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Systematic review of endometriosis pain assessment: how to choose a scale?

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BACKGROUND: Numerous studies concerning endometriosis and pain have been reported. However, there is no consensus on the best method to evaluate pain in endometriosis and many scales have been used. Moreover, there are only a few descriptions of minimal clinically important differences after treatment (MCID) to evaluate variations in pain. In our study, we aim to identify pain scales used in endometriosis pain treatment, to address their strong and weak points and to define which would be the ideal scale to help clinicians and researchers to evaluate endometriosis-related pain.

METHODS: A search of the MEDLINE and EMBASE databases was carried out for publications in English, French or Portuguese from 1980 to December 2012, for the words: endometriosis, treatment, pain. Studies were selected if they studied an endometriosis treatment and a pain scale was specified. A quantitative and a qualitative analysis of each scale was performed to define strong and weak points of each scale (systematic registration number: CRD42013005336).

RESULTS: A total of 736 publications were identified. After excluding duplications and applying inclusion criteria 258 studies remained. We found that the visual analog scale (VAS) is the most frequently used scale. Both VAS and the numerical rating scale (NRS) show a good balance between strong and weak points in comparison with others such as the Biberoglu and Behrman scale. Concerning MCID, only VAS, NRS and Brief Pain Inventory scales have reported MCID and, among these, only VAS MCID has been studied in endometriosis patients (VAS MCID = 10 mm). Adding the Clinical Global Impression score (CGI) to the pain scale allows calculation of the MCID.

CONCLUSIONS: When using pain scales their strengths and weaknesses must be known and included in the analysis. VAS is the most frequently used pain scale and, together with NRS, seems the best adapted for endometriosis pain measurement. The use of VAS or NRS for each type of typical pain related to endometriosis (dysmenorrhea, deep dyspareunia and non-menstrual chronic pelvic pain), combined with the CGI and a quality-of-life scale will provide both clinicians and researchers with tools to evaluate treatment response.

Key words: endometriosis / pain / review / scale / responder

Introduction

Endometriosis and pain

One of the main symptoms of endometriosis is pain. There are classically three types of pain related to endometriosis: dysmenorrhea, deep dyspareunia and non-menstrual chronic pelvic pain (CPP). Dysmenorrhea is defined as pelvic pain associated with menstrual bleeding, while deep dyspareunia is pelvic pain during deep sexual penetration (Fedele *et al.*, 1992; Stratton and Berkley, 2011): both present with repeated acute pain episodes. CPP has been defined as non-menstrual pelvic pain of >6 months duration that is severe enough to cause functional disability or require medical or surgical treatment (Howard *et al.*, 2000; Howard, 2003). The definition of CPP may be more restrictive and some authors exclude severe dysmenorrhea and deep dyspareunia (Jones and Sutton, 2003), but other experts (Vercellini *et al.*, 1990) recommend a broader definition that includes severe dysmenorrhea, deep dyspareunia and all other painful symptoms located in the pelvis. The difficulty lies not only in the definition of the type of pain related to endometriosis but also in the evaluation of this pain. Pain is a subjective and complex experience, the understanding of which requires a good description of its individual characteristics for each patient (Dworkin *et al.*, 2005). Despite this complexity, many endometriosis studies classify dysmenorrhea, dyspareunia and CPP as either absent, mild, moderate or severe and describe the degree of debility experienced (Biberoglu and Behrman, 1981). This incomplete evaluation strategy hampers assessment of pain outcomes (Vincent *et al.*, 2010) (Stratton and Berkley, 2011). Clinicians are often perplexed when setting up a trial on endometriosis as to how to adequately assess endometriosis-related pain. In order to clarify this point the objectives of this review were first to identify all pain scales described in the literature and used in clinical endometriosis studies, secondly to analyze the main strengths and weaknesses of each scale, and finally, to determine what could constitute an ideal scale.

Methods

Literature search

We undertook a MEDLINE and EMBASE search using the following terms: endometriosis treatment; pain. We included observational, retrospective and prospective studies, controlled clinical trials and RCTs; comparative or non-comparative studies, multicenter and single-center studies were all included. Publications were selected if they studied endometriosis treatment and if a pain scale was used. The references of each identified study were also checked for other potentially relevant studies. An additional search was made focusing on every scale and on 'endometriosis' for articles related to scale development applied to endometriosis patients. Studies were limited to those published between January 1980 and December 2012 and written in English, French or Portuguese. Authors were contacted to obtain specific details regarding the pain scales when considered relevant for scale descriptions. Data were collected in Endnote X4® independently by two researchers and, at the end, were verified by a third researcher when there was disagreement in the collected data. The search measurement was the sum of articles using each pain scale.

Description and comparison of scales

We begin by describing all the scales found (quantitative analysis), focusing thereafter on the analysis of their strengths and weaknesses (qualitative analysis: comparative analysis of scales). The strong and weak points were defined according to the literature on chronic pain and specificity of pain in endometriosis. First of all, we focused on criteria used in evaluating potential core outcome measures for chronic pain clinical trials by the IMMPACT group (Initiative on Methods, Measurement and Pain Assessment in Clinical Trials, Dworkin *et al.*, 2005). The mission of IMMPACT (http://www.immpact.org/) is to 'develop consensus reviews and recommendations for improving the design, execution, and interpretation of clinical trials of treatments for pain' and members of this group come from academia, regulatory agencies (US Food and Drug Administration (FDA), European Medicines Agency), US National Institutes of Health (NIH), US Veterans Administration, consumer support and advocacy groups and industry. The IMMPACT group has published several guidelines, recommendations and systematic reviews since 2002. The criteria used by IMMPACT were (i) appropriateness of the measure's content and conceptual model, (ii) reliability, (iii) validity, (iv) responsiveness, (v) interpretability, (vi) precision of scores, (vii) respondent and administrator acceptability, (viii) respondent and administrator burden and feasibility, (ix) availability and equivalence of alternate forms and methods of administration (e.g. self-report, interviewer) and (x) availability and equivalence of versions for different cultures and languages. We also included criteria stressed by the Art and Science of Endometriosis meeting (an international meeting convened 5 years ago by the NIH, in collaboration with the American Society for Reproductive Medicine (ASRM), with the aim of establishing entry criteria and outcome measures for use in international clinical trials in endometriosis with regard to pain symptoms): single (summed) or separate pain assessments, cyclicity and frequency of assessment and definition of responder (Vincent *et al.*, 2010). Data regarding pain assessment and scales used in other specialties (Hawker *et al.*, 2011; Hjermstad *et al.*, 2011) were also used when considered relevant for the comparison. We also included the guidance published by the FDA (U.S. Department of Health and Human ServicesFDA, 2009) to support claims in approved medical product labeling. This guidance emphasized the use of Patient-reported outcomes (PRO) and PRO instrument in the evaluation of the safety and effectiveness of medical products (such as a treatment for endometriosis or endometriosis-related pain). We then divided the assessment of scales into nine fields to include the criteria previously published by the IMMPACT group, by the Art and Science of Endometriosis meeting, by the FDA and adapted to the specificity of endometriosis: 1, scale description and application; 2, validity, responsiveness, reproducibility and reliability; 3, disease specificity; multidimensionality; 4, respondent and investigator burden and feasibility; 5, validation in foreign languages; 6, precise pain measurement and pain measurement inclusion criteria; 7, timing of pain assessment; 8, PRO and PRO instrument; 9, responder concept and minimal clinically important difference after treatment (MCID).

