Review of the confusion in current and historical terminology and definitions for disturbances of menstrual bleeding

Jane G. Woolcock, M.B.B.S.,[a] *Hilary O. D. Critchley, M.D.,*[b] *Malcolm G. Munro, M.D.,*[c,d] *Michael S. Broder, M.D.,*[e] *and Ian S. Fraser, M.D.*[a,f]

[a] Department of Obstetrics and Gynaecology, Royal Prince Alfred Hospital, Sydney, Australia; [b] Division of Reproductive and Developmental Sciences, University of Edinburgh, Edinburgh, Scotland; [c] Department of Obstetrics and Gynecology, University of California at Los Angeles, Los Angeles, California; [d] Kaiser Permanente, Los Angeles, California; [e] Partnership for Health Analytic Research, Beverly Hills, California; and [f] Department of Obstetrics and Gynaecology, University of Sydney, Sydney, Australia

Objective: There has been increasing recent recognition of the worldwide confusion in the terminology and definitions for abnormalities of menstrual and uterine bleeding. The present review was undertaken to objectively explore some of the origins and current uses of terms for symptoms, signs, and causes of abnormal uterine bleeding and to demonstrate the international lack of uniformity.

Design: A detailed, but not systematic, search of the huge current and historical literature across the range of menstrual terminology, definitions, and some causes, with an emphasis on "menorrhagia" and "dysfunctional uterine bleeding."

Setting: An international collaboration to study ways of reaching worldwide agreement on descriptive terms and definitions for abnormal bleeding.

Result(s): A large number of synonyms and overlapping terms for heavy menstrual bleeding have been identified, as well as smaller numbers of terms for other symptoms and causes of abnormal uterine bleeding. The origins and meanings of several of these terms have been explored in detail and wide variations in meaning demonstrated.

Conclusion(s): There is great confusion in the way these terminologies are used and there is an urgent need for international agreement on consistent use of terms and definitions for symptoms, signs, and causes of abnormal uterine bleeding. (Fertil Steril® 2008;90:2269–80. ©2008 by American Society for Reproductive Medicine.)

Key Words: Menstruation, menstrual disorders, terminology, definitions

It has become increasingly clear in recent years that current terminology used to describe both the symptom of abnormal uterine bleeding (AUB) and the disorders that contribute to the symptoms is ill defined and used inconsistently, leading to confusion in clinical management and in interpreting research on basic mechanisms and clinical trials (1). Common terms, such as menorrhagia, metrorrhagia, and dysfunctional uterine bleeding (DUB) are used differently in different countries, and textbooks often do not define them or they use varying and often conflicting descriptions and definitions. Many of the English-language medical terms have obvious Greek or Latin roots, but their origins and original definitions are unclear.

The term "abnormal uterine bleeding" is one that has had wide acceptance, includes a broad range of uterine bleeding symptoms and has enjoyed some measure of agreement on definition (2, 3).

To further characterize these issues we performed a wide-ranging review of the available literature, including articles published in peer-reviewed journals as well as chapters, monographs, and books, both historical and contemporary. The focus of the review was on usage of terminology and definitions of menstrual symptoms, signs, and the more common underlying causes of menstrual disturbances.

METHODOLOGY

We reviewed the published literature for terms commonly used to describe symptoms, signs, and causes of menstrual

Received April 9, 2007; revised and accepted October 8, 2007.

Dr. Critchley has received project grant funding for laboratory staff and consumables for studies evaluating uterine effects of SPRMs from TAP Pharmaceutical and Schering. She has also received expenses and lecture fees for contributing as an invited speaker. Dr. Munro is or has been a consultant to Karl Storz Endoscopy, Gynesonics, Ethicon Women's Health and Urology, Ethicon Endosurgery, Tyco Medical, ConMed, Boston Scientific, Novacept, Microsulis Americas, TAP Pharmaceuticals, JL Company, and Gyrus-ACMI. Dr. Broder has served as a consultant to TAP Pharmaceutical Products. Dr. Fraser has received lecture fees and expenses and has acted as an occasional consultant to Bayer Schering Pharma, Organon, and Daiichi.

Reprint requests: Prof. Ian S. Fraser, Department of Obstetrics and Gynaecology, Queen Elizabeth II Research Institute for Mothers and Infants, University of Sydney, NSW 2006, Sydney, Australia (FAX: (61-2) 9351 4560; E-mail: helena@med.usyd.edu.au).

disorders. These included many synonyms for AUB, heavy menstrual bleeding, irregular menstrual bleeding, and causes of abnormal bleeding, such as "dysfunctional uterine bleeding." A wide range of textbooks, monographs, reviews, and original articles in medical journals (over 500) were consulted, mainly those published in the English language but also selected historical publications in Latin, Greek, and French. The review was wide ranging but not systematic or even comprehensive because of the many thousands of publications on this major health issue. The intent was primarily to demonstrate a lack of uniformity in current definitions and usage and secondarily to explore how these terms came to be used, beginning with a historical perspective on common symptoms, signs, and diagnoses.

We consulted documents in the Medical Libraries of the University of Sydney and the University of Edinburgh and the large historical book collections of the Royal College of Obstetricians and Gynaecologists (4) and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists. We also entered a wide range of search terms into Medline, Pubmed and Embase. We have been necessarily selective of the references which we have quoted but have attempted to ensure that they are representative.

The main search terms used were menstruation, menorrhagia, metrorrhagia, heavy menstrual bleeding, heavy uterine bleeding, hypermenorrhoea, hypermenorrhea, irregular menstrual bleeding, heavy uterine bleeding, prolonged menstrual bleeding, prolonged uterine bleeding, and dysfunctional uterine bleeding. We have reviewed how these terms were used historically and are used currently, especially for the symptom of heavy uterine bleeding. Specifically, we decided to assess how one of these terms, menorrhagia, was used by the authors of a consecutive series of 100 publications on Medline where the word menorrhagia appeared in the manuscript title. These publications appeared between 2000 and 2006, and were reviewed to understand how the authors had defined and used the term menorrhagia.

We particularly explored how the symptom of heavy uterine bleeding was described in the historical literature, an important basis for making decisions about how such terminology might be considered in future use.

HISTORICAL USE OF TERMINOLOGIES AND DEFINITIONS

The Process of Menstruation

The unique phenomenon of menstruation and the range of symptoms and consequences which may accompany it have engendered an enormous literature in both modern and historical times, and a significant portion of this relates to both descriptive terms and definitions (5–7). Myths and taboos have considerably influenced this literature. Indeed, the word "taboo," which has come to mean "forbidden" or "sacred," comes from the Polynesian word "tabu," which originally meant menstruation (8).

