., 2008; Shamiyan et al., 2008). 6-8/7/15/216-219
- It has been demonstrated that a combination of pelvic floor muscle training and biofeedback for the treatment of SUI in men after prostatectomy is no more effective than pelvic floor muscle training alone. Quality of the studies identified: At (Hunter et al., 2007; Van Kampen et al., 2007; Moore et al., 2001). 6/7/8/12/20

Other considerations

Biofeedback is based on the principle of operant conditioning, in which a particular behavior is expected to be maintained after positive reinforcement and to disappear after negative reinforcement. Biofeedback refers to a range of audiovisual techniques that present information about the activity of striated muscles in the context of learning and controlling muscle functions. For instance, biofeedback can be used to teach a patient with SUI to selectively contract their pelvic floor muscles. A sensor or electrode is introduced into the vagina or rectum, to record the vaginal or rectal pressure or the an–electromyogram (EMG) signal of the sphincter muscle. The patient receives visual or acoustic information about the pressures measured and/or the EMG signals, enabling them to see what force is being generated by the pelvic floor muscles and whether this force has reached its maximum. The technique can also be used to visualize progress, which obviously motivates patients to keep exercising. Biofeedback is not a therapy in itself, but supports existing forms of therapy. Recent research has investigated the use of extracorporeal ultrasonography to show patients with SUI whether they are producing the right type of lift (in an inward and upward direction) of the pelvic floor during contraction. Dietz et al. used suprapubic external ultrasonography for this purpose. They concluded that this form of biofeedback takes little time (an average of 5 minutes) and is effective as well as efficient, and as such is a useful strategy to teach patients to produce the right contractions. Ultrasonography can also be used to estimate the volume (thickness) of the pelvic floor. But this type of biofeedback cannot be used to measure muscle strength. Further research will be needed to assess methodological aspects of this type of biofeedback, such as its validity and reliability.

A combination of biofeedback and pelvic floor muscle training can be useful to reduce the involuntary loss of urine in patients with SUI. Successful use of biofeedback very much depends on the physical therapist’s knowledge and skills. The value of biofeedback as an add-on to PFMT is controversial. Studies into the effects of various types of biofeedback in combination with PFMT have reported improvements to the incontinence ranging from 54–95%. Berghmans et al. concluded that PFMT with and without biofeedback are both effective modalities for the treatment of SUI, but that the value of adding biofeedback to PFMT lies only in the more rapid progress made in the early stages of the therapy.

Mørkved et al. compared the results of a combination of PFMT and biofeedback for women with SUI (based on intravaginal pressure measurements for use at home and in the physical therapist’s treatment room) with a similar program without biofeedback. Although a large percentage of the patients showed major improvement, and a significant reduction was found in involuntary loss of urine, the authors found no significant difference between the two groups at any of their assessments. On the other hand, Aksac et al. concluded that a combination of PFMT and biofeedback (based on digital palpation) yielded better results than PFMT alone, although both groups showed significant improvement of the SUI compared to an untreated control group. Patients who are insufficiently aware of their pelvic floor may well benefit from the addition of biofeedback to PFMT, but this hypothesis needs to be further examined in a high–quality controlled clinical trial. The long–term results of biofeedback also remain to be further investigated.

A review by the ICI made a distinction between biofeedback used only in the therapist’s treatment room and biofeedback that is also used at home. The results and methodological quality of the studies included in this review indicate that nearly all studies had methodological shortcomings, but also that the currently available evidence does not suggest a difference between the effects of PFMT with and without biofeedback (at least in the patient sample investigated), whether it is performed at home or in the treatment room.
Conclusion about biofeedback (level 4)

• In the opinion of the guideline development team, combining pelvic floor muscle training with biofeedback in the early stages of treatment of SUI may be useful for persons with insufficient voluntary control over their pelvic floor, as it enables patients to find out sooner the correct way to contract their pelvic floor muscles.

C.3.3 Training with the help of electrostimulation

The purpose of electrostimulation in the treatment of patients with SUI is to make the pelvic floor muscles contract, with the aim of achieving a training effect to ensure that the pelvic floor will provide sufficient support to prevent loss of urine during an increase in the intra-abdominal pressure.

The evaluation is based on systematic reviews by Berghmans et al., Neuman et al., and Berghmans et al., and the review by Wilson et al. All reviews include results of a number of RCTs of sufficient methodological quality. The guideline development team evaluated the effect of electrostimulation for incontinence due to prostatectomy on the basis of the Cochrane reviews by Moore et al. and Hunter et al., as well as reviews by Van Kampen. These reviews show that there is insufficient evidence that electrostimulation alone is an effective treatment for patients with SUI (level 1) and also show that the addition of electrostimulation to pelvic floor muscle training offers no additional benefits for the treatment of patients with SUI (level 1).