Results

We identified 736 articles (flow diagram, Fig. 1) by tracking the key words 'endometriosis', 'treatment' and 'pain'. One hundred and thirty-two duplicates were excluded leaving 604 records to be screened. Abstracts were screened and found that 279 articles did not address the subject of endometriosis treatment response. Disagreement between the two researchers concerned 23 articles (not shown in flow diagram). Sixteen were excluded by the third researcher (articles not within the inclusion criteria: pain scale was not accurately described). After reading

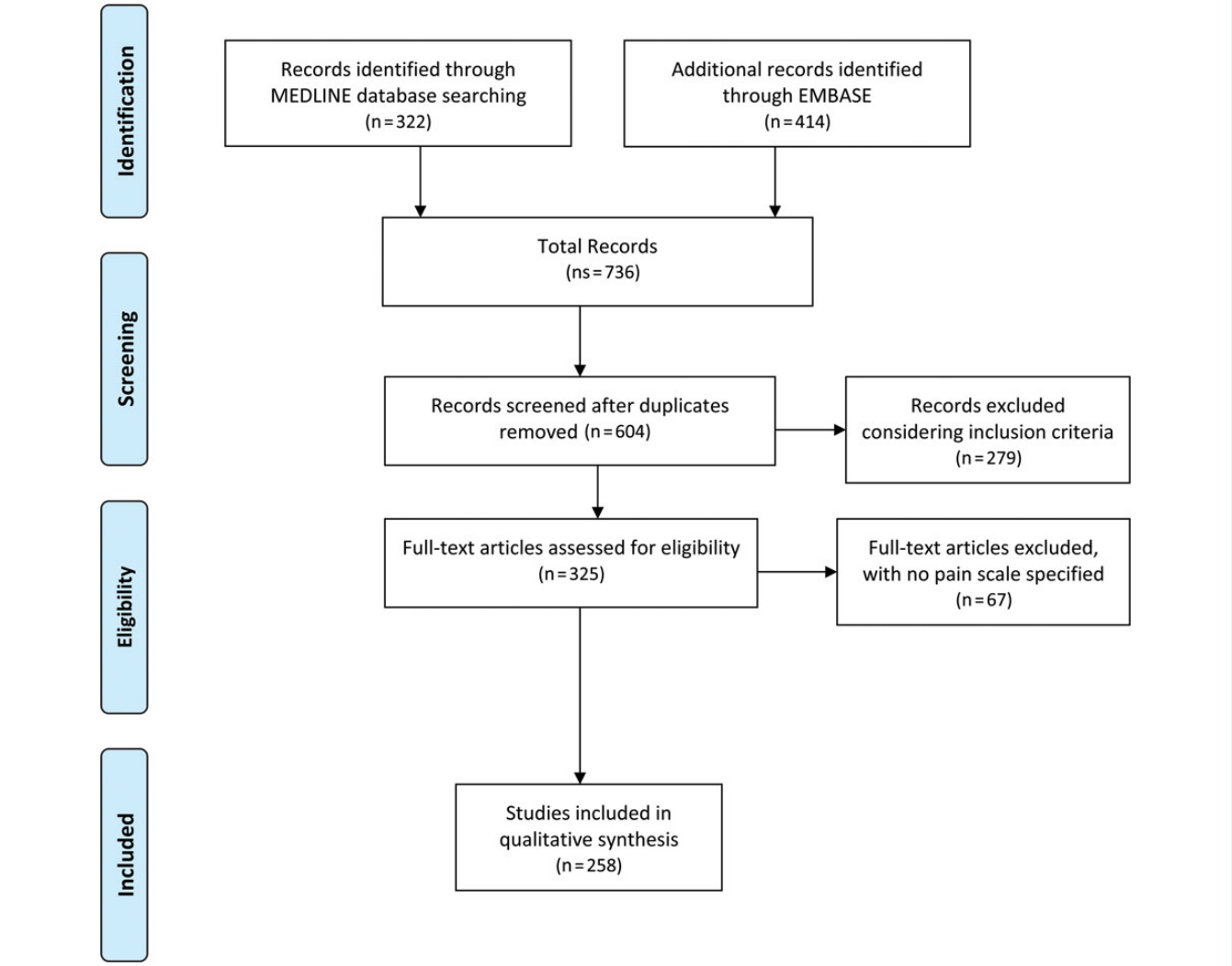


Figure 1 Flow diagram.

the full records, 67 did not specify the pain scale used and we kept 258 articles for the analysis.

Pain scales

Quantitative analysis

In these 258 selected publications, we identified nine scales that are now briefly described. Study references found regarding each scale are presented in Table I.

Visual analog scale. The visual analog scale (VAS) was used most frequently, with a total of 167 publications identified in our search. The VAS consists of a 10 cm long horizontal line with its extremes marked as 'no pain' and 'worst pain imaginable' (Fig. 2). Each patient ticks her pain level on the line and the distance from 'no pain' on the extreme left to the tick mark is measured in millimeters yielding a pain score from 0 to 100 (Gerlinger *et al.*, 2012a, b). This scale can be used for each type of pain, namely dysmenorrhea, dyspareunia, dyschesia and CPP. This self-report of pain is considered as the 'gold standard' of pain measurement.

Numerical rating scale. A total of 33 publications were found to have used the Numerical Rating Scale (NRS). The NRS is a segmented numerical version of the VAS in which a respondent selects a whole number (0–10) that best reflects the intensity of the pain (Rodriguez, 2001). The common format is a horizontal bar or line (Fig. 2). Like the VAS pain scale, the NRS is anchored by terms describing pain severity extremes (Breivik *et al.*, 2008; Hawker *et al.*, 2011). This scale can also be used for each type of pain.

Verbal rating scales. A total of 48 publications were found to have used Verbal Rating Scales (VRS). VRSs use categories to differentiate pain intensity. There is a wide variability of terms used to describe each category and the rating may be divided into four (0–3) or six (0–5) categories. Patients score their pain intensity from absent (0) to severe (3) or from none (0) to very severe (5) (Vercellini *et al.*, 1999). This scale can also be used for each type of pain.

Biberoglu and Behrman score. A total of 48 publications were found to have used the Biberoglu and Behrman (B&B) score. The B&B score (Biberoglu

Table I Studies found in a systematic review of endometriosis pain assessment and the pain scale used.

