

KNGF Evidence Statement

Anal incontinence



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The KNGF Evidence Statement is summarized on a flowchart.
Statement and summary are available from www.fysionet.evidence-based.nl.

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 this Evidence Statement into English, to make the statement accessible to an international audience. International accessibility stimulates international collaboration in the process of developing and updating guidelines.

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Contents

1 Introduction	5	3 Therapeutic process	9
1.1 Definition	5	3.1 Drafting the treatment plan	9
1.2 Epidemiology	6	3.2 Providing education and advice	9
1.3 Costs	6	3.3 Electrostimulation (Note 22)	9
1.4 Etiological factors	6	3.4 Pelvic floor muscle training (PFMT) (Note 23)	10
1.5 Prognostic factors (Note 7)	7	3.5 Biofeedback	10
1.6 Factors predicting response to pelvic physical therapy (Note 8)	7	3.6 Treatment process	10
1.7 Preventing AI (Note 9)	7	3.7 Evaluation	10
1.8 Referral and direct access to physical therapy	8	3.8 Conclusion of treatment	11
		3.9 Follow-up	11
2 Diagnostic process	8	Notes	12
2.1 History-taking	8	References	19
2.2 Tests (Note 11)	8	Supplement	22
2.3 Physical examination	9	Supplement 1 Defecation diary	22
2.4 Physical therapy analysis/diagnosis (flowchart)	9		

Evidence Statement on anal incontinence

1 Introduction

This evidence statement concerns the diagnostic and therapeutic physical therapy process for adult patients with bowel incontinence, that is, anal incontinence (AI). We decided to publish an evidence statement rather than a guideline, as this enabled us to describe the current state of knowledge and formulate recommendations to support a methodical approach, notwithstanding the paucity of published evidence. This evidence statement conforms to the shortened version of the *Method for the development, implementation and updating of KNGF guidelines*, as described by Van der Wees et al.¹ The recommendations have been formulated on the basis of scientific evidence and 'best practice'. The scientific evidence for each aspect is briefly summarized in a conclusion indicating the level of evidence. This was written using the evaluation lists and the criteria of the *Evidence Based Richtlijn Ontwikkeling* (evidence-based guideline development; EBRO) developed under the auspices of the Dutch Institute for Health Care Improvement (CBO).² Where no scientific evidence was available, the recommendation was formulated on the basis of consensus among the evidence statement development team. The evidence and consensus underlying the recommendation have been included in an extensive set of notes.

We searched for relevant literature published between 1 January 1980 and 1 November 2012 in the electronic databases of the Cochrane Library, PubMed, EMBASE, PEDro en CINAHL, as well as in relevant reference lists. Where possible, publications on anal incontinence (AI), fecal incontinence (FI) and flatal incontinence were examined separately.

The Evidence Statement on AI restricts itself to adult patients with AI, since the causes of AI in children are often of a different nature and their complaints therefore require a different approach. This is also reflected in the scientific research into AI, which generally distinguishes between children and adults. AI in adults is often associated with other pelvic floor, pelvic and abdominal problems, like constipation, rectal prolapse and urinary incontinence. Discussing all of these patient profiles would make the statement too complex. Where necessary, the statement refers to other problem areas or guidelines.

This statement is intended for registered pelvic physical therapists. Registered pelvic physiotherapists are specialized therapists who have completed a pelvic physical therapy training course accredited by the Nederlandse Vereniging voor Fysiotherapie bij Bekkenproblematiek en pré- en postpartum gezondheidszorg (NVFB; Dutch association of physical

therapists specializing in pelvic problems and pre- and postpartum care), including the use of invasive treatment (Note 1). Pelvic (and other) physical therapists can use the KNGF Guideline on pregnancy-related pelvic pain (Richtlijn Zwangerschapsgerelateerde bekkenpijn; in Dutch) from 2005 and the *KNGF Guideline on Stress Urinary Incontinence (SUI)*, updated and extended to include SUI in adult men in 2011.

The objective of the current evidence statement is to answer the following questions:

- What are the prevalence and incidence of anal incontinence, and what are the direct and indirect costs of this health problem?
- What etiological factors are known to affect the development of anal incontinence?
- What prognostic factors are known for the course of anal incontinence, and which of these can be modified by pelvic physical therapy?
- What medical/diagnostic and psychosocial information relevant to pelvic physical therapists is required to enable them to formulate treatment goals and a treatment plan?
- What types of treatment and prevention are effective and efficient in relation to the nature, severity and modifiability of the health problem?
- What measurement instruments can, in terms of methodological quality, be used to identify the health problems of people with AI and evaluate the effects of treatment?

1.1 Definition

Anal incontinence (AI) as a symptom is defined as 'complaints of involuntary loss of feces or flatus'. Fecal incontinence (FI) as a symptom is defined as 'complaint of involuntary loss of feces', and is subdivided into (a) solids, (b) liquids, (c) passive FI (e.g. involuntary loss without sensation or difficulty wiping clean after defecation and (d) involuntary loss of fecal matter during vaginal intercourse. Flatal incontinence is defined as 'complaint of involuntary loss of flatus'. The term AI is therefore used for incontinence for solid and liquid feces and flatus, while the term FI refers only to incontinence for liquid and solid feces.³ This evidence statement uses the terminology used by the International Urogynecological Association (IUGA) and the International Continence Society (ICS). This terminology has been adapted to international developments and has been formulated on the basis of consensus and subsequently recorded in 'An International Urogynecological Association (IUGA) International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction' from 2009.⁴

This international terminology has been adopted to prevent errors in the communication and interpretation of the literature on this topic. This is why publications on anal incontinence (AI), fecal incontinence (FI) and flatal incontinence were examined separately where possible. The remainder of this statement uses AI as an umbrella term, and explicitly indicates where the specific symptoms of flatal incontinence or FI are meant.

1.2 Epidemiology

Prevalence

Prevalence figures for AI are often influenced by the use of different definitions and target populations (Note 2), as well as by underreporting because patients are too embarrassed to report the problem to their family doctor, are unaware of possible treatments or think their situation is normal. Overall, only a third of patients with FI consult a doctor.^{5,6}

A systematic literature review based on cross-sectional studies estimated the prevalence of AI in the general population at 2–24% and that of FI at 0.4–18%.⁷ Another systematic review reported a prevalence of FI of 0.8% for men and 1.6% for women in the < 60 age category, and 5.1% for men and 6.2% for women in the ≥ 60 category.⁸ These figures roughly agree with the outcomes of a Dutch study (7% for men and 6% for women in the > 60 category).⁹

The prevalence greatly increases among people admitted to residential (long-term, non-medical) care (30–47%).^{10,11}

Little is known about the specific prevalence of flatal incontinence. Research among Dutch women aged 45–85 years found that 39% of them were troubled by flatal incontinence, 3.5% by incontinence involving solid stools and 12.3% by incontinence involving liquid stools.¹²

Clinical studies suggest that FI is more common among women than among men, although the results of epidemiological studies tend towards an equal distribution across the sexes. This discrepancy could relate to the age and gender of the persons who actively seek help for their problem.¹³ High prevalence values have also been reported for postpartum women and persons with multiple pathologies, such as cognitive impairments or neurological disorders.¹⁴ About 50% of patients with FI also have urinary incontinence (double incontinence). This could be caused by dysfunction of the musculus (m.) levator ani, and among vulnerable older persons in need of care by functional limitations that hamper normal toileting.⁹ The involuntary losses associated with AI may considerably affect people's participation in social life (participation restrictions).¹⁵

Incidence

Few studies have been published on the incidence of FI. The 5- and 10-year incidences among women living independently are 5.3% and 7%, respectively, while those for men living independently are 4.1% and 5.3%, respectively. The 5- and 10-year incidences increase with age: the figures for those aged ≥ 85 years are 13% and 15.3%, respectively, for women and 13.2% and 20%, respectively, for men.^{16–18}

The 10-month incidence among older people living in residential care is 20%.¹⁰

1.3 Costs

The costs for adult patients with AI in the Netherlands are estimated at EUR 2169 per person per year.¹⁹ This concerns direct medical and direct and indirect non-medical costs. Over half of this amount results from productivity losses (paid or unpaid labor). In the United States of America, costs for adult patients with monthly FI are estimated at USD 4110 a year.²⁰ Healthcare costs for people in the US with frequent FI have been reported to be USD 2897 a year higher than for people without FI, although it is unclear how much of this difference is related to comorbidity.²¹

Data from the Dutch Health Care Insurance Board (College voor Zorgverzekeringen) show that the costs and the numbers of users of incontinence products for urinary and anal incontinence rose by 11% and 6%, respectively, between 2007 and 2011 (Note 3). A striking finding is that the proportion of over-65s among users is much higher for women than for men (58% vs. 17% in 2011).²²

1.4 Etiological factors

Incontinence is not a disorder, but a symptom of the failure of one or more components of the normal continence mechanism (Note 4). This means that various etiological factors can be distinguished for AI (Note 5).

Women

The most commonly reported etiological factor for FI in women is delivery, the associated mechanisms being mechanical damage to the sphincter (Note 6) and neuropathy of the n. pudendus.¹³ A systematic review of the literature found that a third- or fourth-degree tear was the only delivery-related risk factor for postpartum FI or AI (evidence level 1).²³ An update of this systematic review found that AI during pregnancy was highly associated with postpartum AI (evidence level 1).^{24–26} Cesarean section does not protect against postpartum FI.^{23,27–29}

In addition, there are indications that a stroke, cognitive impairments, Caucasian ethnicity, depression

and chronic diarrhea contribute to the development of FI among women ≥ 65 years.^{16,18} A history of rectocele (e.g. resulting from chronic straining) also contributes to the development of FI in women ≥ 50 years (level 3).¹⁷ Finally, there are indications that the risk of developing AI is increased at 1 and 3 years after abdominal hysterectomy and at 3 years after vaginal hysterectomy (level 3).^{30,31} A combination of abdominal hysterectomy with bilateral salpingo-ovariectomy further increases the risk of AI 1 year after surgery.³⁰ A history of obstetric damage and a more advanced age at the time of the abdominal or vaginal hysterectomy further add to the risk of developing AI 3 years later.³¹

Men

There are indications that men > 85 years or men with kidney problems are at increased risk of FI (level 3).¹⁸ In addition, radiotherapy for the treatment of prostate cancer increases the risk of flatal incontinence, for instance if the rectal capacity has been reduced by radiation proctitis (level 3).³² Low-dosage radiotherapy does not appear to prevent FI.³³

Woman and men

There are indications that kidney problems,¹⁸ diarrhea, a feeling of incomplete evacuation, a history of pelvic radiation treatment, urgency complaints¹⁷ or urinary incontinence¹⁶ contribute to the development of FI (level 3).

Older people in residential care

It has been demonstrated that a more advanced age contributes to the development of FI (level 1).^{10,34} It also seems plausible that urinary incontinence, limited mobility, having a neurological disorder, cognitive decline,¹⁰ dementia, problems of trunk control, non-white ethnicity and difficulties with activities of daily living (ADL) all contribute to the development of FI (level 2).³⁴

1.5 Prognostic (Note 7)

Having FI is associated with an increased risk of mortality among older people (≥ 60 years) living in residential care (level 2).¹⁰

1.6 Factors predicting response to pelvic physical therapy (Note 8)

Attempts to determine the response to pelvic physical therapy are hampered by the heterogeneity among studies, especially as regards the population investigated and the form and intensity of therapy. We distinguish between factors associated with the chances of recovery in general and factors specifically associated with the chances of recovery after electrostimulation, biofeedback with pelvic floor muscle

training (PFMT) and a combination of biofeedback with PFMT and electrostimulation.

General

- Sufficient training dosage (training specific muscles 3 times a day, 2-3 times a week for 5 months, 8-12 slow and virtually maximal contractions) and sufficient therapy compliance increase the chances of recovery (level 1).³⁵⁻³⁷
- A higher level of motivation on the part of the patient and better interaction between patient and therapist increase the chances of recovery (level 4).³⁸
- Teaching patients to cope with their problem and inspiring patients increase the chances of recovery (level 4).
- Inability to follow or comprehend instructions due to neurological disorders or spinal disorders or damage reduces the chances of recovery (level 4).^{39,40}

Electrostimulation

- Less severe FI symptoms and loss of liquid rather than solid stools increases the chances of recovery after electrostimulation (level 3).⁴¹

Biofeedback with PFMT

- A longer duration of the AI symptoms reduces the chances of recovery after biofeedback with PFMT (level 3).⁴²
- Less feelings of embarrassment, use of constipating medication and having at least one delivery-related risk factor (high birth weight, episiotomy, instrumental delivery, extended duration of second stage of delivery or breech presentation) increase the chances of recovery after biofeedback with PFMT (level 3).⁴²
- The need for more than 3 biofeedback session predicts a poorer long-term prognosis (level 3).⁴³

Biofeedback with PFMT and electrostimulation

- Passive AI, liquid stools, the presence of primary repair of a rupture after vaginal delivery, and perineal and/or perianal scar tissue reduce the chances of recovery (level 2).⁴⁴

1.7 Preventing AI (Note 9)

- Cesarean section, the most commonly used preventive measure, offers no protection against postpartum AI (level 1).^{23,27-29}
- There is moderate evidence that constipating medication (loperamide oxide) and diphenoxylate with atropine) reduces the risk of FI among patients with liquid stool (level 1).⁴⁵
- Weight loss through behavioral intervention is associated with improvement in the frequency of liquid stool incontinence among obese women with urinary incontinence (level 3).⁴⁶⁻⁴⁸

- Dietary supplementation with Psyllium husk or gum arabic fiber is associated with a reduced number of FI episodes and improved consistency of stools (level 3).⁴⁹
- PFMT during pregnancy reduces the risk of FI after 32–36 weeks of pregnancy among women who have had previous deliveries (level 3).⁵⁰
- In patients with incomplete evaluation, irrigating the rectal ampulla with an irrigation system such as a rectal balloon catheter, enema (Microlax) or Peristeen may help to reduce the risk of fecal loss for a limited period of time (level 4).
- In patients with liquid stools, reducing the fluid intake when ingesting dietary fiber and constipating medication (loperamide) may thicken the stools, thus reducing the risk of FI (level 4).