Medical and community attitudes have been greatly influenced by Pliny the Elder writing in Rome in the first century CE (9). As a historian and author he reflected the attitudes of his time. Those were predominantly negative attitudes, seen from a male perspective, and they profoundly influenced thinking about menstruation well into medieval times. An English translation of selected quotations from Books VII and XXVIII of Pliny's *Historia Naturalis* provides a background to these terms: "wine sours if they pass, vines wither, grass dies, and buds are blasted. Should a menstruating woman sit under a tree, the fruit will fall. A looking-glass will discolour at her glance, and a knife turn blunt. Bees will die, and dogs tasting her blood run mad." Later, he goes on to say, "but to come again to women, hardly can there be found a thing more monstrous than is that flux and course of theirs." These beliefs persisted right through 17th-century England, and presumably many other countries as well (6).

These attitudes were so widely held in society that the "menstruous" simile was widely used to describe anything that was foul or filthy. For example, the Jacobean dramatist Barnabe Barnes (10) wrote: "thy soule foule beast is like a menstruous cloath, polluted with unpardonable sinnes."

Even in more modern times, H. Beckwith Whitehouse (5) stated in his Hunterian Lecture that "periodic uterine haemorrhage is in fact one of the sacrifices which women must offer at the altar of evolution and civilisation."

In the 17th century the wide range of language used for menstruation included "the terms," "the courses," "the months," "the flux," "the monthly disease," "the monthly infirmity," "the sickness," "monthly evacuations," "natural purgations," or even the "time of your unwonted grief" or, perhaps even worse, "the monthly flux of excrementitious and unprofitable blood" (6). One of the more seemingly poetic terms, "the flowers," was actually a pejorative term likening menstruation to the fermentation of malt liquors whereby the liquid flings up to the surface a sort of scum bounding with air, which is called "the flowers" (11).

It is of interest that primitive societies quite independently usually have negative terms for menstruation, such as the "sik bilong mun" of the Pidgin language of Papua New Guinea. The phrase "at those monthly periods" was used for the first time in the early 17th century (6).

Heavy and Irregular Uterine Bleeding

The early literature is replete with a range of simple descriptive terms to characterize the symptom of heavy menstrual (or uterine) bleeding, but the term "heavy menstrual bleeding" does not appear in this exact form in the early literature. Hippocrates (12) (born around 460 BCE and the writer of the first comprehensive medical texts) in his *Aphorisms* briefly addresses the subject of heavy menstrual bleeding twice:

1. "To stop excessive evacuations of the menses, a large cupping glass may be applied to the breast" (section v, L).
2. "Menstruation if too abundant produces disease" (section v, LVII).

The English translation of Hippocrates' works was made in 1822 by Thomas Coar (12), and his use of terminology obviously reflects usage of English in the early 19th century. However, the Greek and Latin versions of the Hippocratic *Aphorisms* use words of similar meaning.

Aristotle, the famous Greek philosopher, scientist, and teacher, had a prodigious output of study and writing in the third century BCE. There are many English-language versions of "Aristotle's Masterpieces" (13), the exact wording of which probably reflect the time of translation. In medical matters, he probably relied heavily on the foundations laid by the writings of Hippocrates. For example: "In quantity, bleeding is excessive, saith Hippocrates, when they flow about eighteen ounces"; "In time when they flow about three days"; and "but it is inordinate flowing when the faculties of the body are thereby weakened." Eighteen ounces is a considerable volume to lose each month, when a modern ounce is approximately 30 mL. Even if this 540 mL includes 50% endometrial transudate (14), a regular monthly loss of around 270 mL of blood would indeed be debilitating.

Aristotle (13) addressed the terminology of excessive bleeding in several ways in "Directions for midwives, counsel and advice for childbearing women":

> Chapter VIII is entitled "Of the overflowing of the courses"
>
> "this immoderate flux"
>
> "it is said to exceed both in quantity and time … the natural limits"
>
> Chapter IX is entitled "Of the weeping of the womb" (discussing variable, irregular, often light bleeding, often accompanied by pains)

In the Bible (15) (New Testament, Gospel of St. Mark, King James I translation from the original Greek, 1611), excessive bleeding is strongly implied:

> "And a woman, which had an issue of blood twelve years, and had suffered many things of many physicians … and straightway the fountain of her blood was dried up"

Avicenna (Abu al-Hussain Ibn Abdullah Ibn Sina), the 11th-century Persian scholar, philosopher, and physician, wrote extensively about all that was known about medicine in the tradition of Hippocrates, Aristotle, and Galen and profoundly influenced medical thinking in Europe until the 17th century. In the first book of his *Canon of Medicine* (16) he writes about a situation where "menstruation is profuse and is arrested with difficulty."

Thomas Sydenham, writing in 1666 (17), mentions "immoderate menstrual flow" and states that "the natural flow of the menses would fill a vessel the size of a goose's egg. When inordinate, there is difficulty, weakness, anorexia, cachexia, cadaverous complexion and swelling of the feet."

William Heberden, a very successful general physician and astute observer, practising in London in the mid-1700s (and whose son published Heberden's *Commentaries on the history and cure of diseases* in 1802 (18), after his father's death) was also a capable medical gynecologist. Chapter 62 of his *Commentaries* is titled "Menstrua" and contains a clear and fascinating description of the more common menstrual symptoms and their management. He uses four different terms for heavy menstrual bleeding: "menses have exceeded the healthy limits," "too great abundance," "excessive floodings," and "uterine haemorrhage." Heberden gives an indication that many of the cases reaching him as a highly respected society physician were acute and very heavy, although few were life threatening:

> "Sometimes, without any apparent cause the menses have exceeded the healthy limits … and have appeared in too great abundance. But these cases have been usually more alarming than dangerous, for among the many instances of excessive floodings which I have known, I have remarked only two, who, without being pregnant, have bled till they were exhausted and died."

The many Latin publications of the 1700s, written by a variety of European physicians, all use terms which reflect "immoderate" flow. e.g., "fluxu mensium immodico" (19) and "copiosus menses" (20). Contemporary English language publications use similar terminology: "The plethora of blood gradually builds in her body until it is discharged through one of the natural passages" (21); "an immoderate and irregular flooding, as it were in heaps" (22); "Immoderate, long continued and frequent menstruation" (23); "a plethora or too great abundance of blood" (24). In a chapter entitled "Of the immoderate flux of the menses," Manning (25) wrote in 1771, "The flux is immoderate, either when the periods return too often, when they continue too long, or when too much blood is discharged at one time." None of these publications used terms such as menorrhagia or metrorrhagia.

It seems clear that these physicians were mainly dealing with truly excessive bleeding, which we would nowadays classify as "acute and severe" rather than with chronic and recurring heavy periods which are not easy to cope with in a modern lifestyle. This sense of an acute event was supported by the contemporary writings in other languages, such as the French use of "l'eruption des regles" (26).