Scale	Study references
VAS, $n = 167$	Fedele *et al.* (1989), Vercellini *et al.* (1991), Candiani *et al.* (1992), Fedele *et al.* (1992), Vercellini *et al.* (1993), Fedele *et al.* (1993), Parazzini *et al.* (1994), Sutton *et al.* (1994), Vercellini *et al.* (1994), Gestrinone Italian Study Group (1996), Kettel *et al.* (1996), Vercellini *et al.* (1996a), Crosignani *et al.* (1996b), Sutton *et al.* (1997), Beretta *et al.* (1998), Kettel *et al.* (1998), Bergqvist *et al.* (1998), Takeuchi *et al.* (1999), Bianchi *et al.* (1999), Morgante *et al.* (1999), Fedele *et al.* (1999), Vercellini *et al.* (1999), Parazzini *et al.* (2000), Garry *et al.* (2000), Muzii *et al.* (2000), Miller (2000), Fedele *et al.* (2001), Jones *et al.* (2001), Chapron *et al.* (2001), Kaminski *et al.* (2001), Gordon *et al.* (2002), Vercellini *et al.* (2002), Ylanen *et al.* (2003), Zullo *et al.* (2003), Vercellini *et al.* (2003a), Ylanen *et al.* (2003), Milingos *et al.* (2003), Abbott *et al.* (2003), Vercellini *et al.* (2003c), Abbott *et al.* (2004), Ailawadi *et al.* (2004), Alborzi *et al.* (2004), Cobellis *et al.* (2004a), Cobellis *et al.* (2004b), Ford *et al.* (2004), Johnson *et al.* (2004), Abbott *et al.* (2004), Zupi *et al.* (2004), Fedele *et al.* (2004), Huber *et al.* (2004), Zullo *et al.* (2004), Amsterdam *et al.* (2005), Laursen *et al.* (2005), Petta *et al.* (2005), Lockhat *et al.* (2005), Petta *et al.* (2005), Vignali *et al.* (2005), Hong (2005), Ikeda *et al.* (2005), Vercellini *et al.* (2005), Hefler *et al.* (2005), Lyons *et al.* (2006), Vercellini *et al.* (2006), Parker *et al.* (2006), Wykes *et al.* (2006), Parazzini *et al.* (2006), Ceyhan *et al.* (2006), Gomes *et al.* (2007), Razzi *et al.* (2007), Alborzi *et al.* (2007), Sesti *et al.* (2007), Acien *et al.* (2007), Remorgida *et al.* (2007a, b), Remorgida *et al.* (2007a, b), Frenna *et al.* (2007), Villa *et al.* (2007), Seracchioli *et al.* (2007), Razzi *et al.* (2007), Kristensen and Kjer (2007), Ferrero *et al.* (2007), Fedele *et al.* (2007), Landi *et al.* (2008), Stratton *et al.* (2008), Harada *et al.* (2008), Roman *et al.* (2008), Koninckx *et al.* (2008), Manwaring *et al.* (2008), Kamencic and Thiel (2008), Kitawaki *et al.* (2008), Seracchioli *et al.* (2008), Daniels *et al.* (2009), Kaiser *et al.* (2009), Ferrero *et al.* (2009), Harada *et al.* (2009), Momoeda *et al.* (2009), Jedrzejczak *et al.* (2009), Lijoi *et al.* (2009), Walch *et al.* (2009), Romão *et al.* (2009), Walch *et al.* (2009), Stepniewska *et al.* (2009), Harada *et al.* (2009), Ferreira *et al.* (2010), Vercellini *et al.* (2010), Gerlinger *et al.* (2010), Ferreira *et al.* (2010), Porpora *et al.* (2010), Long *et al.* (2010), Lv *et al.* (2010), Roman *et al.* (2010a, b), Strowitzki *et al.* (2010b), Rubi-Klein *et al.* (2010), Darai *et al.* (2010a), Healey *et al.* (2010), Roman *et al.* (2010), Seracchioli *et al.* (2010a), Seracchioli *et al.* (2010b), Strowitzki *et al.* (2010a), Valiani *et al.* (2010), Minelli *et al.* (2010), He *et al.* (2010), Ferrero *et al.* (2010a, b, c), Mereu *et al.* (2010), Cobellis *et al.* (2011), Souza *et al.* (2011), Hsu *et al.* (2011), Karp *et al.* (2011), Kitawaki *et al.* (2011), Possover *et al.* (2011), Gerlinger and Schmelter (2011), Xu *et al.* (2011), Tandoi *et al.* (2011), Stepniewska *et al.* (2010), Missmer and Bove (2011), Ferrero *et al.* (2011), Mabrouk *et al.* (2011), Coccia *et al.* (2011), Alborzi *et al.* (2011), Shi *et al.* (2011), Abushahin *et al.* (2011), Flower *et al.* (2011), Ferrero *et al.* (2011), Muzii *et al.* (2011), Bayoglu Tekin *et al.* (2011), Petraglia *et al.* (2012), Cheewadhanaraks *et al.* (2012), Vercellini *et al.* (2012), Mabrouk *et al.* (2012), Ghahiri *et al.* (2012), Gerlinger *et al.* (2012b), Martellucci *et al.* (2012), Setala *et al.* (2012), Tanmahasamut *et al.* (2012), Strowitzki *et al.* (2012), Mereu *et al.* (2012), Napadow *et al.* (2012), Santanam *et al.* (2013), Gerlinger *et al.* (2012a), Mabrouk *et al.* (2012), Wickstrom *et al.* (2012), McKinnon *et al.* (2012), Friggi Sebe Petrelluzzi *et al.* (2012), Ferrari *et al.* (2012), Dubuisson *et al.* (2013)
Numeric rating scale, $n = 33$	Fedele *et al.* (1989), Candiani *et al.* (1992), Busacca *et al.* (1998), Ling (1999), Morgante *et al.* (1999), Hurst *et al.* (2000), Busacca *et al.* (2001), Fauconnier *et al.* (2002), Chapron *et al.* (2003), Thomassin *et al.* (2004), Chopin *et al.* (2005), Darai *et al.* (2005), Dubernard *et al.* (2006), Fedele *et al.* (2006), Landi *et al.* (2006), Fedele *et al.* (2007), Wayne *et al.* (2008), Wayne *et al.* (2008), Ahn *et al.* (2009), Doyle *et al.* (2009), Minelli *et al.* (2009), Minelli *et al.* (2009), Darai *et al.* (2010b), Deal *et al.* (2010), Roghaei *et al.* (2010), Kovoor *et al.* (2010), Chawla (2010), Guzick *et al.* (2011), Bassi *et al.* (2011), Miranda-Mendoza *et al.* (2012), Ercoli *et al.* (2012), Kaser *et al.* (2012), Issa *et al.* (2012)
Verbal rating scale, $n = 48$	Kauppila and Ronnberg (1985), Shaw (1990), Schlaff *et al.* (1990), Elstein *et al.* (1992), Rock *et al.* (1993), Vercellini *et al.* (1991), Vercellini *et al.* (1993), Vercellini *et al.* (1994), Biggerstaff Iii and Foster (1994), Redwine (1994), Carpenter *et al.* (1995), Gestrinone Italian Study Group (1996), Vercellini *et al.* (1996), Crosignani *et al.* (1996a, b), Vercellini *et al.* (1996), Dmowski *et al.* (1997), Tummon *et al.* (1989), Regidor *et al.* (1997), Bergqvist *et al.* (1998), Vercellini *et al.* (1998), Dmowski *et al.* (1989), Vercellini *et al.* (1999a, b), Ling (1999), Bianchi *et al.* (1999), Harrison and Barry-Kinsella (2000), Fedele *et al.* (2000), Kwok *et al.* (2001), Bulletti *et al.* (2001), Vercellini *et al.* (2003c), Abrao *et al.* (2003), Wong and Tang (2004), Lockhat *et al.* (2005), Wright *et al.* (2005), Nardo *et al.* (2005), Hill *et al.* (2005), Trivedi *et al.* (2007), Harada *et al.* (2008), Stratton *et al.* (2008), Wang *et al.* (2009), Harada *et al.* (2009), Momoeda *et al.* (2009), Radosa *et al.* (2010), Kim *et al.* (2011), Yeung *et al.* (2011), Wurn *et al.* (2011), Cheewadhanaraks *et al.* (2012), Dubuisson *et al.* (2013)
Biberoglu and Behrman scale, $n = 48$	Mettler *et al.* (1991), Candiani *et al.* (1992), Wheeler *et al.* (1992), Reichel *et al.* (1992), Cirkel *et al.* (1995), Cirkel *et al.* (1995), Choktanasiri *et al.* (1996), Vercellini *et al.* (1996b), Hornstein *et al.* (1997a), Hornstein *et al.* (1997b), Gregoriou *et al.* (1997), Colwell *et al.* (1998), Hornstein *et al.* (1998), Ling (1999), Vercellini *et al.* (1999a, b), Bergqvist and Group (2000), Fedele *et al.* (2000), Miller (2000), Bergqvist and Theorell (2001), Busacca *et al.* (2001), Fedele *et al.* (2001), Surrey and Hornstein (2002), Vercellini *et al.* (2002), Vercellini *et al.* (2003b), Vercellini *et al.* (2003a), Soysal *et al.* (2003), Soysal *et al.* (2004), Fernandez *et al.* (2004), Cheng *et al.* (2005), Vercellini *et al.* (2005), Cheng *et al.* (2005), Crosignani *et al.* (2006), Angioni *et al.* (2006), Vercellini *et al.* (2006), Schlaff *et al.* (2006), Crosignani *et al.* (2006), Wayne *et al.* (2008), Loverro *et al.* (2008), Moravek *et al.* (2009), Vercellini *et al.* (2010), Deal *et al.* (2010), Lv *et al.* (2010), Ferrero *et al.* (2011), Guzick *et al.* (2011), Bayoglu Tekin *et al.* (2011), Strowitzki *et al.* (2012), Gerlinger *et al.* (2012b), Maia *et al.* (2012)
McGill Pain Questionnaire, $n = 8$	Ling (1999), Gordon *et al.* (2002), Lukanova and Popov (2008), Moravek *et al.* (2009), Fabbri *et al.* (2009), Valiani *et al.* (2010), Xiang *et al.* (2011), Martin *et al.* (2011)
Andresch and Milsom's scale, $n = 7$	Fedele *et al.* (1989), Candiani *et al.* (1992), Fedele *et al.* (1992), Parazzini *et al.* (1994), Parazzini *et al.* (2000), Parazzini *et al.* (2001), Gruppo Italiano per la studio dell'Endometriosi (2001), Parazzini *et al.* (2006)