1.8 Referral versus direct access to physical therapy

- In the Netherlands, patients are usually referred to a pelvic physical therapist by their family doctor or a medical specialist, or sometimes by an obstetrician. Patients can also contact a pelvic physical therapist without referral, sometimes on the advice of a menopause counselor. Direct access to physical therapy for patients with AI requires considerable caution and attention to possible problems.
- Patients with AI frequently have medical pathology that requires different or supplementary healthcare, and a history of pathology may provide prognostically relevant factors. Hence, the therapist is advised to contact the patient's family doctor or a specialist before starting the diagnostic process for physical therapy (level 4).
- After a patient applies for direct access to pelvic physical therapy, the therapist should screen for the presence of 'red flags' (see the flowchart), while keeping in mind that alertness to red flags remains necessary throughout the diagnostic and therapeutic process.

2 Diagnostic process

In the diagnostic process, the pelvic physical therapist examines the nature, severity and degree of modifiability of the patient's health problem. This information is derived from history-taking, self-reports by the patient, questionnaires, defecation diaries and a pelvic physical therapy examination.

2.1 History-taking

- The physical therapist carries out an intake assessment to check whether pelvic physical therapy is indicated.

- The intake assessment focuses on impairments of body functions and body structures, limitations of activities and skills, restrictions of participation, and the influence of environmental and personal factors (whether impeding or facilitating). Based on expert judgment, a systematic literature review⁵¹ and consensus among the evidence statement development team (see the flowchart), the following topics are considered to be relevant for the intake:
 - reason for contact and the patient's presenting problem;
 - the nature (i.e. underlying cause/condition/characteristics) and severity of the AI (using the domains of the International Classification of Functioning Disability and Health [ICF]);
 - the degree of modifiability (general and local impeding factors);
 - red flags;
 - proctologic, gynecological, obstetric, urological and sexological history in relation to the musculoskeletal system;
 - comorbidities;
 - coping strategies;
 - psychosocial problems;
 - defecation and micturition patterns;
 - nutrient and fluid intake;
 - status of the components of the continence mechanism (muscle function, reservoir function, consistency of stools, awareness and acknowledgement of health problem, and their interactions);
 - the patient's pattern of expectations.
- The process of history-taking may be integrated with education and advice.

2.2 Tests (Note 11)

There may be a discrepancy between the patient's perception and that of the clinician with regard to the severity of the symptoms.⁵² We therefore recommend that the processes of screening, diagnosing or evaluation include at least one measurement instrument that allows the patient to report their own views about the severity of their symptoms and the consequences of their health problem (level 4).⁵³

Wexner score

We recommend the Wexner score to assess the severity of the AI and the patient's level of coping (Note 12) (level 4).

Quality of life

In the opinion of the evidence statement development team, there is currently no disease-specific quality-of-life questionnaire that can be recommended (Note 13).

Global Perceived Effect (GPE)

The evidence statement development team recommends using the Global Perceived Effect (GPE) as a measurement instrument, in view of its simplicity and manageability (level 4). The patient can use the GPE to indicate what global changes or what improvements in their health they have perceived (Note 14).^{54,55}

Defecation diary

A patient's defecation diary enables the therapist to determine the defecation frequency and the severity of the FI (Note 15, level 4).^{47,56} The evidence statement development team recommends keeping a defecation diary until the consistency and frequency of defecation have normalized (see Supplement 1). In the opinion of the team, the Bristol Stool Scale (BSS) is a good instrument to monitor the consistency of the stools.⁵⁷ The BSS can be included in a defecation diary (Note 16) (level 4).

2.3 Physical examination

The flowchart shows what specific physical examinations are relevant (Note 17).

2.4 Fysiotherapeutische analyse/ diagnose (stroomdiagram)

- It is very important to analyze whether and to what extent there is sufficient balance between strain and physical condition. The physical condition may be affected by dysfunctions of the continence mechanisms:
 - damage to or weakness of the pelvic floor muscles (external anal sphincter and m. levator ani);
 - damage to or weakness of the internal anal sphincter;
 - a neurological problem: nuclear / infranuclear dysfunction, peripheral innervation, spinal cord, brainstem, awareness.
- The physical condition partly depends on other factors, such as general mobility, diet, intestinal system (peristalsis or fecal composition), medication, problematic history (e.g. adverse sexual experiences, physical violence) and comorbidity. The patient's physical condition (at local, personal and participation level) determines how much they can bear.
- The analysis process is used to determine the nature, severity and modifiability of the problem.

The guideline development team, in consultation with the members of the feedback group, has distinguished four problem categories for patients with AI (for further subdivision see the Flowchart):

- I: AI with pelvic floor dysfunction and awareness of loss of stools (urgency). The treatment plan is developed based on the presence or absence of a neurological problem, anorectal sensation, voluntary or involuntary control and factors that adversely affect pelvic floor function.
- II: AI with pelvic floor dysfunction without awareness of loss of stools (passive). The treatment plan is developed based on the presence or absence of a neurological problem and anorectal sensation.
- III: AI without pelvic floor dysfunction.
- IV: AI with or without pelvic floor dysfunction, in combination with general factors impeding the recovery or adjustment processes. The treatment plan is developed based on the presence or absence of comorbidity.

The nature and severity of any pain symptoms must be taken into consideration for all four problem categories, as these represent a complicating factor.

3 Therapeutic process

The therapeutic process includes the actual treatment, evaluation and conclusion of treatment (Notes 18 and 19).

3.1 Drafting the treatment plan

- The treatment plan relates to the problem category; pain symptoms represent a complicating factor (Note 20).
- The goal of the treatment is to improve one or more of the following components of continence: muscle function, reservoir function, consistency of stools, awareness and acknowledgement of the health problem, or interactions between these components. No adverse effects or worsening of symptoms have been reported for any of the forms of therapy discussed below.^{38,58}

3.2 Providing education and advice

- A patient-specific education plan is used for each problem category. Taking account of the patient's views, preferences and expectations, the pelvic floor physical therapist explains any relevant aspects, using visual aids where necessary, and discusses the normal function of the continence mechanism (Note 21) (level 4).

3.3 Electrostimulation (Note 22)

- Although uncontrolled studies have reported that electrostimulation is effective, and is a major factor

in the conservative treatment of AI for some patients, this conclusion is not supported by the findings of controlled studies.

Based on a small number of heterogeneous controlled studies there is insufficient evidence for the use of electrostimulation in the treatment of AI. It is unclear on what basis patients should be selected for electrostimulation and what electrostimulation modality would be optimal (level 1).^{47,48,58}

- The evidence statement development team does, however, consider electrostimulation to be useful for a specific group of patients, viz. to improve the voluntary control of the pelvic floor by patients who lack this voluntary control (problem category IA in the flowchart) (level 4).

3.4 Pelvic floor muscle training (PFMT) (Note 23)

- PFMT consists of repeated voluntary contractions and relaxations of the pelvic floor muscles. Since it is unclear whether PFMT can be distinguished from anal sphincter exercises, these two types of training are usually taken together. Where necessary, PFMT aims to train the patient's awareness regarding the way in which and the extent to which the pelvic floor muscles can be used. PFMT also aims at:
 - muscle strength (increasing static and dynamic muscle strength);
 - voluntary control of muscle relaxation;
 - endurance (i.e. the capacity to keep up a maximal or submaximal contraction over a longer period of time);
 - repeatability (i.e. the number of times the patient can perform a maximal or submaximal contraction);
 - duration and coordination of muscle contractions of the pelvic floor and anal sphincter;
 - correct position of the pelvic floor.
- It has been demonstrated that some elements of PFMT have a therapeutic effect, but no definitive conclusion can be drawn about the role of anal sphincter exercises in the treatment of patient with FI (level 1).³⁸
- In the opinion of the evidence statement development team, PFMT can be part of an integrated approach, which involves education/advice, training the patient's awareness of the way in which and the extent to which the pelvic floor muscles can be used, where necessary with the help of biofeedback and/or rectal balloon training (for problem categories IC, ID, II-IV). This approach is supported by the recommendations of the 'International Consultation on Incontinence' and is partly based on the low cost and the absence of adverse effects of the therapy (level 4).^{47,48}

- In the opinion of the guideline development team, exercises to reduce the anorectal angle, focusing on the m. puborectalis (similar to 'the knack' described for the inward movement of the urethra) can be used to improve the patient's voluntary control of their pelvic floor (for problem category IB) (level 4).

3.5 Biofeedback

Biofeedback can be used in various ways for patients with AI: EMG biofeedback (activity of motor units), pressure (anal manometry or probe) or using a rectal balloon (Note 24).

- It has been demonstrated that some biofeedback elements have a therapeutic effect. PFMT with biofeedback appears to be more effective than PFMT alone, and biofeedback with electrostimulation appears to be more effective than electrostimulation alone. However, the available literature does not allow any definitive conclusions to be drawn on the role of biofeedback in the treatment of patients with FI (level 1).³⁸
- A combination of manometry biofeedback or rectal balloon training with PFMT is more effective than PFMT alone if previous conservative treatment has failed (level 3).^{59,60}
- In the opinion of the evidence statement development team, biofeedback can be used when there is doubt about the ability of a patient without voluntary control of the pelvic floor to perform pelvic floor contractions (problem category IA) or if a patient shows insufficient progress, in order to accelerate progress in the context of an integrated approach (e.g. education and advice, voluntary control, PFMT) based on all modifiable components (e.g. for problem categories IC, ID, II and IV) (level 4).

3.6 Treatment process

- The therapist must evaluate and report any changes in the nature, severity and modifiability of the health problem in relation to the findings of the diagnostic process as regards impairments of body functions, limitations of activities and restrictions of participation.

3.7 Evaluation

- The therapist should evaluate the treatment using the Wexner score, the GPE and the defecation diary, and should also evaluate the modifiable components of the continence mechanism that emerged from the physical examination.

3.8 Conclusion of treatment

- The report to the patient's family doctor or specialist must describe the result of the treatment, using the categories of the International Classification of Functioning Disability and Health (ICF)⁶¹ (i.e. effects at local level, in this case the continence components; at personal level, in this case the limitations of activities; and at social level, in this case restrictions of participation).

3.9 Follow-up

- The therapist and patient may jointly consider arranging a re-evaluation, in the form of a check-up or reminder therapy, at predefined dates after the conclusion of the treatment.

Note 25 offers a case description that reflects the clinical argumentation according to the steps described in this evidence statement.

Measurement instruments are available from www.meetinstrumentenzorg.nl.

Realization of the Evidence Statement

The project to develop this evidence statement was prompted by a number of questions arising from problems encountered in everyday practice, and differences in the treatment of patients with AI. The project was subsidized by KNGF.

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Feedback Group

[Comments and feedback*]

We wish to thank the following members of the feedback group (in alphabetical order) for their help in developing the Evidence Statement:

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* Comments and additions were collected in a Delphi round. The inclusion of the above persons as consultants does not imply that each of them agrees with every detail of the Evidence Statement.

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Notes

Note 1 Internal examinations and treatments

Under current Dutch law (Medical Treatment Agreement Act [WGB0] 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 a number of special conditions, as described in the brochure entitled 'Brochure Zorgvuldig handelen bij voorbehouden en bijzondere handelingen' (in Dutch).⁶²

Registered pelvic physical therapists who meet the conditions described in this brochure are able 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.

Any pelvic physical therapist who examines and treats a patient internally is expected to have the necessary expertise and qualifications. These professional requirements are described in the document called 'Beroepscompetentieprofiel (BCP) Bekkenfysiotherapeut' (in Dutch).⁶³

Note 2 Classification of anal incontinence

There is as yet no consensus about the best classification of anal incontinence (AI).³⁹ The most commonly used classifications are:

1. Symptom-based classification: distinguishes between urgency AI (in which a patient perceives urgency before the incontinence episode), passive AI (in which the patient is unaware of the loss of feces) or a combination of both.^{3,58,64}
2. Classification based on the nature of the feces lost: solid, liquid, gaseous or mucous matter.
3. Classification based on patient categories: for instance AI in persons with neurological problems, older and vulnerable persons and postpartum AI.
4. Classification based on the presumed primary cause: muscle control of the external anal sphincter (EAS) or the internal anal sphincter (IAS) (with voluntary or involuntary contraction and relaxation present), neuropathy (damage to n. pudendus caused by prolonged straining during delivery or chronic constipation, chronic coughing [chronic obstructive pulmonary disease, COPD], diabetes mellitus (DM), traumata and neurological disorders), reduced cognitive abilities, difficulties accessing the toilet, medication (laxatives, antidepressants [muscle relaxants], antiparkinson medication), caffeine addiction, anticholinergics (reduced sensation), rectal capacity, intestinal peristalsis, composition of feces, psychosocial, overweight or underweight (eating disorders like anorexia/bulimia) or exposure to violence (emotional, physical or sexual).⁶⁵ It is not always easy to determine the primary cause of AI, since AI usually arises from an interaction between multiple causative factors.