Conclusions about electrostimulation (level 1)

• It has been demonstrated that the addition of electrostimulation to pelvic floor muscle training for the treatment of patients with SUI offers no additional benefits compared to pelvic floor muscle training alone.

Quality of the studies identified: A1 (Neumann et al., 2006; Berghmans et al., 1998; Wilson et al., 2005; Hay-Smith et al., 2007; Berghmans, 2007).

• It has been demonstrated that the addition of electrostimulation to pelvic floor muscle training for the treatment of patients with SUI after prostatectomy offers no additional benefits compared to pelvic floor muscle training alone.

Quality of the studies identified: A1 (Hunter et al., 2007; Van Kampen, 2007; Moore et al., 2001).

Other considerations

There are major inconsistencies between the various electrostimulation protocols, partly due to a lack of understanding of the physiological principles of electrostimulation and the way it could contribute to recovery from SUI in women. Patients whose pudendus nerve is intact and who find it hard to voluntarily contract their pelvic muscles may benefit from the use of electrostimulation to induce contractions in these muscles. These contractions can be used for the re-education of inadequate pelvic floor muscles. Contraction of the levator ani muscle and the external urethral sphincter can also be brought about by direct stimulation of the efferent fibers of the n. pudendus. When combined with stimulation of the hypogastric nerve fibers, which activate periurethral smooth muscle, this may influence the urethral closure mechanism. In addition, stimulation of the efferent fibers of the n. pelvis appears to increase the intraluminal urethral pressure.

Based on the above considerations, the guideline development team has formulated the following recommendation:

Selective contraction of pelvic floor muscles

The guideline development team recommends combining pelvic floor muscle exercises with electrostimulation for the treatment of patients who are unable to voluntarily and/or selectively contract their pelvic floor muscles.
C.3.4 Training with the help of vaginal cones

The goal of using vaginal cones is to train the pelvic floor muscles by contracting them to hold a weight inserted into the vagina. If the patient manages to hold a particular weight in place, it is then replaced by a slightly heavier weight.

The evaluation was based on systematic reviews by Neumann et al.,6 Herbison et al.,66 and Berghmans2 and reviews by Bø et al.8 and Wilson et al.97 All reviews include results of a number of RCTs of sufficient methodological quality.

The reviews show that it remains unclear whether the use of vaginal cones to treat patients with SUI is more effective than no treatment (level 1), and that this treatment modality offers no demonstrable additional benefits compared to a combination of pelvic floor muscle training and electrostimulation (level 1). By contrast, the use of a combination of PFMT and vaginal cones in accordance with the general principles of strength training is effective (level 3). On the other hand, many women find training with vaginal cones difficult and uncomfortable (level 1).

Conclusion about training with vaginal cones (level 1)

- It remains unproven that training the pelvic floor muscles with vaginal cones alone is an effective treatment for SUI.
- Quality of the studies identified: A (Neumann et al., 2006; Berghmans et al., 1998; Wilson et al., 2005; Herbison et al., 2002)66;197;66 and C (Bø et al., 2007).8

Conclusion about combining PFMT with vaginal cone training (level 3)

- There are indications that it may be useful to train the pelvic floor muscles using a combination of PFMT and vaginal cones in accordance with general principles of strength training.
- Quality of the studies identified: C (Bø et al., 2007).8

Other considerations

The use of vaginal cones can serve as an application in PFMT for women. The patient is given a set of vaginal cones, which are all the same size but have different weights. In the context of her exercise program, the patient inserts the selected cone intravaginally, above the level of the levators muscle plate, using a standardized procedure, and then tries to hold the cone in place for up to 15 minutes by contracting her pelvic floor muscles.66 If a positive result is obtained twice in a row, the training can be continued with the next heavier cone. Training based on this principle is thought to strengthen the pelvic floor muscles under simultaneous proprioceptive feedback.

A Cochrane review including studies of stress as well as mixed urinary incontinence concluded that training with vaginal cones is more effective than no treatment.66

There are currently 5 RCTs available comparing the results of PFMT with and without vaginal cones for the treatment of SUI.197;266;270 Bø et al.36 concluded that PFMT is better than training with cones, while 3 other studies found no difference, and Cammu and Van Nynen68 reported that training with cones kept causing problems. The women found the training uncomfortable, and there were motivational problems. Bø et al. also doubted the theoretical basis of the treatment with vaginal cones.271

Further research is required to establish the value of vaginal cones for the treatment of SUI.367 Training with vaginal cones might be more effective if the woman tries to keep the cone in place in her vagina while at the same time trying to pull it out with her hand. If this is repeated 8–12 times, 3 times a day, it would be in accordance with the general training principles for PFMT described above.8