Continued

Table I *Continued*

Scale	Study references
Detailed questionnaire of dysmenorrhea, $n = 1$	Tjaden *et al.* (1990)
Endometriosis pain and bleeding diary, $n = 1$	Deal *et al.* (2010)
Brief Pain Inventory scale, $n = 1$	Deal *et al.* (2010)

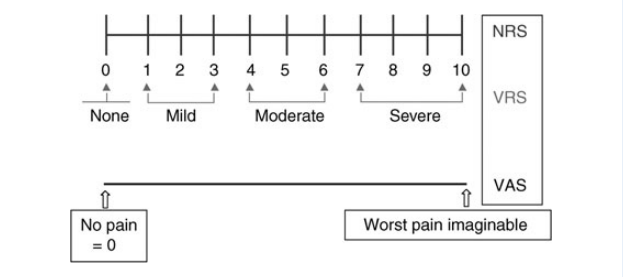


Figure 2 VAS, NRS (numeric rating scale) and VRS (verbal rating scale). From Breivik *et al.* (2008). Used by permission of Oxford University Press.

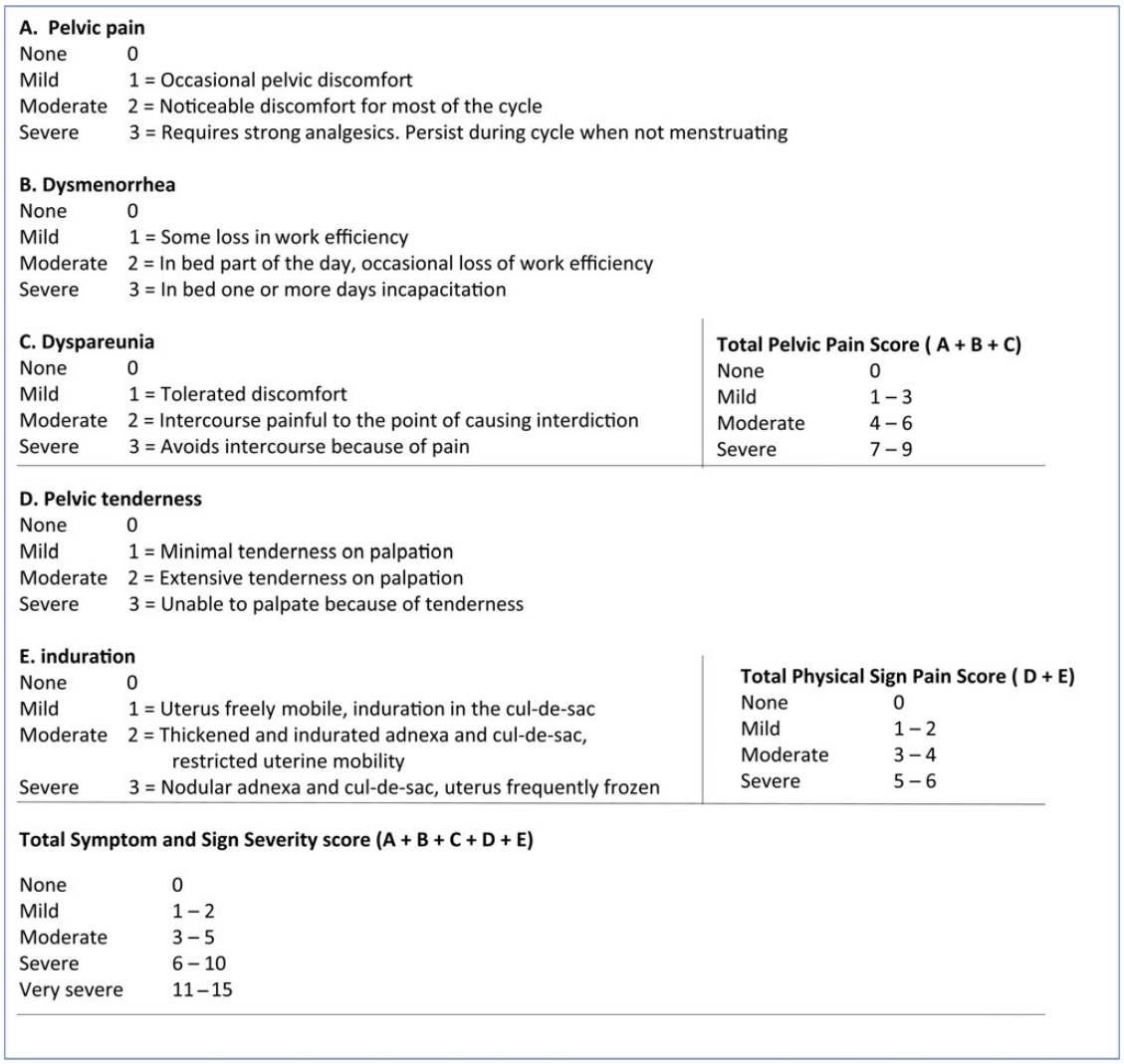
and Behrman, 1981) consists of a rating based on the patient's assessment of three distinct pain symptoms (dysmenorrhea, pelvic pain and dyspareunia) and on two findings obtained during gynecologic palpation (tenderness and induration). Each symptom is classified as absent, mild, moderate or severe. The original article only described a severity profile for symptoms and findings (for example severe dysmenorrhea is considered to be when the patient remains in bed for one or more days). Modified versions of the B&B score combine the three pain symptoms into the 'pelvic symptoms score' or 'endometriosis symptom severity scale' and the two clinical findings into the 'physical symptoms score'. This can be misleading because if the comparison is made between a woman with moderate dyspareunia, dysmenorrhea and pelvic pain and a consequent score of 6, and another woman with severe dyspareunia (avoids intercourse because of pain) but mild dysmenorrhea and no pelvic pain and a score of only 4, the incapacitating symptomatology is not taken into account. Finally, both the pelvic symptoms score and the physical symptoms score can be combined with the 'B&B total sum score' (Gerlinger *et al.*, 2012a, b). The final score ranges from 0 to 15 (Fig. 3). This final score can also be confusing and potentially hazardous because combining physical examination with symptomatology can induce wrong conclusions. Patients describe symptomatology and gynecologists evaluate tenderness and induration during physical examination with an exceedingly high risk of bias and inconsistent reproducibility.