The term "menorrhagia" appears to have come into use for the first time in the late 1700s. Its first use seems to have been in the lectures of Professor William Cullen, Professor of the Practice of Physic at the University of Edinburgh. Early in his career he wrote in Latin but later in English. One of the earliest written uses of the term "menorrhagia" was in a treatise in Latin written by one of Cullen's postgraduate students and attributed to Cullen (27): "Activorum generum unum, nempe Menorrhagia, hujus disputationis argumentum erit. Ejus haec definitio est."

Cullen wrote extensively about "menorrhagia": Chapter VI of his *First Lines of the Practice of Physic* was entitled "Of the menorrhagia, or the immoderate flow of the menses" (28). Immoderate flow was a direct translation of the Latin

"menstruorum copiosior." He used the term "menorrhagia rubra" to describe immoderate bleeding in nongravid and nonpuerperal women and "menorrhagia abortus" to describe heavy bleeding in pregnant or lying-in women. The word "menorrhagia" is derived from the Greek word "mene" meaning moon and the verb "regnumi" meaning to burst forth, to let loose, or to break asunder, clearly implying a sudden, acute, and severe bleeding.

Cullen also gave due consideration to the frequency, duration, and quantity of the menses, and to change in pattern in individuals: "The flow of the menses is considered immoderate when it recurs more frequently, when it continues longer, or when during the ordinary continuance it is more abundant than is usual with the same person at other times" (28). He only considered menorrhagia as a disease with those "deviations which are excessive in degree, which are permanent and which induce a manifest state of disability."

The English physician Fleetwood Churchill (29), who practiced most of his life in Dublin, devoted his career to midwifery and diseases of women (one of the first true specialist obstetrician/gynecologists) and children and published his experience extensively. He clearly summarizes early 19th-century usage of the new term "menorrhagia." His textbook on "Principal Diseases of Females" (29) devotes a full chapter to "menorrhagia" which he indicates "signifies an increase in the catamenia." He also uses the term "excessive menstruation." He specifically states that the term "uterine hemorrhage" should be applied exclusively to floodings connected with pregnancy and parturition.

The term "menorrhagia" is regularly used in classic publications appearing throughout the 19th and 20th centuries (30, 31) and was obviously taken up with enthusiasm. It is not usually defined clearly in those publications, and the sense in which it is used implies that the reader is expected to understand that it refers to the symptom of heavy menstrual bleeding. For example, Ashwell (32) describes menorrhagia as "inordinate menstruation, both as to the frequency of return and to the amount of the secretion." The French were also using similar terms by the mid-1800s, such as "menorrhagie" and "metrorrhagie" (33).

It seems probable that the term "metrorrhagia" to describe irregular bleeding came into usage at about the same time as "menorrhagia," because Cullen (28) certainly used the term "maetrorrhagia" in his lectures. However, "metrorrhagia" seems to have been less popular than "menorrhagia," and Churchill (29) does not use the term at all—he uses "irregularity of bleeding"—although he does use other Latin-based terms, such as amenorrhea and dysmenorrhea.

The Causes of Abnormal Uterine Bleeding

Before the 1800s relatively little space in the literature was generally devoted to causes of abnormal bleeding because of the real lack of knowledge of this aspect of bleeding. Aristotle (third century BCE) wrote of "breaking of the veins, heating of the blood and trauma" (13). The general impression of underlying causes is exemplified by quotations from three authors, writing as late as the mid-1800s:

1. "Women are most obnoxious to menorrhagia:— who live indolently and indulge in stimuli; who use little or no exercise; who keep late hours; who dance inordinately; who are intemperate; who have borne many children; who have been subject to febrile infections; who have much leucorrhoea; who are too prodigal in the joys of wedlock; who are advancing toward the non-menstrual period; or, who yield too readily to passions or emotions of the mind" (34).
2. Women who have "great weakness, general debility of the uterus occasioned by tedious labour or frequent miscarriages, full habit [obesity], violent exercise, excess in venery or strong passions of the mind" (35).
3. Freind (36) (1752) covers very similar ground to Dewees and Mauriceau in writing "Of the causes of a plethora."

Gradually it became clear that malignant and benign tumours and infections are major causes of abnormal bleeding, but specific detail had to await the introduction of safe anesthesia with full relaxation to permit "examination under anesthesia," as well as minor and major surgery, and modern pathologic examination of the removed specimens. Effective imaging had to await much more modern technologies with endoscopy, x-rays, and ultrasound. The clinical and pathologic appearances of uterine fibroids and adenomyosis were well described and defined by the early 20th century (31, 37), but the symptomatic and clinical associations of endometriosis were not clearly described and defined until somewhat later (38, 39). The term adenomyosis was first used by Frankl in 1925 (40).

CURRENT USAGE OF TERMINOLOGIES

Definitions and Terminology for Normal Menstrual Bleeding and the Normal Menstrual Cycle

It is only within the last one to two decades that the word "menstruation" has become sufficiently acceptable to be used widely in the public arena in most societies, although it has been an acceptable scientific and medical term since the 17th century (6). Current scientific terminology also uses "monthly periods" and "menses" widely, whereas vernacular speech uses a very wide range of euphemisms which are often confined to a particular community.

There is no single agreed definition for normal menstruation, but most physicians are comfortable with a definition that includes words such as a periodic discharge of blood and tissue from the uterus and vagina of reproductively mature females, usually lasting between 3 and 6 days per month. Menstruation is the consequence of the decline in circulating E_2 and P concentrations that occurs with luteal regression.

Terminology and definitions around the parameters describing the "normal" menstrual cycle as a whole are even more uncertain and controversial than those describing normal menstrual bleeding. A substantial number of studies

have been undertaken to record and describe these parameters, and these studies are well reviewed by Snowden and Christian (41). A recent attempt (42) has been made to redefine, using the World Health Organization's menstrual analysis experience, the "normal" parameters of cycle length and other features from the huge database of individual menstrual periods originally established by Alan Treloar and the Tremin Trust (43). These different studies still require an international reassessment to put them in a modern cultural context.

Establishment of definitions for abnormally heavy menstrual loss presupposes a measure of agreement on definitions for normal monthly menstrual blood loss. This has been a remarkably difficult clinical problem.

Normal ranges were objectively quantified first by Barer and Fowler (44) in 1936. They investigated 100 hospital employees aged 15 to 43 years, and found a mean blood loss per period of 50.5 mL, with a range from 6.5 mL to 179 mL. Two major population studies were carried out in the 1960s (45, 46), in which menstrual blood loss was objectively measured in several hundred women in each study and attempts made to define the limits of normality. Hallberg et al. (45) found a mean measured blood loss of 43.4 mL per menstrual period. The upper limit of normal for menstrual blood loss per cycle was calculated using the 95th percentile value of the distribution curve, which was 76.4 mL. In addition, it was found that a number of hematologic indices of iron deficiency declined slowly beyond 60 mL and then markedly and progressively when menstrual loss exceeded around 80 mL per month. This led to a common research definition for heavy menstrual bleeding as being "measured menstrual blood loss of >80 mL per month." Some definitions specify that this quantity of loss of >80 mL should be averaged over more than one menstrual period (46, 47). However, there is uncertainty as to the value of this limit of 80 mL in the routine clinical situation (48).