Note 3 Costs of incontinence products

The table below shows the costs (in Euros) and numbers of users of incontinence products for urinary and anal incontinence over the 2007–2011 period.

	costs	users
2007	€ 152.049.000	545.800
2008	€ 151.749.000	576.100
2009	€ 156.795.000	579.200
2010	€ 164.699.000	581.100
2011	€ 168.158.000	577.300

Source: GIP/College voor zorgverzekeringen, 2012.

Note 4 The normal continence mechanism

Incontinence is not a disorder, but a symptom indicating the failure of one or more components of the normal continence mechanism. Normal continence requires sufficient functioning of the following systems.⁶⁶

I. The resistance system

The resistance system includes the m. levator ani (m. puborectalis, m. pubococcygeus and m. iliococcygeus) and the anal sphincters, whose basic muscle tone keeps the anal canal closed and thus resists any loss of bowel content (see Figure 1).

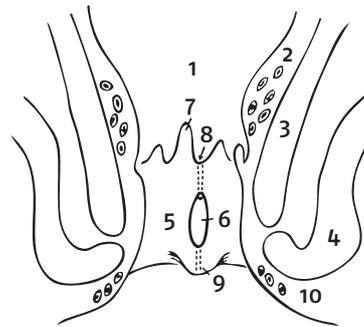


Figure 1. Anatomy of rectum and anus.

1. ampulla recti; 2. plexus haemorrhoidalis superior; 3. m. sphincter ani internus; 4. m. sphincter ani externus; 5. anal canal; 6. fissura ani; 7. columns of Morgagni; 8. crypts of Morgagni; 9. mariscas; 10. plexus haemorrhoidalis inferior.

Source: Modern Medicine. September 1990. Vol. 14, No. 9.

The external anal Sphincter (EAS) mainly closes off the distal part of the anal canal. This striate muscle only contributes about 15% to the resting muscle tone. The m. puborectalis (PR) runs as a band along the lower caudal side of the rectum and bends the rectum forward to prevent feces from entering the anal canal from the rectum. The angle is about 90° at rest, and is increased or reduced depending on the muscle tone. The angle widens to 140° during defecation. The precise role of the anorectal angle in the preservation of continence remains unclear.

The internal anal sphincter forms a ring closing off the anal canal; the IAS is a continuation of the intestinal smooth muscle layer and is not under voluntary control but is innervated by the autonomic nervous system. The IAS contributes 80% to the basic tone of the sphincter system around the anal canal.⁵⁶

II. The capacity system

This is the extent to which the rectum is capable of storing bowel content by compliance.

III. Reflex system

This includes the set of reflexes that are elicited when the rectum is filled as feces from the sigmoid reach the rectum: the external anal sphincter (EAS) reflex, the recto-anal inhibitory reflex (RAIR) and the recto-rectal reflex.

Contractions of the sigmoid push feces into the rectum, and this filling is detected by sensors in the wall of the rectum and the pelvic floor muscles. The EAS reflex powerfully constricts the distal part of the anal canal. At the same time, the RAIR causes the proximal part of the anal canal to open slightly through relaxation of the internal sphincter. As a result, bowel content comes into contact with the highly sensitive wall of the upper anal canal, allowing the person to distinguish (by sensation) whether the bowel content is solid or liquid. If the person decides to allow the content to be released, they relax the external sphincter, and the rectorectal reflex causes contractions of the rectum, allowing the feces to be excreted. If defecation is inopportune, the EAS and the m. puborectalis strongly contract, until the IAS has regained its normal tone and the closure of the anal canal is automatically ensured. The feces is then driven back to the rectum, which adapts to the larger content by compliance. The system returns to a resting state, and the person will not feel any urgency again until new feces reaches the rectum or until they start straining by increasing the abdominal pressure.⁵⁶

Note 5 Etiological risk factors

Etiological factors (risk factors) are factors that can promote the development of a health problem. The evidence statement development team has examined the etiological factors for AI by performing a systematic review of the literature, including only articles on prospective cohort studies published in Dutch, English or German. Eleven prospective studies met the inclusion criteria. One systematic literature review was found on the etiological factors for postpartum AI.²³ The etiological factors (risk factors) for FI in men have been examined in a review study that included only one observational study.^{18,67} Research into etiological factors is largely based on cross-sectional studies, which do not allow conclusions about causal relationships,

as they cannot decide whether a particular factor preceded the AI or whether the AI led to the presumed causative factor. Nor can such studies identify interactions between social and environmental factors.³ The etiology of AI is in most cases multifactorial, and it is difficult to determine the relative contributions of the individual factors.¹⁴ For instance, a particular risk factor may be an intermediary factor (an example being episiotomy as a risk factor at delivery; in this case damage to the sphincter may be the intermediary factor that eventually causes AI).²³

Level of evidence

Women

Level 1. It has been demonstrated that a third- or fourth-degree tear is the only delivery-related risk factor for postpartum FI or AI.²³

Level 1. It has been demonstrated that AI during pregnancy is highly associated with postpartum AI.^{23,24-26}

Level 3. There are indications that a stroke, cognitive impairments, Caucasian ethnicity, depression and having chronic diarrhea contribute to the development of FI in women ≥ 65 years^{16,18} and that a history of rectocele contributes to the development of FI in women ≥ 50 years.¹⁷

Level 3. There are indications that the risk of developing AI is increased at 1 and 3 years after abdominal hysterectomy and at 3 years after vaginal hysterectomy.^{30,31} A combination of abdominal hysterectomy and bilateral salpingo-oophorectomy further increases the risk of AI 1 year after surgery,³⁰ and a history of obstetric damage and a more advanced age at the time of the abdominal or vaginal hysterectomy further add to the risk of developing AI 3 years later.³¹

Men

Level 3. There are indications that men aged over 85 years and men with kidney disorders are at increased risk of developing FI.¹⁸

Level 3. There are indications that radiotherapy for the treatment of prostate cancer increases the risk of flatal incontinence.³²

Women and men

Level 3. There are indications that kidney problems,¹⁸ diarrhea, a feeling of incomplete evacuation, a history of pelvic radiation treatment, urgency complaints¹⁷ or urinary incontinence¹⁶ contribute to the development of FI.

Older people in residential care

Level 1. It has been demonstrated that a more advanced age contributes to the development of FI.^{10,34}

Level 2. It is plausible that urinary incontinence, limited mobility, having a neurological disorder, cognitive decline,¹⁰ dementia, problems of trunk control, non-Caucasian ethnicity and difficulties with general activities of daily living (ADL) all contribute to the development of FI.³⁴

Note 6 Perinatal sphincter damage

About 30% of women develop sphincter damage during their first delivery, a percentage that decreases to 9% in subsequent deliveries. About 30% of women whose sphincter is damaged later develop FI.⁶⁸

Note 7 Prognostic factors for the course of AI

Prognostic factors are factors that influence the course of a disease. Few studies have been published about prognostic factors for the course of AI; only one prospective cohort study could be included in this evidence statement.

Level of evidence

Level 2. It is plausible that older persons (≥ 60 years) living in residential care and having FI have an increased mortality risk.¹⁰

Note 8 Predictors of the response to pelvic physical therapy

Level of evidence

General

Level 1. It has been demonstrated that sufficient training dosage (training specific muscles 3 times a day, 2-3 times a week for 5 months, with 8-12 slow and virtually maximal contractions) and sufficient therapy compliance increase the chances of recovery.³⁵⁻³⁷

Level 4. In the opinion of the evidence statement development team, a higher level of motivation on the part of the patient and better interaction between patient and therapist increase the chances of recovery.³⁸

Level 4. In the opinion of the evidence statement development team, teaching patients to cope with their health problem, and inspiring patients, increase the chances of recovery.

Level 4. In the opinion of the evidence statement development team, there is a reduced chance of recovery if the AI results from a neurological disorder or a disorder of or damage to the spinal cord which means that the patient is unable to follow or comprehend instructions.^{39,40}

Electrostimulation

Level 3. There are indications that less severe FI symptoms and the loss of liquid rather than solid stools increase the chances of recovery after electrostimulation.⁴¹

Biofeedback with PFMT

Level 3. There is conflicting evidence that gender (B-, B+), age (A2-, B-, B+, C-), severity of AI symptoms (A2-, B-, B+, C-, C+), the etiology of the AI (A2-, B-, C-, C+), baseline manometry data (A2-, B-, C-, C+), sphincter damage (B-, C-, C+), sensory threshold values (A2+, B-, C-, C+) and neuropathy of the n. pudendus (B-, C-, C+) are associated with the chances of recovery after biofeedback with PFMT.^{35,42,43,69-76}

Level 3. There are indications that a longer duration of the AI symptoms reduces the chances of recovery after biofeedback with PFMT.⁴²

Level 3. There are indications that less feelings of embarrassment, use of constipating medication and having at least one delivery-related risk factor (high birth weight, episiotomy, instrumental delivery, extended duration of second stage of delivery or breech presentation) increase the chances of recovery after biofeedback with PFMT.⁴²

Level 3. There are indications that the need for more than 3 biofeedback sessions predicts a less favorable long-term prognosis.⁴³

Biofeedback with PFMT and electrostimulation

Level 2. It is plausible that gender, age, duration of complaints, sensory threshold values and neuropathy of the n. pudendus are not associated with the chances of recovery after biofeedback with electrostimulation.^{44,77}

Level 2. It is plausible that passive AI, watery stools, primary recovery after a tear during vaginal delivery and perineal and/or perianal scar tissue reduce the chances of recovery after biofeedback with electrostimulation.⁴⁴

Level 3. There is conflicting evidence that the severity of the FI symptoms, baseline manometry data (A2+, B-) and sphincter damage (A2-, B-, C+) are associated with the chances of recovery after biofeedback with electrostimulation.^{44,77,78}

Level 3. There are indications that the etiology of the FI is not associated with the chances of recovery after biofeedback with electrostimulation.⁷⁷

Note 9 Efficacy of preventive measures

There is hardly any information available about effective measures to prevent AI.^{79,80}

Cesarean section

The most commonly used preventive measure is cesarean section, although its protective effect against postpartum AI remains unproven.^{23,27-29}

Medication

There is moderate evidence that constipating medication (loperamide [oxide] and diphenoxylate with atropine) reduces the risk of FI among patients with liquid stools.⁴⁵ Its mechanism of action is based on increasing the amount of feces in the rectum and a more solid consistency, which then stimulates the reservoir function and increases the chances of improved control. In addition, increasing the amount of feces in the rectum may also optimize the evacuation of feces from the rectum, reducing the risk of passive incontinence. It is important, however, to use the correct dosage, in view of possible side-effects like constipation.

Physical activity

One study, in a nursing home setting, found that a structured daily program of activities (improving mobility and the strength of the lower extremities), in combination with increased fluid and nutrient intake and toileting assistance, did not alter the frequency of FI.⁸¹ Another study by the same author, however, found that physical activity and improved incontinence care in combination with improved fluid intake resulted in a significantly reduced frequency of FI.⁸² As regards the former study, it should be noted that 45% of the participants had no bowel motion during the pretreatment and posttreatment assessments, so that no FI could be established. In addition, the intervention period in the former study was considerably shorter than in the latter (3 vs. 8 months), while the power was too low.

Weight reduction and dietary interventions

The prevalence of FI among overweight/obese women is high.^{83,84} Studies into the effect of surgical weight reduction among obese women on the prevalence of postoperative AI have yielded conflicting findings.^{85,86} One study found that FI among obese women (BMI 25-50) with urinary incontinence was associated with low fiber intake (30-40 g of fiber a day being recommended as a preventive measure).⁸⁷ The frequency of incontinence for liquid stools has been found to decrease after reducing weight by at least 5 kg and increasing fiber intake by 10 g (independent association). This was found in a secondary analysis⁴⁶

of a randomized study into the effect of a behavioral intervention to reduce body weight.⁸⁸ Two other studies examined dietary interventions for the treatment of AI. One of these studies found that dietary supplementation with Psyllium husk or gum arabic fiber was associated with a reduced number of FI episodes (17–18% vs. 50%) and improved consistency of stools.⁴⁹ The other found no effect of fiber as a dietary supplement (Psyllium) in addition to loperamide, compared with a low-fiber diet plus loperamide.⁸⁹

Peripartum pelvic floor muscle training (PFMT)

One systematic literature review,⁹⁰ including 8 randomized effect studies, examined the effect of PFMT during and after pregnancy on the prevention of antenatal^{50,91} and postnatal FI.^{91–97} It concluded that FI or AI after 32–38 weeks of pregnancy cannot be prevented by PFMT during the pregnancy in women delivering their first or subsequent child.^{50,91} One study did report an effect of PFMT during pregnancy on the prevention of FI after 32–36 weeks of pregnancy, but only among the women who had had previous deliveries.⁵⁰ PFMT after pregnancy by women with symptoms of urinary incontinence 3 months after their delivery was found to result in a non-significant reduction of the risk of FI 1 year post partum (RR = 0.68; 95%CI = 0.24–1.94).^{90,92,93} After 6 years, there was still no difference in the reported FI.⁹⁴ Studies also found that the preventive effect of antenatal^{91,97} or postnatal^{95,96} PFMT on FI is not larger than the effect of the treatment used in a control group (only PFMT instructions or no intervention) at 6 weeks and 3 months,^{91,95} 7 months⁹⁷ and 10 months⁹⁶ after delivery. It should be noted that the descriptions of the training programs used in 3 of the studies^{95–97} were insufficiently detailed to ascertain whether their intensity was high enough to influence the pelvic floor muscle function.⁹⁰

Other

There is no evidence for FI prevention by: giving up smoking, ending the use of medication for the gastrointestinal system that may have FI as a side-effect; adjusting the physical and social environment for persons with physical or mental impairments; and increasing the fluid intake to influence the consistency of the stools.^{47,48}