McGill Pain Questionnaire. A total of eight publications were found to have used the McGill Pain Questionnaire (MPQ). The MPQ is a multidimensional verbal scale in which descriptive terms play a role to help women in defining their own pain (Fabbri *et al.*, 2009; Hawker *et al.*, 2011). It has five dimensions: pain location, intensity, quality, pattern, alleviating and aggravating factors. Pain intensity is measured in six categories as in the VRS (0 = none, 1 = mild, 2 = discomforting, 3 = distressing, 4 = horrible and 5 = excruciating). Pain location is assessed on a sketch of the human body where the patient draws the areas that are painful. The number of pain sites is summed as an indicator of the sensory pain dimension. Pain quality is assessed by asking the patient 'what does your pain feel like?' with selection from 78 descriptors in 20 subclasses. In relation to the pain pattern (sensory dimension), participants respond to the question 'How does your pain change with time?' by selecting from nine words (continuous, steady, constant, rhythmic, periodic, intermittent, brief, momentary and transient). These nine words are categorized into three main pain patterns—continuous, intermittent and transient. Finally, in relation to alleviating and aggravating factors (behavioral dimension), participants respond to two open-ended questions: 'What kind of things decrease your pain?' and 'What kind of things increase your pain?' Responses are qualitative and commonly are organized in themes with frequency distributions reported. The pain score is a sum of all applicable descriptors with a maximum of 78 and a minimum of 0. This scale is frequently used for chronic pain assessment.

Andersch and Milsom scale. A total of seven publications were found to have used the Andersch and Milsom scale. The Andersch and Milsom scale defines pain severity according to work performance (unaffected = 0; rarely affected = 1; moderately affected = 2 and clearly inhibited = 3), the coexistence of systematic symptoms (absent = 0 and present = 1) and the consumption of analgesics (never = 0; rarely = 1; regularly = 2 and never because they are ineffective = 3) (Andersch and Milsom, 1982). The total score is a sum of every answer and, therefore, the maximum score is 7 and the minimum 0.

Detailed questionnaire of dysmenorrhea (Tjaden et al.*, 1990).* One publication was found using this scale. This is described by the author as a detailed questionnaire in the subjective assessment of dysmenorrhea before surgery and 6 months after surgery. This questionnaire includes a section on personal history as well as a list of 80 descriptive terms frequently noted by patients with dysmenorrhea. Patients are asked to choose all terms that are applicable. An anatomical diagram for location of dysmenorrhea is also included (Tjaden *et al.*, 1990). The author does not, however, specify the method to calculate the pain score or the range of this pain scale.

Endometriosis pain and bleeding diary. One publication was found using this scale. It is a 17-item diary (assessing for instance dyspareunia) concerning endometriosis pain and allowing correlation with the bleeding pattern. It measures pain with a NRS (0–10) namely: intermittent pelvic pain, continuous pelvic pain, intermittent dysmenorrhea, continuous dysmenorrhea and dyspareunia (Deal *et al.*, 2010).



A. Pelvic pain

None	0
Mild	1 = Occasional pelvic discomfort
Moderate	2 = Noticeable discomfort for most of the cycle
Severe	3 = Requires strong analgesics. Persist during cycle when not menstruating

B. Dysmenorrhea

None	0
Mild	1 = Some loss in work efficiency
Moderate	2 = In bed part of the day, occasional loss of work efficiency
Severe	3 = In bed one or more days incapacitation

C. Dyspareunia

None	0
Mild	1 = Tolerated discomfort
Moderate	2 = Intercourse painful to the point of causing interdiction
Severe	3 = Avoids intercourse because of pain

Total Pelvic Pain Score (A + B + C)

None	0
Mild	1 – 3
Moderate	4 – 6
Severe	7 – 9

D. Pelvic tenderness

None	0
Mild	1 = Minimal tenderness on palpation
Moderate	2 = Extensive tenderness on palpation
Severe	3 = Unable to palpate because of tenderness

E. induration

None	0
Mild	1 = Uterus freely mobile, induration in the cul-de-sac
Moderate	2 = Thickened and indurated adnexa and cul-de-sac, restricted uterine mobility
Severe	3 = Nodular adnexa and cul-de-sac, uterus frequently frozen

Total Physical Sign Pain Score (D + E)

None	0
Mild	1 – 2
Moderate	3 – 4
Severe	5 – 6

Total Symptom and Sign Severity score (A + B + C + D + E)

None	0
Mild	1 – 2
Moderate	3 – 5
Severe	6 – 10
Very severe	11 – 15

Figure 3 B&B score. From Biberoglu and Behrman (1981). Used by permission of Elsevier.

The modified Brief Pain Inventory—short form. One publication has been reported. A modified version of the Brief Pain Inventory—short form (mBPI-SF) (Cleeland, 1991) was used in only one study (Deal *et al.*, 2010). The BPI-SF measures pain intensity, the impact of pain on daily functions, pain location and analgesic use. In the mBPI-SF, pain location and analgesic use items were excluded. Thus, the mBPI-SF uses a 0–10 NRS to rate pain intensity (four items), pain relief (one item) and level of pain interference (seven items) from the patient's perspective. In this study, the four severity items were averaged to assess pain intensity. The seven items relating to pain interference were averaged to provide an overall interference. The pain score ranges from 0 to 1.

Pain scales

Qualitative analysis: comparative analysis of scales

Qualitative analysis was performed as described in 'Methods'. The principal characteristics (classified as weak/strong points) of the nine pain scales are summarized in Table II.

Scale description and application. All are accurately described except the detailed questionnaire of dysmenorrhea used in a single study (Tjaden *et al.*, 1990). VAS is the most frequently used pain scale in endometriosis treatment and 167 articles using this scale were found (Table II), followed by VRS and B&B, which were each used in 48 articles. Despite the fact that most scales are well described, some of these scales, such as B&B and VRS, have been administered in different formats by authors (only partially or with restrictions), thus making a comparative analysis more difficult (Vincent *et al.*, 2010). For instance, VRS has different numbers of categories described with the most common being four categories. Concerning B&B, some authors applied B&B as first described and others excluded the pelvic examination (part of the initially described scale). So almost all scales are precisely described but some, such as B&B and VRS, were applied using modified versions. Although scales such as VAS and NRS do not have many modified versions available (in the studies included) the existence of these modified versions using different extremity descriptors (Hjermstad *et al.*, 2011) underlines the importance of applying scales in a uniform manner.