A common problem in applying definitions accurately to women with the complaint of heavy menstrual bleeding is the difficulty in quantifying blood loss in a clinical setting. This was well recognized a century ago: "the amount of red uterine discharge cannot be regarded as a criterion of the severity of haemorrhage and as an index of the quantity of blood lost" (49). Several studies have shown little correlation between the quantity of objectively measured menstrual blood loss and a patient's subjective assessment of her blood loss or even a change in the amount (15, 50, 51), although more recent experience has shown that some women may actually be better at this subjective assessment than hitherto appreciated (52). There may also be little relation between duration of menstruation and total measured menstrual blood loss (46). Attempts have been made to assess the volume of blood loss using charts, the most successful being that developed by Higham et al. (53), although this is probably only a semiquantitative approach (54).

The issues of assessment and perception are further confused by the recognition that less than half of the total menstrual fluid loss comprises whole blood and that the remainder is made up of an endometrial transudate and other secretions (14, 54). These problems contribute substantially to the difficulties of describing and defining menstrual symptoms.

Definitions and Terminology for Abnormal Uterine Bleeding

"Abnormal uterine bleeding" is a term of relatively recent but widespread use, appearing in numerous publications from 1950 on (2, 3, 55–57). The actual origins of the term are unclear, but it was used erratically in the 20th century before 1950 (58) although most publications in the first half of the century tended to use terms such as "abnormal haemorrhage from the genital organs" (59). Widespread use generally acknowledges AUB as a consistent "umbrella" term for a wide range of uterine and menstrual bleeding symptoms and signs (57). It does not seem to have been used as a diagnosis.

The term "abnormal uterine bleeding" has been used much more widely than the term "abnormal menstrual bleeding," however, there is little discussion in the literature on the differences between the terms. It is clear that most gynecologists generally restrict their use of the term "menstrual" to bleeding of apparent uterine origin which occurs at approximately monthly intervals, but limits have not been defined. It seems safer to use the umbrella term "AUB," which can even include premenarchal, postmenopausal, and cervical bleeding.

A simple review of the literature indicates that AUB may be used to include the full gamut of uterine bleeding symptoms, including heavy, prolonged, "spotting," frequent, infrequent, intermenstrual, and unpredictable episodes.

We wished to investigate the frequency with which some of the more common terms used to describe different types of AUB appeared in the literature. We therefore queried three electronic databases (Pubmed, Medline, and Embase; Table 1) for the numbers of publications containing several frequently used "menstrual" terms (menorrhagia, hypermenorrhea (and the British spelling, "hypermenorrhoea"), metrorrhagia, and dysfunctional uterine bleeding). Several thousands of "hits" were recorded for most of these terms in each of the databases, although there was considerable variation in the numbers of publications displayed under specific terms. Publications included in these databases went back to between 1937 and 1949, but no attempt was made to assess consistency of the records in each database at different dates. For most terms, the majority of publications were in English, but metrorrhagia had a higher usage in non–English language publications. These databases provide a clear indication of the high frequency with which these terms are used in the medical literature.

Heavy menstrual bleeding and heavy uterine bleeding

Throughout the 20th century the complaint of heavy uterine bleeding has been described by doctors by a variety of terms, typically including: menorrhagia, hypermenorrhoea, dysfunctional uterine bleeding, excessively heavy menstrual

TABLE 1

Numbers of publications identified in three different electronic databases when queried with four different terms used to describe menstrual symptoms or diagnoses. Numbers of manuscripts in the English language are noted separately.

	Medline	Pubmed	Embase
Menorrhagia	2,631	3,598	3,625
English	2,152	2,554	2,978
Hypermenorrhoea (hypermenorrhea)	140	2399	365
English	80	1906	232
Metrorrhagia	1,228	2,329	2,573
English	414	808	1,174
Dysfunctional uterine bleeding	526	1847	872
English	458	862	620

Woolcock. Menstrual bleeding terminology and definitions. Fertil Steril 2008.

TABLE 2

Terms used during the past 100 years to describe increased or heavy menstrual bleeding (references in parentheses).

Menorrhagia—to "burst forth each month" (59)
—excessive uterine bleeding (91)
Hypermenorrhea—synonymous with menorrhagia (many authors)
Menometrorrhagia—irregular and heavy bleeding [many authors]
Dysfunctional uterine bleeding—some authors use this to describe the symptom
Functional uterine hemorrhage (58, 88)
Excessively heavy menstrual loss (many authors)
Ovulatory menorrhagia; anovulatory menorrhagia (many authors)
Functional menorrhagia (92)
Essential menorrhagia (64, 93)
Idiopathic menorrhagia (54)
Primary menorrhagia (94)
Uncomplicated menorrhagia (95)
Symptomatic menorrhagia (96)
Persistent menorrhagia (97)
Unexplained menorrhagia (98)
Genuine menorrhagia (99)
Idiopathic uterine hemorrhage (58)
Anomalous uterine hemorrhage (58)
Epimenorrhea—too frequent menstruation (59)
Epimenorrhagia—too frequent menstruation with too great a loss (59)
Polymenorrhea—frequent menstrual bleeding (58)
Polymenorrhagia—frequent and heavy menstrual bleeding (79)
Metropathia hemorrhagica—irregular and excessive bleeding associated with endometrial hyperplasia (58)

Woolcock. Menstrual bleeding terminology and definitions. Fertil Steril 2008.

loss, ovulatory menorrhagia, anovulatory menorrhagia, as well as many others (Table 2) (54, 58, 59, 64, 79, 88, 91–99). These terms were used to express the doctor's interpretation of the patient's subjective complaint of heavy bleeding; however, it is unusual for their exact meaning to be defined by clinicians. Nevertheless, this finding acknowledges that the majority of clinicians used these terms (such as menorrhagia) primarily as a recognition of the impact of the patient's complaint of heavy bleeding. The first authoritative use of the term "heavy menstrual bleeding" appears to have been in the New Zealand *Guideline for the management of heavy menstrual bleeding* (60), although use of the term "heavy uterine bleeding" may have been more logical.

Menorrhagia "Menorrhagia" is a term which appears to have been steadily taken up by English medical writers through the early 1800s, so that it was in almost universal usage by the middle to late 1800s in the English-speaking world (29, 31, 32, 61, 62). It was also taken up by French writers ("menorrhagie") (33) and is currently in widespread use by doctors throughout Greece to describe (in Greek) the symptom of heavy menstrual bleeding (Creatsas G, personal communication, 2006). We have not carried out any wide-ranging review of the use of any of these terms in other languages.