D Preventing SUI

The evaluation below is based on the systematic reviews by Hay-Smith216 and Haddow et al.,242 the review by Wilson et al.197 and the studies by Brown et al.,272 and Subak et al.246 on the effect of treating overweight. The guideline development team evaluated the effect of pelvic floor muscle training (PFMT) for incontinence in men due to prostatectomy on the basis of the Cochrane reviews by Moore et al.,272 and Hunter et al.,246 as well as reviews by Van Kampen.158

These reviews show that weight loss reduces SUI in women who are obese (level 2). They also show that weight loss reduces the problems of SUI in women who are moderately overweight (level 1). Women who train their pelvic floor are at lower risk of developing perinatal and postnatal SUI (level 1). There have been inconsistent findings with regard to the effect of pre- and postoperative pelvic floor muscle training for men undergoing prostatectomy. Two studies reported a favorable effect, while a third study found the opposite.

Conclusions about the prevention of SUI (level 1)

- It has been demonstrated that weight loss reduces the risk of SUI in women who are overweight.
- Quality of the studies identified: A (Wilson et al., 2005; Hay-Smith et al., 2001; Haddow et al., 2005)197;216;242 and A2 (Subak et al., 2006).272;246
- It has been demonstrated that supervised pelvic floor muscle training of sufficient intensity reduces the postnatal risk of SUI in pregnant women (primipara).
- Quality of the studies identified: A (Wilson et al., 2005; Hay-Smith et al., 2001; Haddow et al., 2005).197;216;242
- There is conflicting evidence that pre- and postoperative pelvic floor muscle training is an effective method to prevent SUI in men who have to undergo prostatectomy.
- Quality of the studies identified: A (Moore et al., 2001; Hunter et al., 2002)216;246 and A2 (Van Kampen et al., 2009).158

Other considerations

Preventing pelvic floor muscle insufficiency is an important goal of pelvic floor education (re-education).246;228 Identifying the target population (i.e. those who would benefit from preventive measures) requires identification of etiological factors for the development of pelvic floor muscle dysfunction.

A number of intrinsic and extrinsic etiological factors are associated with pelvic floor problems. Intrinsic etiological factors include hereditary factors such as weak supportive tissues, excessive overweight and prolapse.59 Extrinsic etiological factors include pregnancy, vaginal delivery, certain work- and sports-related activities associated with increased intra-abdominal pressure, and chronic overtraining during defecation.59 Certain exercise programs which involve increased abdominal strain can also contribute to pelvic floor dysfunctions. It remains unclear how strong the unfavorable influence of each of these factors on the pelvic floor is.197;228 In practice, it turns out to be difficult to identify the target popula-
tion for prevention. One of the reasons is that people with a pelvic floor insufficiency often do not perceive this to be a problem, and may perceive little subjective discomfort from mild forms of SUI. This means that a large part of this population probably does not turn to a professional care provider like their family doctor. If the complaints worsen later, the patients often have other symptoms as well, such as frequent micturition, increased urgency and nocturia. Frequent use of absorptive products by women may give rise to chronic vulvitis.

Contraction of the pelvic floor muscles may stabilize the bladder neck or close the urethra at moments of increased intra-abdominal pressure. These concomitant symptoms can be influenced by increasing the strength and improving the voluntary control of the pelvic floor muscles before SUI arises. Although pelvic floor education improves a patient’s control over their pelvic floor muscles and the strength of these muscles, little high-quality research has been done into the effectiveness of SUI prevention. Studies by Wall and Davidson\(^{202}\) and Morkved et al.\(^{248}\) concluded that PFMT is an effective method to prevent urinary incontinence. PFMT during pregnancy may reduce the birth trauma, speed up postpartum recovery and improve the long-term functioning of the pelvic floor muscles.\(^{202,248}\)

Recent years have seen the publication of a PhD thesis\(^{273}\) and a number of articles on the prevention of incontinence that underlined the effectiveness of PFMT during pregnancy\(^{248}\) as well as after pregnancy.\(^{248}\) Especially for women at increased risk of postpartum urinary incontinence. It should be mentioned, however, that only Reilly et al.\(^{254}\) actually investigated real primary/secondary prevention of incontinence, as the other two studies included women with and without incontinence. Woldringh et al.\(^{257}\) undertook an RCT among 264 women who were at increased risk of SUI, as they were already incontinent during pregnancy, to study the short- and long-term effects of PFMT during pregnancy, with 112 women engaging in PFMT and 152 being given usual care. The treatment included only 3 sessions, combining PFMT with written instructions, between the 23rd and 30th weeks of pregnancy, and 1 session 6 weeks after delivery. Six months after delivery, no difference in effect was found between the two groups, although the severity of incontinence had decreased considerably. This finding may have been affected by the dose-response relationship, in view of the low frequency and intensity of the intervention.