Level of evidence

Level 1. It has been demonstrated that cesarean section does not protect against postpartum AI, compared with spontaneous vaginal delivery.^{23,28,29}

Level 1. It has been demonstrated that there is moderate evidence that constipating medication (loperamide [oxide] and diphenoxylate with atropine) reduces the risk of FI in patients with liquid stools.⁴⁵

Level 2. It is plausible that PFMT during pregnancy does not prevent the development of FI or AI after 34–38 weeks of pregnancy in women delivering their first or subsequent child.^{50,91}

Level 2. It is plausible that PFMT after pregnancy in women with symptoms of urinary incontinence 3 months after delivery does not prevent the development of FI 1 year after the delivery.^{92,93}

Level 3. There is conflicting evidence (B+, B-) that a structured daily activities program in a nursing home setting, combined with extra fluid intake and toileting assistance, can reduce the frequency of FI.^{81,82}

Level 3. There are indications that body weight reduction can be seen as a modifiable factor in the prevention of FI among obese women with urinary incontinence.^{46–48}

Level 3. There are indications that increasing fiber intake (Psyllium or gum arabic) can be seen as a modifiable factor in the prevention of FI.⁴⁹

Level 3. There are indications that dietary fiber supplementation (Psyllium) in addition to loperamide, does not contribute to the prevention of FI.⁸⁹

Level 3. There are indications that PFMT during pregnancy reduces the risk of AI after 32–36 weeks of pregnancy among women who have had a previous delivery.⁵⁰

Level 3. There are indications that PFMT after pregnancy among women with symptoms of urinary incontinence 3 months after delivery cannot prevent FI in the longer term.⁹⁴

Level 3. There are indications that the preventive effect of ante- or postnatal PFMT for FI is not greater than the effect of the treatment received by a control group at 6 weeks and 3, 7 and 10 months after delivery.^{91,95–97}

Level 4. In the opinion of the evidence statement development team, patients with incomplete evacuation can benefit from irrigation of the rectal ampulla with an irrigation system, such as a rectal balloon catheter, enema (Micolax) or Peristeen, as a method to prevent fecal loss for a limited period of time.

Level 4. In the opinion of the evidence statement development team, patients with liquid stools may benefit from reducing fluid intake (e.g. when ingesting constipating medication) which may thicken the stools, thus reducing the risk of FI.

Note 10 Referral policy

Little evidence is available about the policies of medical specialists regarding referral of patients with AI to pelvic physical therapists. A

number of recent developments in pelvic physical therapy (further specialization, competencies acquired based on competency profiles, higher training requirements, scientific research into effects, more effective provision of information to referring doctors and patients about what pelvic physical therapists can and cannot do) will probably cause a gradual rise in the number of referrals to pelvic physical therapists.

The letter of referral must contain sufficient information, i.e. details that the physical therapist will require for an effective intervention. If any medical data are missing, the physical therapist should contact the relevant doctor, with the patient's consent.

Level of evidence

Level 4. The therapist is advised to contact the patient's family doctor or specialist before starting the diagnostic or therapeutic process of physical therapy, since the health problem of AI implies a considerable risk of medical pathology that requires different or supplementary medical care, and a history of medical pathology can also yield prognostically relevant factors.

Note 11 Measurement instruments

Recording the severity of a patient's AI and its consequences for their everyday life and sense of self-respect is important for the patient's perception of the health problem. Assessing and recording any changes in the severity of the complaints or the patient's quality of life (QoL) using validated and responsive measurement instruments is essential to evaluate the effects of the physical therapy interventions, and is also highly useful for the communication between the various care providers involved as well as with health insurers.

As there is no uniform classification of AI symptoms, the measurement instruments that have been developed focus on different aspects of the complaints. Most of these concern instruments that have not been adjusted and validated specifically for the Dutch situation, although Dutch translations of the Vaizey score and the Wexner score are available. The available instruments also vary greatly in terms of their comprehensiveness, the time required to complete them and their user-friendliness.

By and large, the measurement instruments can be subdivided into severity scores, disease-specific QoL instruments, Global Perceived Effect scores and defecation diaries.

Level of evidence

Level 4. In the opinion of the evidence statement development team, the screening, diagnostic and treatment evaluation processes should involve a patient-reported outcome measure.

Note 12 Severity scores

Severity scores may consist of grading (categorization) or sum scales (continuous).⁶⁶ Severity scores should assess the following variables: (1) loss of feces (form or amounts of feces lost) and (2) the mechanisms used by the patient to cope with fecal losses. In addition, such instruments often ask about the frequency of fecal losses, using frequency scales (which may, e.g., range from 'never' to 'daily'). Grading instruments can be rapidly and easily completed, but do not provide information about the frequency of fecal losses, which is an essential aspect of treatment evaluation. This makes it difficult to use grading to differentiate between patients with minor differences in the severity of incontinence.⁵² Sum scales are better in this respect, but have other disadvantages. Some sum scales have poorly defined answering options (such as 'sometimes'). In some sum scales all items have equal weight (unweighted sum score). Filling out a weighted instrument generally requires more work, and it may also be difficult to assign a weight to a particular question, whereas externally developed weights may not be suitable for the population to which they are applied.⁹⁸ Finally, sum scales that include items like coping mechanisms (e.g. the use of incontinence products) and social disablement appear to cover a grey area between measuring severity and measuring QoL.⁹⁹ This relates to different perspectives in determining the severity of FI: whether severity is only determined by the type of incontinence (form, amount and frequency) or whether it is determined by a combination of the type of incontinence and coping mechanisms. The type of perspective chosen has consequences for determining the psychometric characteristics of the measurement instruments and for assigning weights: one either assumes no difference in the type of incontinence (equal weights), or one assumes that the perceived importance differs for each type of incontinence (by assigning weights).

Severity scores that have been described and discussed in the literature include the Wexner (Cleveland Clinic) score,¹⁰⁰ the Vaizey score (St. Mark's score),^{99,101} the Fecal Incontinence Severity Index (FISI),¹⁰² the Pescatori Index,¹⁰³ the Miller Grading Scale,¹⁰⁴ the Kelly Index¹⁰⁵ and the Lunniss Index.^{51,53,106} A systematic review of the literature by Avery et al.⁵³ and the recommendations of the International Consultation on Incontinence¹⁰⁷ allow the conclusion that none of the severity scores deserves to be recommended, due to insufficient evidence from

psychometric studies. As long as evidence from such studies remains insufficient, the Vaizey and Wexner scores are recommended as the instruments of first choice,⁵¹ and the Wexner has proved to be more suitable as a severity score than the Vaizey score.^{108, 109}

Level of evidence

Level 4. In the opinion of the evidence statement development team, the Wexner score is a suitable instrument to assess the severity of AI as a health problem and how well the patient is coping.

Note 13 Quality-of-life (QoL) scales

Incontinence obviously affects the quality of life (QoL), so that QoL needs to be included in the history-taking and treatment evaluation. In addition to general QoL questionnaires, like the SF-36 and EuroQoL, there are also disease-specific QoL questionnaires, which cover a specific narrowly defined area within the concept of 'well-being'. Their disadvantage is that they make it more difficult to compare studies with different gastro-enterological disorders, while an advantage is that they are better able to assess changes. Disease-specific QoL scales that have been described and discussed in the literature include the *Fecal Incontinence Quality of Life Scale (FIQL)*,¹¹⁰ the *Gastrointestinal Quality of Life Index (GIQLI)*,¹¹¹ the *Hirschprung's Disease Anorectal Malformation Quality of Life Questionnaire (HAQL)*¹¹² and the *Manchester Health Questionnaire (MHQ)*.^{51,53,66,107,113,114} The findings of psychometric studies¹⁰⁸ and systematic reviews of the literature^{51,53,107,114} suggest that the FIQL might be recommended as an instrument to assess disease-specific QoL. There is as yet no validated Dutch version of this questionnaire, although a study examining this is nearly completed.

Note 14 Global Perceived Effect (GPE) questionnaire

The Global Perceived Effect (GPE) questionnaire usually consists of 5, 7 or 9 categories. Numerical scales with more than 9 categories generally appear to be equivalent to visual analog scales (VAS), while it seems that patients can no longer reliably distinguish between categories if there are more than 20 categories.¹¹⁵

Level of evidence

Level 4. In the opinion of the evidence statement development team, GPE is a suitable instrument to evaluate patient-perceived changes in health status.⁵⁴

Note 15 Defecation diary

Defecation diaries help to overcome some of the disadvantages of symptom-based questionnaires.¹¹⁶ Questionnaires typically ask about symptoms that occurred in the weeks or months preceding the moment of completion of the questionnaire. This may lead to 'recall bias' (information bias)¹¹⁵ and is often affected by a tendency to underestimate¹¹⁷ or overestimate¹¹⁸ the frequency of defecation. A study found that patients who were asked to complete a history-taking questionnaire on defecation (relying on their memory) underestimated the severity (amount and nature of loss of stools) compared to patients who kept a defecation diary for 2 weeks.¹¹⁷ A defecation diary also makes it easier to assess variations in the defecation pattern, and makes it easier to relate defecation and incontinence episodes to the consistency of the stools and defecation habits (e.g. straining and urgency).¹¹⁸

Another study investigated if it mattered whether the diary was kept on paper or in electronic form. The study lasted 3 weeks and included patients with chronic pain. It found that compliance with therapy was much lower among the patients using the paper version than among those using the electronic version (11% vs. 94%), whereas the self-reported compliance was actually much higher in the paper group (90%), and this group had a tendency to postpone filling out the diary.¹¹⁹

Objectives and recommendations for the use of a defecation diary include:⁵¹

- determining a patient's usual defecation pattern;
- monitoring defecation frequency;
- monitoring the number of incontinence episodes;
- the diary should be kept until the frequency and consistency have normalized and a certain regularity has been established;
- the diary should be user-friendly;
- the diary should preferably be kept electronically, for instance on a secure website, in view of the greater compliance, higher patient satisfaction and automatic recording of exact times of completion;^{116,119}
- clear instructions should be given, explaining the times of completion and what a patient should do if they forget to fill out the diary on a particular day.¹¹⁶

Level of evidence

Level 4. In the opinion of the evidence statement development team, a defecation diary should be used to assess the defecation frequency and the severity of the FI.⁴⁷

Note 16 Bristol Stool Scale

The Bristol Stool Scale⁵⁷ is often recommended to enable patients to describe the consistency of their stools. This scale can be included in a defecation diary, for instance printed on the back cover.^{120,121} The patient can record more than one number if they produce several types of stools within a day.

The seven types of stools are:

- type 1: separate hard lumps, like nuts (hard to pass)
- type 2: sausage-shaped, but lumpy
- type 3: like a sausage or snake, but with cracks on its surface
- type 4: like a sausage or snake, smooth and soft
- type 5: soft blobs with clear-cut edges (passed easily)
- type 6: fluffy pieces with ragged edges, a mushy stool
- type 7: watery, no solid pieces; entirely liquid

Types 1 and 2 indicate constipation, while 3 and especially 4 are the ideal types of stool, as they are easily passed, and types 5-7 tend towards diarrhea.

Level of evidence

Level 4. In the opinion of the evidence statement development team, the Bristol Stool Scale is a suitable instrument to assess the consistency of a patient's stools.

Note 17 Physical examination

General inspection

Inspection of breathing, spinal column, pelvis, and hips, gait analysis.

Local inspection of vagina/anus/perineum

Inspection of pelvic floor at rest^{51,122}

Initial position:

- supine

Procedure:

- general inspection: skin abnormalities (inflammation, erythema, scaly), scars, swellings, atrophied introitus, prolapse, varices, hemorrhoids, soiling, skin tag, fistula, fissura;
- introitus: open/closed;
- perineal body: shortened/absent, invaginated, bulging;
- vagina: pink, red, white, moist, dry, discharge, focal vulvitis;
- anus: anus closed or open at rest, deeply set or bulging anus, anal atresia/amputation, shape of anus.

Inspection of pelvic floor during contraction

Initial position:

- supine

Procedure: vaginal/anal

- inspection during contraction: strong/clear contraction, moderate contraction, no visible contraction, contraction possible after instruction, outward movement visible.
- co-contractions: abdominal, gluteal, facial, foot and/or hand muscles, adductors, interrupted breathing.

Inspection of pelvic floor during coughing

Initial position:

- supine

Procedure: vaginal/anal

- inspection during straining: downward movement of pelvic floor, loss of urine/feces, flatulence, development of prolapse, prolapse visible, increased prolapse, direction of movement of pelvic floor (upward/downward/no movement).

Inspection of pelvic floor during straining

Initial position:

- supine

Procedure: vaginal/anal

- inspection during straining: downward movement of pelvic floor, loss of urine/feces, flatulence, development of prolapse, prolapse visible, increased prolapse, direction of movement of pelvic floor (upward/downward/no movement).

Supplementary functional examination**Palpation at rest, anorectal^{51,122}**

Initial position:

- left lateral

Assessment:

- accessibility of sphincter: impossible, with difficulty, good, easy, too easy;
- activity of sphincter apparatus (IAS and EAS) at rest: overactive, normal, underactive;
- activity of m. puborectalis at rest (in view of the importance of the anorectal angle);
- EAS deficiency;
- (afferent) sensitivity (nociceptor, mechanical, chemical and/or hormonal): hyposensitive, normal, hypersensitive;
- pain? if so, where?