Most writers use menorrhagia as a descriptor for the symptom or sign of heavy menstrual bleeding, but in the USA, and sometimes elsewhere, it can also be used as a diagnosis (63). In the USA, many seem to use it solely to describe heavy menstrual bleeding that is regular in occurrence (64, 65), and this usage could be said to equate broadly to the way some use the term "ovulatory dysfunctional uterine bleeding" in Europe and Australia (1, 66, 67). Others use "menorrhagia" to describe heavy bleeding, whether it is regular or not (68). Yet others include frequent or prolonged bleeding (64–66). Valle and Sciarra (64) define "menorrhagia" very precisely as "excessive or prolonged uterine bleeding that exceeds 80 mL of blood loss per menstruation that occurs in the presence of a normal secretory endometrium after normal ovulation."

The term "menorrhagia" appears to be universally accepted as a description of some aspect of excessive, heavy, or prolonged menstrual bleeding, but there the agreement ends. We chose "menorrhagia" as an example of a term that was frequently not defined, or not clearly defined, in the literature, and we decided to explore this usage in more detail (Table 3).

One hundred publications (in English) appearing on Medline between 2000 and 2006 in which the term "menorrhagia" appeared in the article title were carefully reviewed

(Table 3). Attention was initially paid to the way in which the term menorrhagia was used in the title and the abstract and then to the detail of how it was used in the body of the publication. In many cases, the sense of how the word was used seemed to change at different points in the publication. We categorized each article in four ways: 1) whether the term menorrhagia was defined (even broadly) or not; 2) whether it was primarily used as a "patient complaint" or a doctor's determination of the severity of the complaint; 3) whether it involved only regular heavy bleeding with no pathology or included women with pathology or irregular bleeding; and 4) whether it was sometimes used as a diagnosis, either on its own or with a qualifying adjective (e.g., idiopathic menorrhagia).

Usage of the term was sometimes so unclear that value judgements had to be made as to which category was the most appropriate, and there was sometimes overlap between categories. For example, some of those articles in which the main emphasis was on the doctor's definition of the complaint (24%) also used it to refer to the patient's primary complaint. Few articles defined menorrhagia precisely, so we included those which at least addressed the broad concept of definition as "defined" (Table 3).

TABLE 3

Analysis of the apparent meaning of the term "menorrhagia" in 100 publications between 2000 and 2006, where the term "menorrhagia" appeared in the title.

1	(a)	Defined	56
	(b)	Undefined	44
			n = 100
2	(a)	Used as symptom of heavy uterine bleeding, irregular or regular, with or without pathology	34
	(b)	Used as symptom of heavy uterine bleeding, regular, with or without pathology	28
	(c)	Used as a symptom of heavy uterine bleeding, regular with no detectable pathology	16
			n = 78
3	(a)	Primarily reflecting patient complaint	59
	(b)	Primarily reflecting the doctor's definition	19
			n = 78
4	(a)	Used as a diagnosis	5
	(b)	Used as a diagnosis when combined with another term (e.g., "idiopathic")	17
			n = 22

Woolcock. Menstrual bleeding terminology and definitions. Fertil Steril 2008.

Most authors (78%) used "menorrhagia" to describe a symptom or sign, but 22% used it to indicate a diagnosis or cause of abnormal bleeding. In those 22%, the term was sometimes also used in the sense of a symptom. There was great variation in whether authors used the term to include heavy bleeding at regular or irregular intervals or in the presence or absence of major pathology.

In three-fourths of those who used menorrhagia in the sense of a cause or diagnosis, a qualifying adjective was appended (e.g., unexplained, symptomatic, essential, uncomplicated, idiopathic, or persistent menorrhagia). This usage seems to overlap the way in which the term "dysfunctional uterine bleeding" is often used.

Prolonged menstrual bleeding Occasionally menstrual bleeding can be prolonged but not excessively heavy on any one day. There is no other specific descriptive term for the symptom of prolonged bleeding. Definitions for prolonged menstrual bleeding are usually included with heavy menstrual bleeding owing to the concerns of causing iron deficiency anaemia (70). For example, "menses that lasts longer than 7 days" (20, 65, 69–71).

Irregular menstrual bleeding There is also a wide variety of terms used to describe irregular menstrual bleeding, and they often overlap with those describing heavy menstrual bleeding. They include oligomenorrhea, metrorrhagia, intermenstrual bleeding, polymenorrhea, epimenorrhea, epimenorrhagia, and acyclic bleeding. These terms have sometimes been defined simply as "noncyclic bleeding disorders" (72) or "bleeding of variable amounts occurring between regular periods" (73). Alternative descriptions include "uterine bleeding occurring at irregular but frequent intervals, the amount being variable" (73). Other definitions specify that the amount of bleeding must be increased, e.g., "irregular bleeding of excessive flow and duration" (74). Polymenorrhea or epimenorrhea usually imply "bleeding episodes occurring at regular intervals less than 21 days apart" (61, 71, 74) or "short cycles which may be irregular or regular." Epimenorrhagia is "excessive bleeding at irregular intervals" (59). "Metrostaxis" has been described as "dripping from the womb" (59). These descriptions highlight the lack of consistency in terminology, and although these definitions all appear to be variations around similar ideas, they do not have identical meanings.

The definition of irregular menstrual bleeding is almost as difficult as that of heavy menstrual bleeding, because there is no general agreement on normal limits and many factors, such as age, body weight, ethnicity, seasons, and attitude may influence cycle interval and regularity (41). The general perception in most societies still is that most women have a fairly regular cycle, although virtually all objective studies describe wide variability (41). In adult women, about a third of menstrual cycles are outside 2 to 5 days from the individual's mean (75). Only 80% of cycles in adults fall within the

range 25 to 38 days (43, 76). Foster (77) was the first to disprove women's claims for cycle regularity with empirical evidence of cycle irregularity with a group range of 6 to 46 days in 380 cycles in 56 women, and individual variations up to 18 days.

It is unclear whether the skewed statistical "tail" of long cycles includes a subpopulation of women with polycystic ovary syndrome, in whom anovulatory cycles predominate, or whether this is a continuous statistical distribution of long cycles with a range of causes. Perception of change in the menstrual pattern of an individual woman will probably feature strongly in the likelihood that the woman will present with a complaint of irregular bleeding.

Prolonged bleeding may be just as important as irregular or heavy bleeding in leading to patient complaint or reflecting underlying pelvic pathology. However, there seem to be no specific terminologies to describe this menstrual symptom. The normal duration of menstrual flow has been well defined in several large studies (41, 76), with a mean duration of 5 days and 80% of women reporting periods between 3 and 7 days. Duration is longer in anovulatory cycles (76). Again, change in pattern seems to be important in determining complaint.

Reduced menstrual bleeding Terms for reduced bleeding include light bleeding, scanty bleeding, spotting, staining, hypomenorrhea, and oligomenorrhea. These all imply decrease in blood loss volume during menses, although oligomenorrhoea also implies infrequent bleeding. Some definitions specify that decreased bleeding associated with "hypomenorrhea" must occur in regular menstrual cycles (74).