There is a need for more research into the prevention of SUI, in order to explore options for reducing the medical, paramedical and other costs of therapeutic interventions for SUI, and to try and improve the quality of life of patients with SUI.\(^{279,280,281}\)

An RCT by Burgio et al. found that a preoperative biofeedback-assisted practice session, followed by a home-based exercise program, speeded up recovery from incontinence and reduced its severity after radical prostatectomy.\(^{219}\)

Parekh et al. found that PFMT for men prior to radical prostatectomy helped to speed up the patient’s return to continence. The exercise therapy had less effect in patients with more severe incontinence.\(^{219}\) Exercise therapy does not appear to affect the eventual prognosis, as the percentage of men who were continent after 1 year was the same in the experimental and control groups. The exercise therapy does not determine whether a man becomes continent again, but only shortens the time until continence is regained.\(^{219}\)

**Conclusion about promoting postoperative recovery after prostatectomy (level 2)**

- It has been demonstrated that preoperative pelvic floor muscle training speeds up the return to continence of men undergoing prostatectomy.

**Quality of the studies identified:** A2 (Burgio et al., 2006; Parekh et al., 2003).\(^{219,219}\)

**Based on the above considerations, the guideline development team has formulated the following recommendation:**

**Pelvic floor muscle training to promote postoperative recovery after prostatectomy**

The guideline development team recommends preoperative pelvic floor muscle training for men who have to undergo prostatectomy.

### E Reporting

In the context of SUI, reporting involves the systematic and methodical recording, documenting, and storing of relevant data on the screening process (if applicable), the presentation and referral by a doctor, the physical therapist’s diagnostic process, the conclusion drawn from the diagnostic process, the decision whether to treat the patient, the treatment plan, the therapy, the evaluation of the therapy and the report to the doctor holding the patient’s file or the referring doctor. The goal of reporting is to record all the facts from the moment of presentation to that of reporting back to the referring doctor, to show the choices and decisions made during the various stages of the methodical approach. The first KNFG guideline for reporting on physical therapy (Fysiotherapeutische Verslaglegging) was developed in 1993. A fully revised version was published in 2011.\(^{281}\)

### F Legal status of the guidelines

Guidelines are not statutory regulations. They offer knowledge and recommendations based on the results of scientific research, which care providers must use to provide high-quality care. Since the recommendations are mainly based on the ‘average’ patient, care providers must use their professional judgment to decide when to deviate from the guidelines if that is required in a particular patient’s situation. Any deviations from the recommendations in the guidelines must be justified and documented.\(^{254,282}\) This implies that the responsibility for the interventions remains that of the individual physical therapist.

### G Guideline revisions

This KNFG guideline offers preliminary answers to clinical questions on diagnostics, treatment, and prevention for adult patients with SUI. New developments that could improve physical therapy care in this group of patients may change the current views described in these guidelines. The methodological recommendations for developing and implementing guidelines state that any guideline should be revised within 3 to 5 years after the original publication.\(^{254,282}\) This implies that KNFG, together with the guideline development team, will decide in 2016 at the latest whether this guideline is still up to date. If necessary, a new guideline development team will be assembled to revise the guideline. The current
guideline will cease to be valid if there are new developments that necessitate a program of revisions. Before any revision is carried out, the document offering methodological recommendations for guideline development and implementation will also be updated on the basis of any new insights and any cooperative agreements between the different groups of guideline developers in the Netherlands. The consensus products developed by the Dutch Evidence-Based Richtlijnen Overleg (evidence-based guidelines platform; EBRO platform), under the auspices of the Dutch Institute for Healthcare Improvement (EBI), will also be included in any updated version of the method. Important improvements include uniform and transparent methods to determine the level of evidence and the practice recommendations derived from them.

H Acknowledgments

The draft guideline was commented on by a group of external experts. The guideline development team gratefully acknowledges the contributions by: Prof. A.L.M. Lagro-jansen, on behalf of the Dutch College of General Practitioners; Dr. M.J.A. van de Weide, Chair of the Afdeling Continentie Verpleegkundigen en Verzorgenden (continence nursing section) of the Verpleegkundigen en Verzorgenden Nederland (Dutch association of nurses); Ms. E.M.J. Bols, Department of Epidemiology at Maastricht University; Prof. Ph. E.V. van Kerrebrouck, head of the Department of Urology of Maastricht University Medical Centre in Maastricht, and Dr. C.H. van der Vaart, gynaecologist at the Utrecht University Medical Center in Utrecht.

The English Translation of this guideline was generously supported by a grant from the foundation for gynaecological and obstetric physical therapy (Eng: the Danish society for gynecology and obstetrics in physiotherapy).

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Review of the evidence

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