Palpation during contraction, anorecta⁵¹

- contraction: absent, weak, normal, strong;⁴
- contraction after instruction: absent, weak, normal, strong;
- co-contraction present/absent;
- contraction of: only sphincter apparatus, only m. puborectalis, both, neither;
- symmetry: symmetry, right > left, left > right;
- direct action/activity of pelvic floor muscles: present, incomplete, absent;
- relaxation after contraction: absent, partial, complete.⁴

Palpation during straining, rectal

- palpation during straining and Valsalva maneuver: involuntary relaxation of pelvic floor and slight descensus present/absent;
- palpation during coughing: involuntary contraction present/absent;
- paradoxical pelvic floor: no relaxation or slight descensus, or contraction instead of relaxation of m. puborectalis and/or EAS.

Rectal balloon and electromyogram (EMG)

- Filling a rectal balloon intrarectally with air allows the therapist to measure the initial sensory perception of filling, the rectoanal inhibitory reflex (RAIR), the initial feeling of urgency and the maximum tolerable volume.
- In addition, EMG can be used to measure the activity at rest and during contraction, as well as the response of the pelvic floor muscles to filling and straining with inflated balloon.

Note 18 Using guidelines

Any intervention must be carried out in accordance with the 'Richtlijn voor het hygiënisch werken in het bekkenbodengebied' (guideline for hygiene in interventions in the pelvic floor area; in Dutch).¹²³

Note 19 Achieving the required training intensity

Achieving a certain training intensity is a necessary precondition for realizing the intended effects of training.³⁶ If the dose-response relation in a particular study was demonstrably too high or too low, a note has been added to the description of the study below, although the level of evidence remains unchanged.

Note 20 Formulating recommendations

The evidence statement development team has tried to relate the recommendations for the therapeutic process to the various problem categories defined above (see also the Flowchart). The populations described in the original studies are very heterogeneous in terms of problem categories, and it is virtually impossible to distinguish which of the problem categories are involved in the various studies. The team has therefore had to make certain assumptions: problem categories I to IV were assumed to be involved in a study if the report did not specify the AI problem categories.

Note 21 Providing education and advice

The following topics may be discussed:

- explaining AI as a symptom;
- functioning of rectum and anus;
- where and how feces is produced;
- relation between rectum, anus and pelvic floor;
- relation between pelvic floor, breathing and posture;
- possible causes and consequences of AI;
- location and function of pelvic floor;
- influence of stress and relaxation on the physical condition of the pelvic floor;
- general and local relaxation exercises;
- relation with other dysfunctions in the pelvic floor region (like prolapse and urinary incontinence);
- explaining about potential risk factors and prognostic factors in general, and the particular factors that are relevant in the patient's specific case (including lifestyle factors);

- advice about relaxed sitting posture and breathing;
- optimizing the frequency and consistency of defecation: advice on defecation behavior,⁴⁷ eating moments, fluid intake, diet (including fiber)²⁴ and use of medication (based on consistent and structured daily completion of a defecation diary).

When evaluating the education and advice that have been provided, the pelvic physical therapist could check whether the patient has realistic views and expectations regarding their problems, and is doing what they should do.

Achieving long-term success will require changing the patient's behavior by means of education and counseling. Not until the patient sufficiently understands the problem can corrections be effectuated.

Essential factors regarding behavioral change include: the expected outcome of behavior (do the advantages for the patient outweigh the disadvantages) and the patient's self-efficacy, that is, their perceived control over their behavior. Whether people eventually change their behavior depends on the following aspects of behavior change:¹²⁵ being receptive, understanding, being willing to change, being able to change, changing behavior and maintaining new behavior.

Level of evidence

Level 4. In the opinion of the evidence statement development team, a patient-specific education plan should be used for each individual problem category. This recommendation is supported by consensus and the recommendations of the International Consultation on Incontinence.^{47,48}

Note 22 Electrostimulation

Electrostimulation is applied in various ways, using different stimulation parameters and combining it with other therapies (like biofeedback or PFMT). The precise mechanism of action of electrostimulation is unknown, but is suggested to involve a transformation from fast-twitch (fatigable) muscle fibers (type 1) to slow-twitch muscle fibers (type 2). In addition, it is thought to increase the blood vessel density. There may also be an important effect of changes in muscle fiber diameter. Apart from these physiological changes, the main mechanism may be based on an increased awareness of the anal sphincter.⁵⁸

Three hypotheses have been proposed about the efficacy of electrostimulation.

Hypothesis 1. Electrostimulation is more effective than any other treatment.

Osterberg et al. randomized patients with idiopathic (neurogenic) AI to levator plasty or electrostimulation, and evaluated the effects at 3, 12, and 24 months after treatment.¹²⁶ At the first follow-up assessment, the surgical patients had a lower incontinence score, but after 12 and 24 months, the difference between the two groups had disappeared. At none of the assessment moments did surgery appear to have altered the physiological variables, whereas the physical and social impairments did change, with surgery yielding the best results for this outcome measure at all assessment moments.

Naimy et al. compared EMG biofeedback using an anal probe with electrostimulation (anal probe).¹²⁷ They found no differences between the two groups after the treatment. It should be noted that the interventions in both of these studies lasted less than 2 months.

Hypothesis 2. A combination of electrostimulation and another treatment is more effective than the other treatment alone.

Fynes et al. compared vaginal biofeedback and PFMT at home (administered by a specialist continence nurse) with anal EMG biofeedback in combination with anal electrostimulation and home exercises (administered by a physical therapist) for patients with FI after obstetric damage.⁷⁸ Twelve weeks after the treatment, there was a significant difference in favor of the electrostimulation group. The findings of this study are, however, difficult to interpret, as it is unclear whether the difference was due to the route (vaginal/anal) of the biofeedback or to the addition of electrostimulation.

Mahony et al. compared intra-anal EMG biofeedback and PFMT at home with the same treatment plus electrostimulation,¹²⁸ and found no differences between the two groups after treatment. Schwandner et al. compared a triple target regime (3T) (amplitude-modulated middle-frequency electrostimulation [AM-MF] plus EMG biofeedback) with EMG biofeedback alone.¹²⁹ Although there was a high dropout rate in both groups, the 3T treatment proved significantly more effective on all outcome measures except QoL. The high dropout rate in this study (61%) may be due to the higher intensity of electrostimulation (100 Hz) or the long study duration (9 months).

Hypothesis 3. One electrostimulation modality is more effective than all other electrostimulation modalities.

Norton et al. compared electrostimulation at 1 Hz and 35 Hz for 8 weeks and found no difference between the two modalities.¹³⁰

Electrostimulation for FI was also the subject of a Cochrane review,⁵⁸ which included only 4 controlled studies with a total of 260 participants. The results of these studies have already been separately incorporated in hypotheses 1 and 2.^{78,126,128,130}

There have also been uncontrolled studies reporting on the effect of electrostimulation for FI. These studies repeatedly mention that 'the international literature, as well as our own research findings, confirm that electrostimulation is effective and that electrostimulation plays an important role as a component of conservative treatment for some patients with AI'.^{58,131}

Level of evidence

Level 1. It has been demonstrated that there is insufficient evidence to recommend electrostimulation for the treatment of FI, based on only 4 studies, which were heterogeneous in terms of patient sample, treatment protocol and outcome measures.⁵⁸

In addition, it is unclear on what basis patients should be selected for electrostimulation and what electrostimulation modality would be optimal. This evidence is supported by consensus and the recommendations of the International Consultation on Incontinence.^{47,48}

Level 4. In the opinion of the evidence statement development team, electrostimulation is useful for a specific group of patients, to improve the voluntary control of the pelvic floor in patients who lack this voluntary control (problem category IA).

Note 23 Pelvic floor muscle training (PFMT)

Two studies were found that examined hypotheses on the efficacy of pelvic floor muscle training (PFMT).

Hypothesis 1. *A combination of PFMT and another treatment is more effective than the other treatment alone.*

In a study by Norton et al., one of the four groups was given PFMT plus advice, while another group only received advice.⁷⁴ No difference between the two groups was found immediately after the end of treatment, nor after 1 year. This study was, however, carried out in a very specific setting (with specialized nurses). In addition, the paper provided insufficient details of the treatment, and it is doubtful whether the intensity of treatment was sufficient (dose-response relation).

Hypothesis 2. *One PFMT modality is more effective than all other PFMT modalities.*

Bartlett et al. found no difference between biofeedback plus PFMT using prolonged submaximal contractions, and biofeedback plus PFMT using a combination of prolonged submaximal contractions and rapid repeated maximal contractions.¹³²

One systematic review of the literature examined the efficacy of biofeedback and/or anal sphincter exercises for adults with FI, but could not formulate a definitive conclusion.³⁸

Level of evidence

Level 1. It has been demonstrated that some elements of PFMT have a therapeutic effect, but no definitive conclusion can be drawn about the role of anal sphincter exercises in the treatment of patients with FI.³⁸

Level 2. It is plausible that PFMT with prolonged submaximal contractions and PFMT using a combination of prolonged submaximal contractions and rapid repeated maximal contractions are equally effective.¹³²

Level 3. There are indications that a combination of PFMT and advice is equally effective as advice alone, though this is based on a study whose intervention was insufficiently described and whose intensity of therapy (dose-response relation) was doubtful.⁷⁴

Level 4. In the opinion of the evidence statement development team, PFMT can be recommended as part of an integrated approach, which involves education/advice, training the patient's awareness of the way in which and the extent to which the pelvic floor muscles can be used, where necessary with the help of biofeedback and/or rectal balloon training (for problem categories IC, ID, II-IV). This evidence is supported by the recommendations of the International Consultation on Incontinence and is partly based on the low cost and the absence of adverse effects of the therapy.^{47,48}

Level 4. In the opinion of the guideline development team, exercises to reduce the anorectal angle, focusing on the m. puborectalis (similar to the 'knack' described for the inward movement of the urethra) can be used to improve the patient's voluntary control of their pelvic floor (for problem category IB). The 'knack' is a voluntary contraction which a person can use to learn to contract their pelvic floor muscles just before a cough or lifting a heavy object, to prevent the loss of urine or stools.

A description of studies into the effect of PFMT to prevent ante- and postnatal AI is provided in the section on prevention (Note 9).

Note 24 Biofeedback

Biofeedback can be used in various ways for patients with anal incontinence (AI).

To reduce or increase rectal sensation using a rectal balloon

The patient is asked to indicate when they perceive the first filling sensation, the first feeling of urgency and the maximum tolerable volume. Some patients only perceive the filling of the rectum at a very late stage, giving them less time to go to the toilet, contract their sphincter, or both. Patients with such an elevated sensory threshold are taught to perceive the filling of the balloon at an earlier stage, by repeatedly filling the balloon, using progressively smaller volumes.³⁸ As soon as the patient perceives the rectum filling up, they should compensate the inhibition of the internal anal sphincter by contracting their pelvic floor muscles. This is trained until the reaction becomes automatic.⁵⁶ In patients who experience urgency at a low rectal filling rate or have an oversensitive rectum, the balloon is filled with progressively larger volumes, and the patient has to learn to tolerate this.

Strength training (EMG/pressure)

Biofeedback can also be used to visualize a patient's anal sphincter activity, including the involuntary 'knack' (providing an indication and awareness of resting activity or the strength of individual contractions of the pelvic floor muscles). This enables the therapist to teach the patient anal sphincter exercises and to give them feedback on their performance and progress. This can be achieved using electromyographic (EMG) skin electrodes, manometry pressure, intra-anal EMG, pulling the pelvic floor muscles, tapping or digital vibration. As the patient sees or hears the signal, or feels the tactile stimuli, they are encouraged to increase their contraction strength and keep up the contraction longer.

There is no consensus about the best exercise protocol to be followed at home, in between the treatment sessions, nor about the number of contractions, the exercise frequency, instructions for home exercising or the duration of treatment; various authors have described different treatment programs.

Coordination training (triplet)

A balloon is inserted into the rectum. Two other, smaller, pressure-recording balloons are introduced into the upper and lower parts of the anal canal. As the rectal balloon is filled, it elicits the recto-anal inhibition reflex. This causes anal relaxation, which is visualized by the two recording balloons, and which the patient must become aware of and must learn to counteract by means of a voluntary anal sphincter contraction. This contraction must be long and powerful enough to allow the resting pressure to return to its initial value.

Three hypotheses have been proposed about the efficacy of biofeedback.

Hypothesis 1. *Biofeedback is more effective than any other treatment*

Naimy et al. compared EMG biofeedback using an anal probe with electrostimulation for AI after a third- or fourth-degree tear.¹²⁷ They found no differences between the two groups after the treatment. This study did not select participants on the basis of having AI with or without voluntary control, which may have affected the therapy response for both treatments. In addition, the treatment lasted less than 2 months.

Hypothesis 2. *A combination of biofeedback and another treatment is more effective than the other treatment alone.*

Healy et al. compared endo-anal electrostimulation, administered at the patient's home, with electrostimulation and EMG biofeedback under supervision.¹³³ They found no differences between the two groups after the treatment.

Two other studies examined patients with AI who had previously been unsuccessfully treated with conservative therapy (dietary adjustment, medication), using a stepwise protocol. Heymen et al. found that a combination of PFMT and manometry biofeedback resulted in a significant improvement of contraction strength, a significantly lower severity score and a significantly greater subjective improvement immediately after treatment than PFMT alone.⁶⁰ After one year, the severity score was still significantly lower and the subjective improvement was still significantly greater. Bols et al. compared PFMT alone with a combination of PFMT and rectal balloon training.⁵⁹ The addition of rectal balloon training resulted in a significant increase in the maximum tolerable volume and the subjective improvement, and a significant improvement on the 'Lifestyle' subscale of the Fecal Incontinence Quality of Life Scale (FIQL). It should be noted that the power of this study was low. These two studies, both using a stepwise protocol, thus show a favorable trend for the effect of manometry biofeedback and rectal balloon training.