Amenorrhea is the term used most commonly for completely absent menstrual bleeding. The earliest reference we found to this term is in a Latin text from 1788 (78). Pathologic amenorrhea is usually defined as absence of bleeding for more than 6 or 12 months. Amenorrhea is usually subdivided into primary and secondary amenorrhoea. Primary amenorrhea is usually defined as absence of any uterine bleeding by 16 or 17 years of age, when there has been appearance of breast and pubic hair changes. Pathologic secondary amenorrhea is defined as the absence of menstruation for 6 or 12 months after some cyclic pattern of bleeding has been established, but it needs to take into account the physiologic amenorrhoea of pregnancy. Physiologic amenorrhea confuses this system, because one cannot wait 6 or 12 months to determine amenorrhea which might be due to a pregnancy. This is usually allowed for by considering when a sexually active woman is significantly overdue with her next menstrual period, also taking into account her own cycle interval and regularity.

Oligomenorrhea is the term used widely for infrequent bleeding, usually defined as "menstrual" cycles greater than 35 days apart but less than 6 months apart. Mild oligomenorrhea is usually taken as 5- to 12-week intervals, moderate as 12- 24-week intervals, and severe as 1 to 2 menstrual periods per year. However, even oligomenorrhea has occasionally been modified in the literature, e.g., as "oligohypomenorrhea" (79). The terms amenorrhea and oligomenorrhea are generally consistently defined.

Terminologies to Describe the Experience of Breakthrough Bleeding in Users of Hormonal Contraception

Steroid hormonal therapies and especially the modern long-acting progestogen-only contraceptive delivery systems are notorious for causing unpredictable episodes of uterine bleeding which may be frequent, prolonged, or infrequent compared with normal menstruation. The Population Council (80) and the World Health Organization (81) have invested major effort into finding new ways of accurately defining and describing these novel uterine bleeding patterns (82, 83). They decided to use a reference period of 90 days (the approximate equivalent of 3 menstrual cycles) to allow a more accurate description of these short, long, or very long "cycles" and very variable-duration bleeding episodes (80).

These unusual patterns of "breakthrough" bleeding demanded the development of a new system of terminology and definitions (Table 4), (80–83) which has now been widely accepted for this specific situation. Although this system makes little attempt to describe variations in the heaviness of an episode of bleeding, apart from defining "spotting," nevertheless a system such as this could be adapted to describe spontaneous episodes of abnormal bleeding as well as these artificial patterns.

Terminologies Around Causes of Abnormal Uterine Bleeding

Causes of most cases of abnormal uterine bleeding are now usually precisely defined with the use of modern imaging

TABLE 4

Definitions of bleeding patterns which can be used in reference period analysis (80–83).

Bleeding: Any bloody vaginal discharge that requires the use of such protection as pads or tampons
Spotting: Any bloody vaginal discharge that is not large enough to require sanitary protection (or where women may use a modern "minipad")
Bleeding/spotting episode: One or more consecutive days on which bleeding or spotting has been entered on the diary card
Bleeding/spotting-free interval: One or more consecutive days on which no bleeding or spotting has been entered on the diary card
Bleeding/spotting segment: One bleeding/spotting episode and the immediately following bleeding/spotting-free interval
Reference period: The number of consecutive days upon which the analysis is based

Woolcock. Menstrual bleeding terminology and definitions. Fertil Steril 2008.

and biopsy techniques. These techniques have allowed simple broad classifications of causes to be developed (Table 5). The terminology used for most of these conditions is fairly well defined, although there is still considerable international disagreement on how the term "dysfunctional uterine bleeding" is used.

Origins and usage of "dysfunctional uterine bleeding" This is a term of fairly recent origin and seems to have been used mainly to describe poorly understood causes of abnormal uterine bleeding. It was first used by Graves (84) in 1930 to describe the "menorrhagia or metrorrhagia" caused by "impairment of the endocrine factors" which normally control menstrual function. He described cases which would now be typically classified as endometrial hyperplasia associated with anovulation, but he used the term "endometrial dysplasia." He used a number of alternative terms, such as "arrhythmic dysfunctional uterine bleeding" (metrorrhagia), "periodic dysfunctional bleeding" (more regular and probably associated with "defective" ovulation), "menorrhagia with metrorrhagic spotting," and "periodic menorrhagias" (more regular heavy bleeding). This usage suggests that he was applying the term "dysfunctional uterine bleeding" to unexplained causes of a wide range of menstrual symptoms, whether or not they were related to ovulation or anovulation.

Others rapidly picked up the term, and it has been used extensively throughout the English-language literature since, often without being precisely defined and covering widely differing circumstances (Table 6) (67, 70, 71, 82, 86, 100–107). In the USA, the term "dysfunctional uterine bleeding" has been used predominantly to describe irregular and presumed anovulatory uterine bleeding (57, 65, 85, 86). In contrast, in Europe and Australia most cases of DUB appear to be classified as "ovulatory" (66). Some American publications describe all cases as anovulatory (86). The American College of Obstetricians and Gynecologists (ACOG) has now recommended that "dysfunctional uterine bleeding" should be replaced by "anovulatory uterine bleeding" (85). It is encouraging to see that the latest publication from ACOG on adolescent menstrual bleeding manages to avoid the terms

TABLE 5

The main currently recognized causes of abnormal uterine bleeding.

- Pelvic pathology
  - Uterine leiomyomata
  - Uterine adenomyomata or diffuse adenomyosis
  - Endometrial polyps
  - Endometrial hyperplasia (often a consequence of anovulation)
  - Endometrial adenocarcinoma; rare sarcomas
  - Uterine or cervical infection
  - Endometrial or cervical infections
  - Benign cervical disease
  - Cervical squamous and adeno-carcinoma
  - Myometrial hypertrophy
  - Uterine arteriovenous malformations (complications of unrecognized early pregnancy)
- Systemic disease
  - Disorders of hemostasis (typically von Willebrand disease and platelet disorders; excessive anticoagulation)
  - Hypothyroidism
  - Other rarities such as systemic lupus erythematosus and chronic liver failure
- Dysfunctional uterine bleeding (DUB)
  - Ovulatory DUB—a primary endometrial disorder of the molecular mechanisms controlling the volume of blood lost during menstruation
  - Anovulatory DUB—a primary disorder of the hypothalamic-pituitary-ovarian axis resulting in excessive unopposed ovarian estrogen secretion and a secondary endometrial disturbance

Woolcock. Menstrual bleeding terminology and definitions. Fertil Steril 2008.

TABLE 6

Examples of current usage and definitions of the term "dysfunctional uterine bleeding" (references in parentheses).