Table II Characteristics of each pain scale and their strong and weak points.

	VAS scale	Numerical rating scale (0–10)	Verbal rating scale (categories)	B&B score	McGill Pain Questionnaire	Andresch and Milsom's scale	Detailed questionnaire of dysmenorrhea	Endometriosis pain and bleeding diary	Modified Brief Pain inventory-short form
Number of studies identified using each scale	167	33	48	48	8	7	1	1	1
Strong points									
Accurately described	*	*	*	*	*	*		*	*
Identically administered	*	*			*			*	*
With minimal score inclusion criteria	*	*	*						
Specific to endometriosis				*			*	*	
Easy to administer	*	*	*					*	
Was it validated?	*	*			*			*	*
Able to detect a response to treatment	*	*			*			*	*
Reliability	*	*			*			*	*
Multidimensional				*	*	*	*	*	*
Comply with patient-reported outcome								*	
Appropriate for low literacy patients	*	*	*	*					
Daily assessment feasible	*	*	*		*			*	
Weak points									
Limited response categories	*	*	*	*	*	*	*	*	*
Subjective pain measure	*	*	*	*	*	*	*	*	*
Patient non-compliance to answer scale									*
Only health professional can administer scale				*	*	*			
Only validated in English				*		*	*	*	

Validity, responsiveness, reproducibility and reliability. To validate a questionnaire it is necessary to compare it with other validated scales in a population and to perform a confirmatory factor analysis, to analyze the internal consistency and reliability, its construct validity, discriminant validity and its responsiveness. It is important that pain scales are adequately validated, reproducible and reliable. Among the nine scales of this review, three scales (Andresch and Milsom, detailed questionnaire of dysmenorrhea, B&B) have not been validated and have not been through reproducibility and reliability studies. However, B&B was specially designed for endometriosis. All studies, except the detailed questionnaire of dysmenorrhea, were responsive and could detect a change in pain score after endometriosis treatment (Wheeler *et al.*, 1992; Vercellini *et al.*, 1993; Gestrinone Italian Study Group, 1996; Hornstein *et al.*, 1997a; Ling, 1999; Deal *et al.*, 2010).

Disease specificity, multidimensionality. The only scales specific to endometriosis are B&B, detailed questionnaire of dysmenorrhea and the Endometriosis Pain and Bleeding Diary. They address specific issues of this disease, such as pelvic examination (Biberoglu and Behrman, 1981) or bleeding pattern (Deal *et al.*, 2010), that other scales do not take in consideration. Apart from VAS, NRS and VRS that only evaluate the intensity of pain, the other scales are multidimensional and assess other domains than pain. VAS and NRS scales are considered to be the most sensitive scales in chronic pain trials (Dworkin *et al.*, 2005) because NRS is an 11-point scale and VAS is a 100-mm point instrument. VAS and NRS, however, assess only pain intensity and the BPI-SF is recommended when physical functioning is to be assessed, as in the IMMPACT recommendations for core outcome measures (Dworkin *et al.*, 2005), because when assessing chronic pain it seems important to establish its consequences on physical functioning.

Respondent and investigator burden and feasibility. NRS and VRS are easier to administer, with better patient compliance (and are more suitable for low literacy), but are less detailed, showing less precision in pain scores (Hjermstad *et al.*, 2011). In a systematic review including 54 studies on different types of pain comparing VAS, NRS and VRS, Hjermstad *et al.* (2011) found that VRS is the scale that patients tend to find easier to fill out, therefore, limiting missed data as described by other authors (Dworkin *et al.*, 2005). With respect to the question of investigator burden, in almost all studies the pain scale is applied by doctors or other health staff but VRS, NRS, Endometriosis Pain and Bleeding Diary and the BPI-SF can be self-administered with the advantages of avoiding rater bias and being less time consuming for investigators. The Endometriosis Pain and Bleeding Diary can also be filled out electronically, easing data collection. In a recent study of 1643 veterans comparing self-pain survey with NRS in electronic medical records, Goulet *et al.* (2013) found that the electronic medical records could underestimate pain scores, underlining the importance of pain score self-administration because it is more accurate. In summary, VRS appears to be the easier scale for patients to fill out with optimal self-assessment. Concerning investigator burden, simpler scales, such as VRS and NRS, are easy and quick to administer. Similarly, pain scales with electronic self-administration, such as the Endometriosis Pain and Bleeding Diary, are not time consuming. In contrast, the MPQ with 78 descriptors and a multidimensional assessment is more difficult to manage.

Validation in foreign languages. With respect to scale availability in languages other than English, the B&B, Andresch and Milsom's scale, the Detailed Questionnaire of Dysmenorrhea and the Electronic Pain and Bleeding Diary only have an English-speaking version; therefore, limiting their worldwide availability and easy comparison between studies performed in different countries. All other scales are widely used, translated and validated in several languages.

Precise pain measurement and pain measurement inclusion criteria. All pain scales have limited response categories but the VAS scale seems to be the strongest (Hjermstad *et al.*, 2011) because it uses a continuous scale (0–100 mm) and, because the question is generic and patients probably include in their answer pain-related information other than pain intensity. Moreover, a pain scale measure is always subjective. 'Worst pain possible' varies from person to person and even a 2-point decrease on an NRS may not be equivalent in different individuals (Farrar *et al.*, 2001): for example, women who have had vaginal childbirth (possibly considered the worst pain possible) compared with other nulliparous women who have different criteria for 'worst pain possible'. In relation to pain measure inclusion criteria, some of these scales can have inclusion criteria such as the VAS and NRS, excluding patients in the lower categories of pain (i.e. VAS $<$ 5 as in Vercellini *et al.* (2002)), meaning that there is a minimum level of pain required for enrollment in the studies. Usually only patients with moderate pain (VAS $>$ 5) are enrolled in studies (Vercellini *et al.*, 2002), but these values have not been justified and are derived from expert/consensual guidelines. A scale-like B&B has no inclusion criteria, thus limiting its use. In conclusion, the most precise pain scale seems to be the VAS scale, being a continuous (0–100 mm) scale.

Timing of pain assessment. If a pain scale is simple and easy to use, such as VAS, NRS and VRS, daily pain assessment is quite feasible. All scales studied except B&B and the detailed questionnaire of dysmenorrhea can be used daily. Separate pain assessments for dysmenorrhea and pelvic pain are superior to a single pain measurement, principally because many treatments induce amenorrhea. Daily pain and the amount of vaginal bleeding should be recorded for at least one calendar month before treatment in order to obtain adequate baseline measurements because of chronological fluctuations (Nnoaham *et al.*, 2011). The use of a daily diary to record both pain scores and bleeding could provide additional support for this approach (Vincent *et al.*, 2010), as recommended in FDA guidelines (U.S. Department of Health and Human Services FDA, 2009). When the treatment is finished, data should be collected when possible (ideally daily), spacing out the timing, with however no consensus so far about when to do so (Vincent *et al.*, 2010). Most of the studies assess pain once before the treatment and at least two or three times after the treatment (6 months and 1 year after the treatment).