Norton et al. compared giving advice, with and without PFMT, with giving advice with and without biofeedback (clinical manometry biofeedback or intra-anal EMG biofeedback at home).⁷⁴ They found no differences between the two groups. This study was, however, carried out in a very specific setting (with specialized nurses).

In addition, the paper provided insufficient details of the treatment, and it is doubtful whether the intensity of treatment was sufficient (dose-response relation).

Davis et al. compared the effect of anal sphincter repair with and without manometry feedback and PFMT, administered at home for only 6 weeks, in a small group of women with obstetric sphincter damage.¹³⁴ They found no differences between the two groups.

Illyckyj et al. found no difference between a group that received a combination of PFMT and manometry biofeedback and a group receiving only PFMT.¹³⁵ The intervention consisted of only 4 treatment sessions over a period of 4 weeks.

Hypothesis 3. One biofeedback modality is more effective than all other biofeedback modalities.

Solomon et al. found no difference between a group treated with a combination of PFMT (feedback by means of digital palpation) and anal manometry biofeedback and a group treated with a combination of PFMT and transanal ultrasound biofeedback.¹³⁶

Heymen et al. found no difference between clinical EMG biofeedback, a combination of clinical EMG biofeedback and rectal balloon training, clinical EMG biofeedback with EMG biofeedback administered at home and clinical EMG biofeedback with rectal balloon training and EMG biofeedback at home.¹³⁷

Miner et al. compared groups using sensory biofeedback with and without feedback results being reported to the patient.¹³⁸ The group receiving feedback improved significantly more in terms of rectal sensations, number of incontinence episodes and achieving continence.

There is little evidence as to which feedback method is ultimately the best option, partly because the samples used in the studies were small, and the training intensity was doubtful, especially in the last two studies mentioned above.

There has been one systematic review of the literature, which included all of the abovementioned studies of biofeedback examining the efficacy of biofeedback and/or anal sphincter exercises among adults with FI.³⁸ This review found that there is insufficient evidence for a possible role of biofeedback in the treatment of FI. In addition, it is unclear on what basis patients should be selected for biofeedback, which biofeedback modality would be optimal, and whether nonspecific placebo effects might be responsible for the results.^{38,74} Paired analyses of over 70 uncontrolled studies into the efficacy of biofeedback and/or PFMT do, however, show improvement and recovery rates, ranging from 0 to 100%, with the majority of studies reporting rates in the 50–80% range.¹³⁹

Level of evidence

Level 1. It has been demonstrated that some biofeedback elements have a therapeutic effect. PFMT with biofeedback appears to be more effective than PFMT alone, and biofeedback with electrostimulation appears to be more effective than electrostimulation alone (though the latter conclusion is based on the study by Fynes et al., which is difficult to interpret⁷⁸), but no definitive conclusion can be drawn regarding the role of biofeedback in the treatment of patients with FI.³⁸

Level 3. There are indications that a combination of manometry biofeedback or rectal balloon training and PFMT is more effective than PFMT alone if previous conservative treatments have failed.^{59,60}

Level 4. In the opinion of the evidence statement development team, biofeedback can be used when there is doubt about the ability of a patient without voluntary control of the pelvic floor to perform pelvic floor contractions (problem category IA) or if a patient shows insufficient progress, in order to accelerate progress in the context of an integrated approach (e.g. education and advice, voluntary control, PFMT) based on all modifiable components (e.g. for problem categories IC, ID, II and IV).

Note 25 Case history

Referral: referral information

Indication: Daily AI, status after total rupture, 6 weeks post-partum

Sex: female, age: 33 years, para I.

Additional investigations: anal endo-ultrasound and manometry:

- EAS and IAS defect at 10–2 hours
- Normal resting pressure, weak contraction strength, incomplete relaxation after straining
- Low rectal capacity: first filling sensation at 50 cc, first urgency at 70 cc, maximum urgency at 120 cc

Question: pelvic physical therapy indicated?

History

- Daily flatal incontinence without voluntary control developed after first delivery. Total rupture, not surgically repaired.
- Comorbidities: n.a.d.; psychosocial problems: worried about work

resumption (sedentary job, accountancy); other urogynecological domains: n.a.d.

Physical examination

General inspection at rest

- Slender build. Elevated abdominal muscle tonicity: keeps lower abdomen drawn in, afraid to relax muscles for fear of flatulence. Diaphragm raised, shoulder tensed. No other abnormalities.

General inspection during movement

- Respiratory movement (breathing with raised diaphragm).

Local inspection of vagina/anus/perineum

- Inspection of perineum: slightly withdrawn perineum, skin normal, scar from rupture, no hemorrhoids.
- Contraction of pelvic floor muscles (PFM) with co-contractions, especially abdominal muscles and adductors, also some shoulder activity. Improved after instruction. Inward movement of perineum during PFM contraction. Upon relaxation, delayed return to original position, with simultaneous gluteal and adductor contraction; more relaxed after instruction.
- Cough reflex present.
- Slight perineal descensus during straining.

Supplementary functional examination

- Anorectal palpation at rest: interrupted sphincter; feces in ampulla.
- Anorectal palpation during contraction: EAS muscle strength weak, m. puborectalis (PR) normal during voluntary contraction. Initially partial and delayed PR relaxation. After instruction virtually complete relaxation at third attempt.

Rectal balloon and EMG

- Rectal balloon: soon reaches maximum capacity; first filling sensation at 40 cc, first urgency at 80 cc, maximum urgency at 130 cc.
- EMG (Anuform): initial resting activity 14 μ V. Pelvic floor muscles after 1 sec of maximum contraction: 60 microvolt (μ V), relaxation 12 μ V; after 6 sec of maximum contraction: 25 μ V decreasing to 15 μ V; relaxation after maximum contraction 10 μ V. Submaximal contraction after 10 sec: 20 μ V, relaxation 12 μ V. Resting activity at end of session 8 μ V.

Measurement instruments

- Micturition list 24 h: n.a.d.
- Defecation diary: frequency: daily; Bristol Stools Scale 4; daily AI; fiber: 1 bag of Metamucil a day.
- Wexner score: 8

Analysis

- Nature: overactive pelvic floor with partial relaxation, weak contraction strength of EAS combined with raised diaphragm breathing, increased abdominal muscle tonicity and low rectal capacity.
- Severity: severe in terms of subjective well-being, social limitations and being worried about work resumption.
- Modifiability: inadequate coping strategies.

Physical therapy diagnosis/conclusion

- Pelvic floor dysfunction, breathing with raised diaphragm, low rectal capacity, avoidance behavior due to flatulence and fear of incontinence, inadequate coping strategies and fear of resuming work.
- Identification of problem category: AI with pelvic floor dysfunction and losses of which patient is unaware → no neurological problem but general impeding factors → problem category IVB.

Goal

- Based on the strategies used by this patient and the physical preconditions for change, therapist and patient decide to work on all components of the continence mechanism: muscle and reservoir function, consistency and increased volume of feces, awareness and acknowledgment of the health problem, and interaction between these components.

Strategy

- Education, improving insight and offering advice using a pelvic phantom and pictures:
 - anatomy and functioning of pelvic floor (PF) and relation between PF and 'core stability', body posture and movement;
 - functioning of anorectum and continence mechanisms, controlling flatal urgency, teaching suitable defecation technique to optimize evacuation;
 - bladder and bowel functions, and interaction between bladder, bowel, brain and PF;
 - focusing on relaxation; influence of diaphragmatic breathing on abdominal and PFM contraction;

- functioning of autonomic nervous system (sympathetic vs. parasympathetic) and influence on bowel function and anorectum.
- Awareness of problem, achieving voluntary control.
- Going from single to multiple, fully automatic ADL tasks.

Therapy

- EMG to promote awareness of PFM functions: optimizing PR relaxation and increasing EAS contraction strength.
- Balloon training to promote awareness of rectal filling sensation and increasing rectal capacity.
- Exercise therapy aimed at: defecation posture, toileting behavior and improved defecation technique, general relaxation, breathing with lowered diaphragm, optimizing PFM functions.
- Home exercise program 3x a day, 3x a week to optimize PFM functions: strengthening EAS, 1 sec maximum contraction, 6 sec maximum contraction, 10 sec sustained contraction, while checking complete relaxation (all exercises 15x).
- Coping strategies, controlling sense of urgency, integrating PFM activity and relaxation in ADL.
- Continuing fiber supplementation (Metamucil).

Evaluation

- Anorectal palpation during contraction: EAS muscle strength at voluntary contraction normal, PR normal; complete relaxation of PR and slight descensus during straining.
- EMG: initial resting activity 6 µV. After 1 sec maximal contraction: 60 µV, relaxation 4 µV. After 6 sec maximal contraction: 35 µV, decreasing to 30-25 µV; relaxation after maximum contraction 3 µV. Submaximal 10 sec: 25µV, relaxation 4 µV. Resting activity at end of session: 3 µV.
- Rectal balloon: first filling sensation at 25 cc, first urgency at 90 cc, maximum urgency at 180 cc.
- Coping: more relaxed, better able to deal with urgency, considerably reduced fear.
- Wexner score: 1 (rarely flatal incontinence).
- Defecation diary: defecation frequency: daily; Bristol Stools Scale 4, no AI, greatly reduced flatulence, 1 bag of Metamucil a day.
- GPE: much improved. Social activities resumed, work resumed, patient highly satisfied, treatment concluded.