- Diagnosis of exclusion of pathologic causes of abnormal uterine bleeding (70, 86, 100–102)
- Excessive uterine bleeding (excessively heavy, prolonged, or frequent) which is not due to demonstrable pelvic disease, complications of pregnancy, or systemic disease (67, 103)
- Synonymous with anovulatory bleeding and a diagnosis of exclusion (86)
- Abnormal uterine bleeding in the absence of pelvic organ disease or systemic disorder (70)
- Abnormal uterine bleeding with no demonstrable organic cause, genital or extragenital (104)
- Abnormal menstual bleeding unrelated to structural uterine abnormality (102, 105)
- Dysfunctional uterine bleeding induced by exogenous hormones—characteristic bleeding pattern disturbances caused by hormonal contraception (82)
- Disruption of the normal menstrual cycle that is unrelated to another illness (71)
- Abnormal menstrual bleeding with no identifiable underlying organic cause (106)
- Can coexist with asymptomatic structural anomalies (such as endometrial polyps and subserosal or intramural leiomyomas) (107)

Woolcock. Menstrual bleeding terminology and definitions. Fertil Steril 2008.

"dysfunctional uterine bleeding" and "anovulatory uterine bleeding" completely (87).

The introduction of the term "dysfunctional uterine bleeding" followed from extensive use of the term "functional uterine bleeding," which appears to have been popular at least back to the time of Fleetwood Churchill (29) and appears to have been used to explain any abnormal uterine bleeding not obviously associated with cancer, benign "fleshy and fibrous tumours," or "inflammation." The term "functional uterine bleeding" (or "functional menstrual bleeding") seems to have been generally used in a somewhat broader sense than "dysfunctional uterine bleeding" (88) and was widely used at least until the 1960s (89).

DISCUSSION

The historical literature provides a fascinating insight into the way in which terminologies and descriptions of a culturally sensitive and gender-specific set of symptoms and diseases have changed as social mores—as well as scientific knowledge—have changed through the centuries. An understanding of this literature also gives clues as to the way in which individual medical writers have coined their own terms or put their own interpretations on the definitions of existing terminologies. This has resulted in a situation where few descriptive English-language terms for menstrual symptoms have any agreed international definitions. There is urgent need for international discussions to ensure that usage becomes consistent and that publications can be clearly understood by all.

Clinical situations where menstruation becomes abnormal are common and varied. However, the limits of "normal" menstruation are not defined in any internationally agreed manner, and perceived deviations from "normal" are probably better categorized as abnormal *uterine* bleeding than as abnormal *menstrual* bleeding. The cultural and physiologic issue of "menstruation" terminology merits a focused debate.

Menorrhagia is a very commonly used term in the medical literature, but we were surprised at the extraordinarily varied way in which the term is used in different publications. All use it to convey some sense of heavy uterine bleeding, but there is little agreement on specific definitions, and indeed there is frequently no mention of the definition of the term in individual publications. The term "dysfunctional uterine bleeding" has only been in use since the mid-1930s, but it has come to be used in widely differing ways. The divergences in use of all of these terms seem to be so wide that it would be extremely difficult to "reinvent" and redefine them in a universally agreed manner.

CONCLUSIONS

We believe we have amply demonstrated that there is great confusion and lack of agreement over the use of most terminologies used to describe disturbances of uterine bleeding. Therefore, there is clearly an important need for international agreement on the use of common terminology and consistent definitions which can be applied in both research and clinical settings. In principle, we would recommend the use of simple and descriptive words which can easily be translated into different languages, and possibly may also be widely accepted with the nonmedical community (90). The International Federation of Gynecology and Obstetrics (FIGO) has approved the establishment of a study group to explore and define these issues of menstrual terminology, definitions, and classifications in much more detail and to consider the needs for wider international agreement.

Acknowledgments: The authors are most grateful to Lucy Reid, Librarian at the Royal College of Obstetricians and Gynaecologists, and Fay Bower, Librarian at the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, for assistance with access to their extensive historical collections of volumes on gynecology; to Ms. Rowan Fraser, classics scholar, for advice on language origins; and to Prof. George Creatsas, Professor of Obstetrics and Gynecology, Athens, for advice on current Greek use of these terms.

REFERENCES

1. Fraser IS, Inceboz US. Defining disturbances of the menstrual cycle. In: O'Brien PMS, Cameron IT, MacLean AB, eds. Disorders of the menstrual cycle. London: RCOG Press, 2000:141–52.
2. Webb AN. Studies in the pathology of abnormal uterine bleeding. Trans Pac Coast Obstet Gynecol Soc 1981;18:115–22.
3. Munro MG. Abnormal uterine bleeding in the reproductive years. Part 1–pathogenesis and clinical investigation. J Am Assoc Gynecol Laparosc 1999;6:393–416.
4. Royal College of Obstetricians and Gynaecologists. RCOG historical library catalogue. 2nd edition. London: RCOG, 1968.
5. Whitehouse HB. The physiology and pathology of uterine haemorrhage. 1. Physiological uterine haemorrhage. Lancet 1914;i:877–85.
6. Crawford P. Attitudes to menstruation in seventeenth century England. Past Present (J Hist Stud) 1981;91:47–73.
7. Eccles A. Obstetrics and gynaecology in Tudor and Stuart England. London: Croom Helm, 1982:145.
8. Drife J. A cultural and historical perspective on menstruation. In: O'Brien PMS, Cameron IT, MacLean AB, eds. Disorders of the menstrual cycle. London: RCOG Press, 2000:3–12.
9. Caius Plinius Secundus (Pliny the Elder). Historia naturalis, book XXVIII, chap. 23; book VII, chap. 13.
10. Barnes B. The devil's charter. London, 1607.
11. Drake J. Anthropologia nova. London, 1707:137.
12. Hippocrates. The aphorisms of Hippocrates: translated into English by Thomas Coar. London: Longman & Co., 1822:314.
13. Aristotle. Directions for midwives, counsel and advice for childbearing women. Of the overflowing of the menses. In: Aristotle's masterpieces (translated and revised). London, 1817.
14. Fraser IS, McCarron G, Markham R. Blood and total fluid content of the menstrual discharge. Obstet Gynecol 1985;65:194–8.
15. Gospel of St. Mark. In: The holy bible, King James I translation. London, 1611: ch. 15, v. 25–9.
16. Avicenna. The canon of medicine. From: Gruner OC. A treatise on the canon of medicine of Avicenna. London: Luzac and Co., 1930:208.
17. Sydenham T. Medical observations concerning the history and the cure of acute diseases. In: The works of Thomas Sydenham. London: The Sydenham Society, 1868:395.
18. Heberden W. Menstrua. In: Heberden W, ed. Commentaries on the history and cure of diseases. London: T. Payne, 1802:299–313.
19. Neumann Samuel. Dissertatio inauguralis medica de fluxu mensium immodico. Jena: Croeker, 1746.
20. Musitanus C. De morbis mulierum tractatus, cui quaestiones duae, altera de semine cum masculeo, tum foemineo, altera de sanguine