PRO and PRO instrument. A PRO is considered to be 'any report of the status of a patient's health condition that comes directly from the patient, without interpretation of the patient's response by the clinician or anyone else', as mentioned in the 2009 FDA PRO Guidance for industry. A PRO instrument (or measure) is a tool for measuring function or feeling (reported by patients in a clinical trial) to evaluate the benefits of treatment. The FDA guidance document describes in detail the development of a PRO instrument (conceptual framework of a PRO

instrument, end-point model and content validity). PRO instruments allow identification of items most important to patients, increase accuracy of measuring outcomes and allow more frequent assessments. Since the Endometriosis Pain and Bleeding Diary (Deal *et al.*, 2010) is a recently developed scale, it has been described in only one study that encompasses the electronic diary description, this being part of PRO according to FDA guidelines (U.S. Department of Health and Human Services FDA, 2009). To our knowledge, this remains the sole instrument available according to the new FDA recommendations, but has been described in a single study only, thus limiting assessment of its applicability.

Responder concept and MCID. A patient is a responder when there is a score change in a measure, experienced by this individual patient over a predetermined time period that has been demonstrated in the target population to have a significant treatment benefit (U.S. Department of Health and Human Services FDA, 2009). In other words, an individual is considered as a responder when there is the smallest score change in a measure, experienced individually, that has been considered in the population to have a significant treatment benefit. Vincent *et al.* (2010) suggested that the definition of responder in endometriosis is either a >30 or >50% reduction in symptoms (but the precise definition will depend on the trial) and that a clear definition of a responder should be provided in each trial. We found no studies in the literature (concerning endometriosis) using these criteria of responder. This is a simplified manner for distinguishing between responder and non-responder. The concept of MCID allows a more precise and probably more valuable method to distinguish responder from non-responder. MCID after treatment is considered to be 'the smallest difference in score in the domain of interest that patients perceive as important, either beneficial or harmful, and that would lead the clinician to consider a change in the patient's management' (Guyatt *et al.*, 2002). In fact even the terminology 'MCID' itself can be confusing, with several terms differing only slightly in definition (e.g. MCID, clinically important difference, minimally detectable difference, the subjectively significant difference. . .) (King, 2011). There are two main methods to determine MCID: the 'anchor-based' (relating changes in scores on a measure to a standard that is different from the specific measure itself) and the 'distribution-based' methods (using statistical parameters associated with the measure to interpret the magnitude of changes in the measure's scores over time) (Revicki *et al.*, 2006; Dworkin *et al.*, 2008). MCID has been described in endometriosis only for VAS, NRS and BPI. For VAS, Gerlinger *et al.* (2010) combined the VAS and the improvement score of the Clinical Global Impression (CGI) rating scales. This 7-point score classified how much the patient's illness has improved or worsened, rated as 1, very much improved; 2, much improved; 3, minimally improved; 4, no change; 5, minimally worse; 6, much worse or 7, very much worse. Gerlinger *et al.* (2010) determined 10 mm as the MCID in endometriosis (using data extracted from two RCTs and including 281 patients (Gerlinger *et al.*, 2010)). In relation to the other two scales described in Table II, NRS and BPI-SF, they do not have MCID described for patients with endometriosis but they are widely used and their MCID is described in other pathologies.

Discussion

Endometriosis pain should be considered in the context of chronic pain in general and evaluated accordingly (Tracey and Bushnell, 2009; Stratton and Berkley, 2011). Pelvic pain can have different causes and it may be difficult to relate pain to endometriosis. When endometriosis is believed to be the cause of pain, the treatment may be with analgesics, hormonal therapies and/or surgery. Nonetheless, pain often recurs, and it is not necessarily associated with recurrence of lesions (Stratton and Berkley, 2011). There is a growing interest in moving the endometriosis treatment focus from pathological classification improvement (like the ASRM classification) to PRO. Moreover, there is no perfect relation between the lesion (number, size and infiltration) and pain (Stratton and Berkley, 2011). An optimal evaluation of pain, of its evolution and the response to pain treatment are therefore mandatory. Despite the fact that endometriosis is a specific disease with a well-defined pain presentation, there are only few specific pain scales available such as the B&B scale (Biberoglu and Behrman, 1981) and the Endometriosis Pain and Bleeding Diary (Deal *et al.*, 2010) but these are not widely accepted (Table II).

Very few articles compared different pain scales in patients with endometriosis as Gerlinger *et al.* (2012b) did. They compared VAS, B&B and SF-36 Bodily Pain Subscale with the CGI score on 428 patients extracted from three studies (Gerlinger *et al.*, 2012b). The highest correlation with the CGI score was observed for the VAS followed by the B&B pelvic pain item. These correlations are probably arguments to use simplified tools such as VAS or NRS and they concluded that a general measure of endometriosis-related pain could be recommended as a primary end-point in clinical trials to assess painful symptoms of endometriosis. That was also the conclusion of the Art and Science of Endometriosis meeting which concluded that the primary outcome measures should include daily ratings of pelvic pain, of dysmenorrhea, daily record of bleeding and ratings on an 11-point NRS. The specific recommendations for using NRS are probably extracted from the IMMPACT group recommendations. However, there are stronger data specific to endometriosis concerning VAS compared with NRS. Regarding the timing of assessment, only VAS or NRS allow a frequent (i.e. daily or weekly) evaluation of pain. Moreover, as we showed in the results the most precise pain evaluation seems to be the VAS scale. VRS seems to be too approximate to evaluate precisely pain and even more change in pain. VAS also allows simplified inclusion criteria (VAS > 50 mm) to be defined for patients in studies, thus increasing homogeneity within and between studies. VAS or NRS is also easily used both by practitioners and patients, are available in many languages, and no copyright nor authorization are needed to use them. VAS and NRS also allow the three main types of pain to be measured as the evaluation of pain in general (as reported in many studies (Gerlinger *et al.*, 2010)) seems to be insufficient (Vincent *et al.*, 2010).

Moreover, in a review selecting pain scales to measure chronic pain, Dworkin *et al.* (2005) considered some of the most important criteria to evaluate scales, namely their validity, reproducibility and reliability in a consensus of pain experts' views. VAS and NRS perfectly fit these criteria. More research is probably needed to render the Andresch and Milsom's scale, the detailed questionnaire of dysmenorrhea and the B&B scale more valuable in terms of validity, reproducibility and reliability. Or these scales could be simply abandoned as evaluation using other scales has been demonstrated to be simple, reproducible and reliable, while measuring the same outcomes. During the Art and Science of Endometriosis meeting the question of continuing to use the B&B scale was put to the panel of invited scientists and clinicians from the UK, USA and Italy. The B&B scale was rejected as a primary end-point. As a secondary end-point many publications and recommendations insist on the evaluation of quality of life (QOL) (Dworkin *et al.*, 2008; Gerlinger

et al., 2010; Vincent *et al.*, 2010). The Endometriosis Health Profile-30 (EHP-30) questionnaire allows measurement of physical and emotional functioning and its use has been recommended but the SF-36 (even though not disease specific) also allows this measurement (Dworkin *et al.*, 2008; Gerlinger *et al.*, 2010; Vincent *et al.*, 2010). Vincent *et al.* recommended the use of B&B and EHP-30 as secondary end-points which seems, from our point of view, very time consuming and probably confusing for the patient compared with the use of one type of scale. In our review, there is no strong argument for the benefit of B&B.