References

- Wees PJ van der, Hendriks HJM, Helderdoorn M, Custers JW, Bie RA de. Methode voor ontwikkeling, implementatie en bijstelling van KNGF-richtlijnen. Methode versie 2.5. Amersfoort /Maastricht: KNGF; 2007.
- CBO Kwaliteitsinstituut voor de Gezondheidszorg. Evidence-based Richtlijnontwikkeling. Handleiding voor werkgroepleden. Utrecht: CBO; 2007.
- Landefeld CS, Bowers BJ, Feld AD, Hartmann KE, Hoffman E, Ingber MJ, et al. National Institutes of Health state-of-the-science conference statement: prevention of fecal and urinary incontinence in adults. *Ann Intern Med.* 2008;148(6):449-58.
- Haylen BT, Ridder D de, Freeman RM, Swift SE, Berghmans B, Lee J, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Int Urogynecol J Pelvic Floor Dysfunct.* 2009;21(1):5-26.
- Whitehead WE. Diagnosing and managing fecal incontinence: if you don't ask, they won't tell. *Gastroenterology.* 2005;129(1):6.
- Kalantar JS, Howell S, Talley NJ. Prevalence of faecal incontinence and associated risk factors; an underdiagnosed problem in the Australian community? *Med J Aust.* 2002;176(2):54-7.
- Macmillan AK, Merrie AE, Marshall RJ, Parry BR. The prevalence of fecal incontinence in community-dwelling adults: a systematic review of the literature. *Dis Colon Rectum.* 2004;47(8):1341-9.
- Pretlove SJ, Radley S, Toozs-Hobson PM, Thompson PJ, Coomarasamy A, Khan KSCP. Prevalence of anal incontinence according to age and gender: a systematic review and meta-regression analysis. *Int Urogynecol J Pelvic Floor Dysfunct.* 2006;17(4):407-17.
- Teunissen TA, Bosch WJ van den, Hoogen HJ van den, Lagro-Janssen AL. Prevalence of urinary, fecal and double incontinence in the elderly living at home. *Int Urogynecol J Pelvic Floor Dysfunct.* 2004;15(1):10-3; discussion 3.
- Chassagne P, Landrin I, Neveu C, Czernichow P, Bouaniche M, Doucet J, et al. Fecal incontinence in the institutionalized elderly: incidence, risk factors, and prognosis. *Am J Med.* 1999;106(2):185-90.
- Thomas TM, Egan M, Walgrove A, Meade TW. The prevalence of faecal and double incontinence. *Community Med.* 1984;6(3):216-20.
- Slieker-ten Hove MC, Pool-Goudzwaard AL, Eijkemans MJ, Steegers-Theunissen RP, Burger CW, Vierhout ME. Prevalence of double incontinence, risks and influence on quality of life in a general female population. *Neurourology Urodyn.* 2010;29(4):545-50.
- Madoff RD, Parker SC, Varma MG, Lowry ACCM. Faecal incontinence in adults. *Lancet.* 2004;364(9434):621-32.
- Tjandra JJ, Dykes SL, Kumar RR, Ellis CN, Gregorczyk SG, Hyman NH, et al. Practice parameters for the treatment of fecal incontinence. *Dis Colon Rectum.* 2007;50(10):1497-507.
- Farage MA, Miller KW, Berardesca E, Maibach HI. Psychosocial and societal burden of incontinence in the aged population: a review. *Arch Gynecol Obstet.* 2008;277(4):285-90.
- Markland AD, Goode PS, Burgio KL, Redden DT, Richter HE, Sawyer P, et al. Incidence and risk factors for fecal incontinence in black and white older adults: a population-based study. *J Am Geriatr Soc.* 2010;58(7):1341-6.
- Rey E, Choung RS, Schleck CD, Zinsmeister AR, Locke GR, 3rd, Talley NJ. Onset and risk factors for fecal incontinence in a US community. *Am J Gastroenterol.* 2010;105(2):412-9.
- Ostbye T, Seim A, Krause KM, Feightner J, Hachinski V, Sykes E, et al. A 10-year follow-up of urinary and fecal incontinence among the oldest old in the community: the Canadian Study of Health and Aging. *Can J Aging.* 2004;23(4):319-31.
- Deutekom M, Dobben AC, Dijkgraaf MG, Terra MP, Stoker J, Bossuyt PM. Costs of outpatients with fecal incontinence. *Scand J Gastroenterol.* 2005 May;40(5):552-8.
- Xu X, Menees SB, Zochowski MK, Fenner DE. Economic cost of fecal incontinence. *Dis Colon Rectum.* 2012;55(5):586-98.
- Dunivan GC, Heymen S, Palsos OS, von Korff M, Turner MJ, Melville JL, et al. Fecal incontinence in primary care: prevalence, diagnosis, and health care utilization. *Am J Obstet Gynecol.* 2010;202(5):493 et-6.
- College voor Zorgverzekeringen. GIPeilingen 2011: Ontwikkelingen genes- en hulpmiddelengebruik 2012; nr. 33. Diemen: CVZ; 2012.
- Bols EM, Hendriks EJ, Berghmans BC, Baeten CG, Nijhuis JG, Bie RA de. A systematic review of etiological factors for postpartum fecal incontinence. *Acta Obstet Gynecol Scand.* 2010;89(3):302-14.
- Brown SJ, Gartland D, Donath S, MacArthur C. Fecal incontinence during the first 12 months postpartum: complex causal pathways and implications for clinical practice. *Obstet Gynecol.* 2012;119(2 Pt 1):240-9.
- Solans-Domenech M, Sanchez E, Espuna-Pons M. Urinary and anal incontinence during pregnancy and postpartum: incidence, severity, and risk factors. *Obstet Gynecol.* 2010;115(3):618-28.
- Torrisi G, Minini G, Bernasconi F, Perrone A, Trezza G, Guardabasso V, et al. A prospective study of pelvic floor dysfunctions related to delivery. *Eur J Obstet Gynecol Reprod Biol.* 2012;160(1):110-5.
- Pretlove SJ, Thompson PJ, Toozs-Hobson PM, Radley S, Khan KS. Does the mode of delivery predispose women to anal incontinence in the first year postpartum? A comparative systematic review. *BJOG.* 2008;115(4):421-34.
- Nelson RL, Furner SE, Westercamp M, Farquhar C. Cesarean delivery for the prevention of anal incontinence. *Cochrane Database Syst Rev.* 2010(2):CD006756.
- Nelson RL, Westercamp M, Furner SECN. A systematic review of the efficacy of cesarean section in the preservation of anal continence. *Dis Colon Rectum.* 2006;49(10):1587-95.
- Altman D, Zetterstrom J, Lopez A, Pollack J, Nordenstam J, Mellgren A. Effect of hysterectomy on bowel function. *Dis Colon Rectum.* 2004;47(4):502-8; discussion 8-9.
- Forsgren C, Zetterstrom J, Lopez A, Nordenstam J, Anzen B, Altman D. Effects of hysterectomy on bowel function: a three-year, prospective cohort study. *Dis Colon Rectum.* 2007;50(8):1139-45.
- Geinitz H, Thamm R, Keller M, Astner ST, Heinrich C, Scholz C, et al. Longitudinal study of intestinal symptoms and fecal continence in patients with conformal radiotherapy for prostate cancer. *Int J Radiat Oncol Biol Phys.* 2011;79(5):1373-80.
- Little DJ, Kuban DA, Levy LB, Zagars GK, Pollack A. Quality-of-life questionnaire results 2 and 3 years after radiotherapy for prostate cancer in a randomized dose-escalation study. *Urology.* 2003;62(4):707-13.
- Nelson RL, Furner SE. Risk factors for the development of fecal and urinary incontinence in Wisconsin nursing home residents. *Maturitas.* 2005;52(1):26-31.
- Byrne CM, Solomon MJ, Young JM, Rex J, Merlino CL. Biofeedback for fecal incontinence: short-term outcomes of 513 consecutive patients and predictors of successful treatment. *Dis Colon Rectum.* 2007;50(4):417-27.
- Bo K, Aschehoug A. Strength training. In: Bo K, Berghmans B, Morkved S, Kampen M van, editors. Evidence-based physical therapy for the pelvic floor. London: Elsevier Ltd; 2007. p. 119-32.
- Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee IM, et al. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Med Sci Sports Exerc.* 2011;43(7):1334-59.

38. Norton C, Cody JD. Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults. *Cochrane Database Syst Rev.* 2012;7:CD002111.
39. NICE Clinical Guideline no. 49. The management of faecal incontinence in adults. London: National Collaborating Centre for Acute Care; 2007.
40. Jorge JM, Habr-Gama A, Wexner SDCJ. Biofeedback therapy in the colon and rectal practice. *Appl Psychophysiol Biofeedback.* 2003;28(1):47-61.
41. Osterberg A, Graf W, Eeg-Olofsson K, Hallden M, Pahlman L. Is electrostimulation of the pelvic floor an effective treatment for neurogenic faecal incontinence? *Scand J Gastroenterol.* 1999;34(3):319-24.
42. Bols E, Hendriks E, Bie R de, Baeten C, Berghmans B. Predictors of a favorable outcome of physiotherapy in fecal incontinence: secondary analysis of a randomized trial. *Neurourol Urodyn.* 2012 Sep;31(7):1156-60. doi: 10.1002/nuu.21236. Epub 2012 Apr 4.
43. Ryn A-K, Morren GI, Hallbook O, Sjudahl R. Long-term results of electromyographic biofeedback training for faecal incontinence. *Dis Colon Rectum.* 2000;43:1262-6.
44. Terra MP, Deutekom M, Dobben AC, Baeten CG, Janssen LW, Boeckxstaens GE, et al. Can the outcome of pelvic-floor rehabilitation in patients with fecal incontinence be predicted? *Int J Colorectal Dis.* 2008;23(5):503-11.
45. Cheetham M, Brazzelli M, Norton C, Glazener CM. Drug treatment for faecal incontinence in adults. *Cochrane Database Syst Rev.* 2009(1).
46. Markland AD, Richter HE, Burgio KL, Myers DL, Hernandez AL, Subak LLC. Weight loss improves fecal incontinence severity in overweight and obese women with urinary incontinence. *Int Urogynecol J.* 2011;22(9):1151-7.
47. Norton C, Whitehead WE, Bliss DZ, Harari D, Lang J. Management of fecal incontinence in adults. *Neurourol Urodyn.* 2010;29(1):199-206.
48. Norton C, Whitehead WE, Bliss DZ, Harari D, Lang J. Conservative and pharmacological management of faecal incontinence in adults. In: Abrams P, Cardoza L, Khoury S, Wein A, editors. *Incontinence.* Plymouth UK: Health Publications Ltd; 2009. p. 1321-86.
49. Bliss DZ, Jung HJ, Savik K, Lowry A, LeMoine M, Jensen L, et al. Supplementation with dietary fiber improves fecal incontinence. *Nurs Res.* 2001;50(4):203-13.
50. Stafne S, Salvesen K, Romundstad P, Torjusen I, Morkved S. Does regular exercise including pelvic floor muscle training prevent urinary and anal incontinence during pregnancy? A randomised controlled trial. *Bjog.* 2012;119(10):1270-80.
51. Fallon A, Westaway J, Moloney C. A systematic review of psychometric evidence and expert opinion regarding the assessment of faecal incontinence in older community-dwelling adults. *Int J Evid Based Healthc.* 2008;6(2):225-59.
52. Baxter NN, Rothenberger DA, Lowry ACCB. Measuring fecal incontinence. *Dis Colon Rectum.* 2003;46(12):1591-605.
53. Avery KN, Bosch JL, Gotoh M, Naughton M, Jackson S, Radley SC, et al. Questionnaires to assess urinary and anal incontinence: review and recommendations. *J Urol.* 2007;177(1):39-49.
54. Jaeschke R, Singer J, Guyatt GH. Measurement of health status. Ascertain the minimal clinically important difference. *Control Clin Trials.* 1989;10(4):407-15.
55. Veldhuyzen van Zanten SJ, Talley NJ, Bytzer P, Klein KB, Whorwell PJ, Zinsmeister ARC. Design of treatment trials for functional gastrointestinal disorders. *Gut.* 1999;45 Suppl 2:II69-77.
56. Backer JCS de. Bekkenbodemreëductie bij anale problematiek. In: Smits-Engelsman BCM, Ham I van, Vaes P, Aufdemkampe G, Dekker JB den, redactie. *Jaarboek Fysiotherapie/kinesiotherapie.* Houten/Diegem: Bohn Stafleu van Loghum; 1998. p. 16-37.
57. Lewis SJ, Heaton KW. Stool form scale as a useful guide to intestinal transit time. *Scand J Gastroenterol.* 1997;32(9):920-4.
58. Hosker G, Cody JD, Norton CC. Electrical stimulation for faecal incontinence in adults. *Cochrane Database Syst Rev.* 2007(3):CD001310.
59. Bols E, Berghmans B, Bie R de, Govaert B, Wunnik B van, Heymans M, et al. Rectal balloon training as add-on therapy to pelvic floor muscle training in adults with fecal incontinence: a randomized controlled trial. *Neurourol Urodyn.* 2012;31(1):132-8.
60. Heymen S, Scarlett Y, Jones K, Ringel Y, Drossman D, Whitehead WE. Randomized controlled trial shows biofeedback to be superior to pelvic floor exercises for fecal incontinence. *Dis Colon Rectum.* 2009;52(10):1730-7.
61. Heerkens Y, Hendriks EJ, Oostendorp RA. Assessment instruments and the ICF in rehabilitation and physiotherapy. *Medical Rehabilitation.* 2006;10(3):1-14.
62. Koninklijk Nederlands Genootschap voor Fysiotherapie. Brochure Zorgvuldig handelen bij voorbehouden en bijzondere handelingen. Amersfoort: KNGF; 2010.
63. NVFB. Engelenburg-van Lonkhuyzen M van, Hogen Esch F, Westerk-Verschuuren L, Coppoolse R. Beroepscompetentieprofiel Bekkenfysiotherapeut. Amersfoort: NVFB; 2009.
64. Abrams P, Andersson KE, Birdler L, Brubaker L, Cardozo L, Chapple C, et al. Fourth International Consultation on Incontinence Recommendations of the International Scientific Committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. *Neurourol Urodyn.* 2010;29(1):213-40.
65. Chiarioni G, Bassotti G, Monsignorini A, Menegotti M, Salandini L, Di Matteo G, et al. Anorectal dysfunction in constipated women with anorexia nervosa. *Mayo Clin Proc.* 2000;75(10):1015-9.
66. Bols EMJ, Berghmans LCM, Hendriks HJM, Baeten CGMI, Bie RA de. Physiotherapy and surgery in fecal incontinence: an overview. *Physical Therapy Reviews.* 2008;13(2):1-20.
67. Shamliyan TA, Bliss DZ, Du J, Ping R, Wilt TJ, Kane RL. Prevalence and risk factors of fecal incontinence in community-dwelling men. *Rev Gastroenterol Disord.* 2009;9(4):E97-110.
68. Oberwalder M, Connor J, Wexner SDCO. Meta-analysis to determine the incidence of obstetric anal sphincter damage. *Br J Surg.* 2003;90(11):1333-7.
69. Chiarioni G, Bassotti G, Stanganini S, Vantini I, Whitehead WECC. Sensory retraining is key to biofeedback therapy for formed stool fecal incontinence. *Am J Gastroenterol.* 2002;97(1):109-17.
70. Glia A, Gyllin M, Akerlund JE, Lindfors U, Lindberg G. Biofeedback training in patients with fecal incontinence. *Dis Colon Rectum.* 1998;41:359-64.
71. Sangwan YP, Coller JA, Schoetz DJ, Jr., Murray JJ, Roberts PLCS. Latency measurement of rectoanal reflexes. *Dis Colon Rectum.* 1995;38(12):1281-5.
72. Kraemer M, Ho YH, Tan W. Effectiveness of anorectal biofeedback therapy for faecal incontinence: medium-term results. *Tech Coloproctol.* 2001;5(3):125-9.
73. Leroi AM, Dorival MP, Lecouturier MG. Pudendal neuropathy and severity of incontinence but not presence of an anal sphincter defect may determine the response to biofeedback therapy in fecal incontinence. *Dis Colon Rectum.* 1999;42:762-9.
74. Norton C, Chelvanayagam S, Wilson-Barnett J, Redfern S, Kamm MACN. Randomized controlled trial of biofeedback for fecal incontinence. *Gastroenterology.* 2003;125(5):1320-9.
75. Pager CK, Solomon MJ, Rex J, Roberts RACP. Long-term outcomes of pelvic floor exercise and biofeedback treatment for patients with fecal incontinence. *Dis Colon Rectum.* 2002;45(8):997-1003.
76. Rieger NA, Wattchow DA, Sarre RG, Cooper SJ, Rich CA, Saccone GT, et al. Prospective trial of pelvic floor retraining in patients with fecal incontinence. *Dis Colon Rectum.* 1997;40(7):821-6.
77. Boselli AS, Pinna F, Cecchini S, Costi R, Marchesi F, Violi V, et al. Biofeedback therapy plus anal electrostimulation for fecal incontinence: prognostic factors and effects on anorectal physiology. *World J Surg.* 2010;34(4):815-21.
78. Fynes MM, Marshall K, Cassidy M, Behan M, Walsh D, O'Connell PR, et al. A prospective, randomized study comparing the effect of augmented biofeedback with sensory biofeedback alone on fecal incontinence after obstetric trauma. *Dis Colon Rectum.* 1999;42(6):753-8; discussion 8-61.
79. Abrams P, Cardoza L, Khoury S, Wein A, editors. *Incontinence: 4th International Consultation on Incontinence.* Paris, France: Health Publication Ltd; 2009.
80. Sievert KD, Amend B, Toomey PA, Robinson D, Milsom I, Koelbl H, et al. Can we prevent incontinence? ICI-RS 2011. *Neurourol Urodyn.* 2012;31(3):390-9.
81. Schnelle JF, Leung FW, Rao SS, Beuscher L, Keeler E, Clift JW, et al. A controlled trial of an intervention to improve urinary and fecal incontinence and constipation. *J Am Geriatr Soc.* 2010;58(8):1504-11.
82. Schnelle JF, Alessi CA, Simmons SF, Al-Samarrai NR, Beck JC, Ouslander JG. Translating clinical research into practice: a randomized controlled trial of exercise and incontinence care with nursing home residents. *J Am Geriatr Soc.* 2002;50(9):1476-83.
83. Erekson EA, Sung VW, Myers DL. Effect of body mass index on the risk of anal incontinence and defecatory dysfunction in women. *Am J Obstet Gynecol.* 2008;198(5):596 e1-4.
84. Altman D, Falconer C, Rossner S, Melin I. The risk of anal incontinence in obese women. *Int Urogynecol J Pelvic Floor Dysfunct.* 2007;18(11):1283-9.
85. Burgio KL, Richter HE, Clements RH, Redden DT, Goode PS. Changes in urinary and fecal incontinence symptoms with weight loss surgery in morbidly obese women. *Obstet Gynecol.* 2007;110(5):1034-40.
86. Roberson EN, Gould JC, Bushman WA. Prevalence of fecal incontinence and urinary incontinence after bariatric surgery (abstract). *Gastroenterology.* 2008;134:A65.
87. Markland AD, Richter HE, Burgio KL, Bragg C, Hernandez AL, Subak LLCM. Fecal incontinence in obese women with urinary incontinence: prevalence and role of dietary fiber intake. *Am J Obstet Gynecol.* 2009;200(5):566 e1-6.
88. Subak LL, Wing R, West DS, Franklin F, Vittinghoff E, Creasman JM, et al. Weight loss to treat urinary incontinence in overweight and obese women. *N Engl J Med.* 2009;360(5):481-90.