The main problem remains the concept of Responder and MCID. The value of MCID is specific to the population included in the study and varies within different diseases. Nonetheless, this value is important because researchers and clinicians should always weigh very carefully the possible complications of any therapeutic plan against the minimal important difference. MCID has been described for medical treatment but finally there is no specific description for surgical treatment. Many evaluations of chronic pain in general do not involve surgical treatment, as endometriosis does (Farrar *et al.*, 2001). A 10 mm difference on a 100 mm VAS constitutes a clinically meaningful difference when the treatment alternatives being compared have similar baseline safety and cost profiles. This is an important point, as we cannot assume that MCID values found in other diseases and treatments are applicable to patients with endometriosis. More studies using anchor tools such as the CGI Score are needed in order to study MCID specifically related to patients with endometriosis (Dworkin *et al.*, 2008). Even after calculating MCID, it is important to recognize that all points on pain scales may not be equal. For example, the results of a study of labor epidural analgesia (Beilin *et al.*, 2003) suggested that, at least in some circumstances, a change in pain intensity from 3 to 1 on a 0–10 NRS) may be of greater importance than a change from 6 to 4. In addition, it is not only the MCID that is important but also the larger improvements. Specifically, VAS reductions of >30% reflect at least moderately clinically (as defined by the IMMPACT group) important differences and reductions >50% appear to reflect substantial improvements, but these values have never been studied in patients with endometriosis. It is recommended that the percentages of patients responding with these degrees of improvement be reported as the number of pain-free patients after treatment (Dworkin *et al.*, 2008).

In fact, we probably have to separate daily practice from inclusion in clinical studies. In clinical studies the concept of primary end-point and secondary end-point should be respected with the use of VAS or NRS for each type of the three pains while adding the CGI (to calculate the rate of responder) and the use of one QOL scale. This will provide both clinicians and researchers with tools to evaluate treatment response and not only considering the statistically significant difference between treatment groups (Dworkin *et al.*, 2008). In daily practice the use of VAS or NRS for each type of pain could be sufficient for initial evaluation of our patient, while adding CGI for evaluation of the treatments and follow-up. Evaluation of the satisfaction is probably the key point in the evaluation of treatment of endometriosis-related pain, and classification with the CGI improvement scale seems a simple and reproducible tool for PRO.

Limitations of our study

Endometriosis is a complex disease and pain is an important component of the syndrome but not the only one (Setala *et al.*, 2012). QOL is also of importance from the patient's point of view (Nnoaham *et al.*, 2011). In this context, scales that only assess pain intensity in relation to endometriosis are always incomplete with respect to the general view of endometriosis as a disease. In this review, we deliberately did not include evaluation of QOL scale or other characteristics related to endometriosis in order to focus on pain, but data on QOL would have been valuable to add. However, we included a pain scale that also evaluates QOL and we tried in our discussion to respect the need to evaluate QOL when completing the evaluation of pain. We included in this review clinical trials, comparative studies, controlled clinical trials, RCTs and multicenter studies and excluded all other articles published about endometriosis treatment that assess pain. Consequently, we may have not analyzed other relevant scales published in various articles. Some authors were contacted in order to give specific details of their scales but not all replied, hence limiting our analysis. This review followed a methodology similar to the one used in other domains such as pain specialists (Hjermstad *et al.*, 2011) for example, but with a search limited by the restricted field of endometriosis. We did not evaluate the influence of loss of follow-up in the measurement of pain: however, any effort aimed at defining the best modality to measure pain symptoms in women with endometriosis and comparing treatment alternatives would be pointless if only efficacy analyses are conducted, thus excluding losses to follow-up for any reason. Only intention-to-treat analyses must be conducted, as this is one of the main methodological aspects that may result in reliable assessment of the effect of different therapeutic options.

Proposal for an 'Optimal' pain scale in endometriosis

Pain is a complex and subjective domain and no optimal pain scale for endometriosis evaluation and treatment is yet available. We propose (Table III) an ideal pain scale in patients with endometriosis showing some points that could be added, such as Internet use (Deal *et al.*, 2010) or the possibility to add specific symptoms such as dyschezia. The main problem after analyzing the literature is, do we need an ideal pain scale? VAS and NRS scales seem to be the two scales with a better balance between strong and weak points (Table II): they both are valid, reliable, precise, translated into the most frequently spoken languages, easy to administer and fulfill. Nonetheless, NRS is easier to fulfill

Table III Optimal pain scale in endometriosis.

Optimal pain scale in endometriosis
Takes account of endometriosis pain specificities (such as menstrual pattern, dyspareunia)
Is adequately described, uniformly administered, validated and reliable
Is easy to administer and score/not time consuming
Can be self-administered
Has the concept of responder feasible/MCID (Minimal Clinically Important Difference) included
Is appropriate to low literacy patients
Has worldwide translation
Access comorbidities (such as dyschezia) should be captured
Has a 'not applicable' box (for symptoms such as dyspareunia)
Captures analgesia and complementary treatments
Has the possibility of daily pain assessment

and administer in comparison with VAS and clinical experts recommend using NRS instead of VAS, which can be expected to provide similar results (Gerlinger et al., 2012b). On the other hand, the B&B scale has several biases and does not appear to fulfill the requirements for state-of-the-art PRO tools as its items were developed on the basis of expert opinion rather than patient input. In addition, the B&B scale has a potential recall bias (4-week period), is inaccurately inflated concerning amenorrhea or sexually inactivity and is subject to rater bias (Vincent et al., 2010). Concerning the VAS and NRS scales, patients interpret measurement scales very differently and can vary widely when reporting pain and baseline scores. In order to compensate for this variability, measures of improvement usually adjust to the individual's baseline measure by calculating raw change or percentage change. Even so, without additional data it is difficult to evaluate the clinical importance of a numeric change, such as a 1- or 2-point decrease on a 0–10-point scale. The concept of responder may be of great help in this context and this concept is feasible for both VAS and NRS. When designing chronic pain clinical trials, the IMMPACT group has recommended six core outcome domains (Turk et al., 2003): (i) pain; (ii) physical functioning; (iii) emotional functioning; (iv) participant ratings of improvement and satisfaction with treatment; (v) other symptoms and adverse events and (vi) participant disposition and characteristics data (Turk et al., 2003). By using VAS or NRS for the three main types of endometriotic pain (CPP, dysmenorrhea and dyspareunia), the CGI to calculate rate of responder or MCID, SF36 or EHP30 and the report of other symptoms (important for the patient), the guidelines of IMMPACT, the Art and Science of Endometriosis meeting and the FDA PRO guidelines are finally almost all respected. For everyday evaluation, adding CGI to VAS or NRS (for the three types of pain) seems feasible, quick and reproducible.

Conclusion

In conclusion, studies should not only analyze statistically for a significant difference but also complete their analyses with: the MCID for the population studied; the proportion of patients that had at least the MCID; the more important improvements and those that did not improve or got worse. Ideally studies should measure pain at least for one calendar month before treatment and then at 3, 6 and 12 months thereafter, continuing their annual evaluation as long as possible. Despite these suggestions, it is often difficult to have optimal conditions in the ward to evaluate patients and to use new tools, such as the Endometriosis Pain and Bleeding Diary, which enables an assessment of pain without an excessive burden for the clinical staff. The VAS scale is the most commonly used scale in endometriosis studies with an MCID determined at 10 mm. This MCID should be related to the specific characteristics of the treatment being studied, and this difference should not be <10 mm, but it could be greater in case of considerable differences between medical interventions in terms of safety, tolerability or costs. Both VAS and NRS combined with CGI show a better balance between strong and weak points compared with other scales.

Authors' roles

N.B. and M.C.: design of the study, A.J., N.B. and I.R.: review of the literature and drafting of the manuscript, G.P., H.R. and M.C.: review and correction of the manuscript.

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Conflict of interest

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