89. Lauti M, Scott D, Thompson-Fawcett MW. Fibre supplementation in addition to loperamide for faecal incontinence in adults: a randomized trial. *Colorectal Dis.* 2008;10(6):553-62.
90. Boyle R, Hay-Smith EJ, Cody JD, Morkved S. Pelvic floor muscle training for prevention and treatment of urinary and faecal incontinence in antenatal and postnatal women. *Cochrane Database Syst Rev.* 2012;10:CD007471.
91. Bo K, Haakstad LA. Is pelvic floor muscle training effective when taught in a general fitness class in pregnancy? A randomised controlled trial. *Physiotherapy.* 2011;97(3):190-5.
92. Wilson PD, Herbison GP. A randomized controlled trial of pelvic floor muscle exercises to treat postnatal urinary incontinence. *Int Urogynecol J Pelvic Floor Dysfunct.* 1998;9(5):257-64.
93. Glazener C, Herbison G, Wilson P, MacArthur C, Lang G, Gee H, et al. Conservative management of persistent postnatal urinary and faecal incontinence: randomised controlled trial. *BMJ (Clinical research ed.)* 2001;323(7313):593-6.
94. Glazener CM, Herbison GP, MacArthur C, Grant A, Wilson PDCG. Randomised controlled trial of conservative management of postnatal urinary and faecal incontinence: six year follow up. *BMJ.* 2005;330(7487):337.
95. Sleep J, Grant A. Pelvic floor exercises in postnatal care. *Midwifery.* 1987;3(4):158-64.
96. Meyer S, Hohlfeld P, Ahtari C, De Grandi P. Pelvic floor education after vaginal delivery. *Obstet Gynecol.* 2001;97(5 Pt 1):673-7.
97. Dannecker C. The effect of the pelvic floor training device Epi-No on the maternal pelvic floor function six months after childbirth - follow-up study of a randomised controlled trial. *Geburtshilfe Frauenheilkd.* 2004;64(11):1192-8.
98. Rockwood THCR. Incontinence severity and QOL scales for fecal incontinence. *Gastroenterology.* 2004;126(1 Suppl 1):S106-13.
99. Vaizey CJ, Carapeti E, Cahill JA, Kamm MACV. Prospective comparison of faecal incontinence grading systems. *Gut.* 1999;44(1):77-80.
100. Jorge JM, Wexner SDCJ. Etiology and management of fecal incontinence. *Dis Colon Rectum.* 1993;36(1):77-97.
101. Bols EM, Hendriks EJ, Deutekom M, Berghmans BC, Baeten CG, de Bie RACB. Inconclusive psychometric properties of the Vaizey score in fecally incontinent patients: a prospective cohort study. *Neurourol Urodyn.* 2010;29(3):370-7.
102. Rockwood TH, Church JM, Fleshman JW, Kane RL, Mavrantonis C, Thorson AG, et al. Patient and surgeon ranking of the severity of symptoms associated with fecal incontinence: the fecal incontinence severity index. *Dis Colon Rectum.* 1999;42(12):1525-32.
103. Pescatori M, Anastasio G, Bottini C, Mentasti A. New grading and scoring for anal incontinence. Evaluation of 335 patients. *Dis Colon Rectum.* 1992;35(5):482-7.
104. Miller R, Bartolo DC, Locke-Edmunds JC, Mortensen NJCM. Prospective study of conservative and operative treatment for faecal incontinence. *Br J Surg.* 1988;75(2):101-5.
105. Shelton AA, Madoff RD. Defining anal incontinence: establishing a uniform continence scale. *Semin Colon Rectal Surg.* 1997;8(2):54-60.
106. Lunniss PJ, Kamm MA, Phillips RK. Factors affecting continence after surgery for anal fistula. *Br J Surg.* 1994;81(9):1382-5.
107. Staskin D, Kelleher C, Avery K, Bosch R, Cotterill N, Coyne K, et al. Patient-reported outcome assessment. In: Abrams P, Cardoza L, Khoury S, Wein A, editors. *Incontinence, 4th International Consultation on Incontinence: Health Publication Ltd;* 2009. p. 363-412.
108. Bols EM, Hendriks HJ, Berghmans LC, Baeten CG, Bie RA de. Responsiveness and interpretability of incontinence severity scores and FIQL scale in patients with fecal incontinence: a secondary analysis from a randomized controlled trial. *Int Urogyn J* 2013 Mar;24(3):469-78.
109. Thomas S, Nay R, Moore K, Fonda D, Hawthorne G, Marosszeky N, et al. *Continence Outcomes Measurement Suite Project (Final report).* Australian Government Department of Health and Ageing; 2006.
110. Rockwood TH, Church JM, Fleshman JW, Kane RL, Mavrantonis C, Thorson AG, et al. Fecal Incontinence Quality of Life Scale: quality of life instrument for patients with fecal incontinence. *Dis Colon Rectum.* 2000;43(1):9-16; discussion 7.
111. Eypasch E, Williams JJ, Wood-Dauphinee S, Ure BM, Schmulling C, Neugebauer E, et al. *Gastrointestinal Quality of Life Index: development, validation and application of a new instrument.* *Br J Surg.* 1995;82(2):216-22.
112. Hanneman MJ, Sprangers MA, Mik EL de, Ernest van Heurn LW, Langen ZJ de, Looyaard N, et al. Quality of life in patients with anorectal malformation or Hirschsprung's disease: development of a disease-specific questionnaire. *Dis Colon Rectum.* 2001;44(11):1650-60.
113. Bug GJ, Kiff ES, Hosker GCB. A new condition-specific health-related quality of life questionnaire for the assessment of women with anal incontinence. *BJOG.* 2001;108(10):1057-67.
114. Avery K, Donovan J, Peters TJ, Shaw C, Gotoh M, Abrams PCA. ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. *Neurourol Urodyn.* 2004;23(4):322-30.
115. Naliboff BDCN. Choosing outcome variables: global assessment and diaries. *Gastroenterology.* 2004;126(1 Suppl 1):S129-34.
116. Irvine EJ, Whitehead WE, Chey WD, Matsueda K, Shaw M, Talley NJ, et al. Design of treatment trials for functional gastrointestinal disorders. *Gastroenterology.* 2006;130(5):1538-51.
117. Fisher K, Bliss DZ, Savik K. Comparison of recall and daily self-report of fecal incontinence severity. *J Wound Ostomy Continence Nurs.* 2008;35(5):515-20.
118. Bharucha AE, Seide BM, Zinsmeister AR, Melton LJ, 3rd. Insights into normal and disordered bowel habits from bowel diaries. *Am J Gastroenterol.* 2008;103(3):692-8.
119. Stone AA, Shiffman S, Schwartz JE, Broderick JE, Hufford MR. Patient non-compliance with paper diaries. *BMJ.* 2002;324(7347):1193-4.
120. Riegler G, Esposito I. Bristol scale stool form. A still valid help in medical practice and clinical research. *Tech Coloproctol.* 2001;5(3):163-4.
121. Talley NJ, Nyren O, Drossman DA, Heaton KW, Veldhuyzen van Zanten SJO, Koch MM. The irritable bowel syndrome: towards optimal design of controlled treatment trials. *Gastroenterol Int.* 1994;6:189-211.
122. Rogers RG, Abed H, Fenner DECR. Current diagnosis and treatment algorithms for anal incontinence. *BJU Int.* 2006;98 Suppl 1:97-106; discussion 7-9.
123. Nederlandse Vereniging voor Fysiotherapie bij Bekkenproblematiek en pré- en postpartum gezondheidszorg (NVFB). *Richtlijn voor het hygiënisch werken in het bekkenbodembgebied.* Amersfoort: NVFB; 2005.
124. Hansen JL, Bliss DZ, Peden-McAlpine C. Diet strategies used by women to manage fecal incontinence. *J Wound Ostomy Continence Nurs.* 2006;33(1):52-61; discussion 2.
125. Burgt MLA van der, Verhulst FJCM. *Doen en blijven doen, voorlichting en compliancebevordering door paramedici.* Houten: Bohn Stafleu van Loghum; 2009.
126. Osterberg A, Edebol Eeg-Olofsson K, Hallden M, Graf W. Randomized clinical trial comparing conservative and surgical treatment of neurogenic faecal incontinence. *Br J Surg.* 2004;91(9):1131-7.
127. Naimy N, Lindam AT, Bakka A, Faerden AE, Wiik P, Carlsen E, et al. Biofeedback vs. electrostimulation in the treatment of postdelivery anal incontinence: a randomized, clinical trial. *Dis Colon Rectum.* 2007;50:2040-6.
128. Mahony RT, Malone PA, Nalty J, Behan M, O'Connell P R, O'Herlihy CCM. Randomized clinical trial of intra-anal electromyographic biofeedback physiotherapy with intra-anal electromyographic biofeedback augmented with electrical stimulation of the anal sphincter in the early treatment of postpartum fecal incontinence. *Am J Obstet Gynecol.* 2004;191(3):885-90.
129. Schwandner T, König IR, Heimerl T, Kierer W, Roblick M, Bouchard R, et al. Triple target treatment (3T) is more effective than biofeedback alone for anal incontinence: the 3T-AI study. *Dis Colon Rectum.* 2010;53(7):1007-16.
130. Norton C, Gibbs A, Kamm MA. Randomized, controlled trial of anal electrical stimulation for fecal incontinence. *Dis Colon Rectum.* 2006;49(2):190-6.
131. Sprakel B, Maurer S, Langer M, Diller R, Spiegel HU, Winde GCS. [Value of electrotherapy within the scope of conservative treatment of anorectal incontinence]. *Zentralbl Chir.* 1998;123(3):224-9.
132. Bartlett L, Sloots K, Nowak M, Ho YH. Biofeedback for fecal incontinence: a randomized study comparing exercise regimens. *Dis Colon Rectum.* 2011;54(7):846-56.
133. Healy CF, Brannigan AE, Connolly EM, Eng M, O'Sullivan M J, McNamara DA, et al. The effects of low-frequency endo-anal electrical stimulation on faecal incontinence: a prospective study. *Int J Colorectal Dis.* 2006;21(8):802-6.
134. Davis KJ, Kumar D, Poloniecki J. Adjuvant biofeedback following anal sphincter repair: a randomized study. *Aliment Pharmacol Ther.* 2004;20(5):539-49.
135. Ilnyckyj A, Fachnie E, Tougas GC. A randomized-controlled trial comparing an educational intervention alone vs education and biofeedback in the management of faecal incontinence in women. *Neurogastroenterol Motil.* 2005;17(1):58-63.
136. Solomon MJ, Pager CK, Rex J, Roberts R, Manning JCS. Randomized, controlled trial of biofeedback with anal manometry, transanal ultrasound, or pelvic floor retraining with digital guidance alone in the treatment of mild to moderate fecal incontinence. *Dis Colon Rectum.* 2003;46(6):703-10.
137. Heymen S, Pikarsky A, Weiss E, Vickers D, Noguera J, Wexner S. A prospective randomized trial comparing four biofeedback techniques for patients with fecal incontinence. *Colorectal Dis.* 2000;2:88-92.
138. Miner PB, Donnelly TC, Read NWCM. Investigation of mode of action of biofeedback in treatment of fecal incontinence. *Dig Dis Sci.* 1990;35(10):1291-8.
139. Norton C, Kamm MACN. Anal sphincter biofeedback and pelvic floor exercises for faecal incontinence in adults - a systematic review. *Aliment Pharmacol Ther.* 2001;15(8):1147-54.