menstruo, ut pote ad opus apte facientis sunt praefixae, quae ad earundem naturam mulierum, anatomen, conceptum, uteri gestationem, foetus animationem, & hominis ortum attinnt, ubertim simul explanatur. Geneva: Chouet et Co., 1709:45–62.
21. Pechey J. A general treatise on the diseases of maids, big-bellied women, childbed women and widows. London, 1696.
22. Maubray J. The female physician, containing all the diseases incident to that sex. London: Holland, 1724.
23. Hamilton A. A treatise on the management of female complaints, and of children in early infancy. Edinburgh: Hill; and London: Murray, 1792.
24. Astruc J. A treatise on the diseases of women. vol. II. London: Nowse, 1762:392.
25. Manning H. A treatise on female diseases, in which are also comprehended those most incident to pregnant and child-bed women. London: Baldwin, 1771:107–63.
26. Emett R. Theorie nouvelle du flux menstrual et traite des maladies de la tete. Paris: Chez Vincent, 1757.
27. Perroneau R. Disputatio medica, inauguralis, de menstruorum profluvio immodico. Edinburgh: Balfour & Smellie, 1775.
28. Cullen W. First lines of the practice of physic. Edited by colleagues after his death. Edinburgh: Bell and Bradfute, 1816.
29. Churchill F. Menorrhagia. Chapter V. Outlines of the principal diseases of women. Dublin and London: Martin Keene and Son, 1838:96–108.
30. McKay WJS. The history of ancient gynaecology. London: Bailliere, Tindall & Cox, 1901:302.
31. Kelly H, Cullen TS. Myomata of the uterus. Philadelphia: Saunders, 1909:723.
32. Ashwell S. Of menorrhagia. In: Ashwell S, ed. A practical treatise on the diseases peculiar to women. London: Samuel Highley, 1848: 130–57.
33. Briere de Boisment AJF. De la menstruation, considéréé dans ses rapports physiologique et pathologique. Paris: Bailliére, 1842.
34. Dewees WP. Treatise on diseases of females; Philadelphia: Carey & Lea, New York: Year Book Medical Publishers, 1826:249–63. (Quoted in Greenblatt RB, Karpas, AE. Dysfunctional uterine bleeding. In: Year Book of Obstetrics and Gynecology, 1978.)
35. Mauriceau AM. The married woman's private medical companion. New York, 1852:22–8.
36. Freind J. Emmenologia (translated from Latin by Thomas Dale). London: T. Cox, 1752:216.
37. Cullen TS. Adenoma of the uterus. Philadelphia: Saunders, 1908.
38. Sampson JA. Perforating hemorrhagic (chocolate) cysts of the ovary. Arch Surg 1921;3:245–23.
39. Sampson JA. Peritoneal endometriosis due to the menstrual dissemination of endometrial tissue into the peritoneal cavity. Am J Obstet Gynecol 1927;14:411–69.
40. Frankl O. Adenomyosis uteri. Am J Obstet Gynecol 1925;10:680–4.
41. Snowden R, Christian B, eds. Patterns and perceptions of menstruation. A World Health Organization international collaborative study. London: Croom Helm, 1983.
42. Belsey EM, Pinol AP. World Health Organization Task Force on Long-Acting Systemic Agents for Fertility Regulation. Menstrual bleeding patterns in untreated women. Contraception 1997;55:57–65.
43. Treloar AE, Boynton RE, Behn BG, Brown BW. Variation of the human menstrual cycle through reproductive life. Int J Fertil 1967;12:77–126.
44. Barer AP, Fowler WM. The blood loss during normal menstruation. Am J Obstet Gynecol 1936;31:979–86.
45. Hallberg L, Hogdahl A-M, Nilsson L, Rybo G. Menstrual blood loss—a population study. Acta Obstet Gynecol Scand 1966;45:320–51.
46. Cole SK, Billewicz WZ, Thomson AM. Sources of variation in menstrual blood loss. J Obstet Gynaecol Br Cwlth 1971;78:933–40.
47. Haynes PJ, Anderson ABM, Turnbull AC. Patterns of menstrual blood loss in menorrhagia. Res Clin Forums 1979;1:73–8.
48. Warner PE, Critchley HO, et al. Menorrhagia II: is the 80-mL blood loss criterion useful in management of complaint of menorrhagia? Am J Obstet Gynecol 2004;190:1224–9.
49. Whitehouse HB. The physiology and pathology of uterine haemorrhage. 2. Pathological uterine haemorrhage. Lancet 1914b;i:951–7.
50. Chimbira T, Anderson ABM, Turnbull AC. Relation between measured menstrual blood loss and patients subjective assessment of loss, duration of bleeding, number of sanitary towels used, uterine weight and endometrial surface area. Br J Obstet Gynaecol 1980;87:603–9.
51. Fraser IS, McCarron G, Markham R. A preliminary study of the factors influencing peception of menstrual blood loss volume. Am J Obstet Gynecol 1984;149:788–93.
52. Warner PE, Critchley HO. Menorrhagia I: measured blood loss, clinical features and outcome in women with heavy periods: a survey with follow-up data. Am J Obstet Gynecol 2004;190:1216–23.
53. Higham JM, O'Brien PMS, Shaw RW. Assessment of menstrual blood loss using a pictorial chart. Br J Obstet Gynaecol 1990;97:734–9.
54. Reid PC, Virtanen-KarL S. Randomised comparative trial of the levonorgestrel intrauterine system and mefenamic acid for the treatment of idiopathic menorrhagia: a multiple analysis using total menstrual fluid loss, menstrual blood loss and pictorial blood loss assessment charts. BJOG 2005;112:1121–5.
55. Kottmeier HL. Endometrial hyperplasia and endometrial polypi in patients with abnormal uterine bleeding. Acta Obstet Gynecol Scand 1950;30(Suppl 7):381–8.
56. Valle RF. Hysteroscopic evaluation of patients with abnormal uterine bleeding. Surg Gynecol Obstet 1981;153:521–6.
57. Brenner PF. Differential diagnosis of abnormal uterine bleeding. Am J Obstet Gynecol 1996;175:766–9.
58. Schlink HH. Gynaecology. Sydney: Angus & Robertson, 1939.
59. Magian AC. The practitioners manual of gynaecology. London: William Heinemann, 1922.
60. New Zealand Working Party for Guidelines for the Management of Heavy Menstrual Bleeding. An evidence-based guideline for the management of heavy menstrual bleeding. N Z Med J 1922;112:174–7.
61. Blundell J. Lectures on midwifery, and the diseases of women and children; as delivered at Guy's Hospital. London: Field & Bull, 1832.
62. Blundell J. The principles and practice of obstetricy. With observations on some of the more important diseases of women. Edited, with copious notes and illustrations by T. Castle. London: Cox, 1840.
63. Monteiro I, Bahamondes L, Diaz J, Perrotti M, et al. Therapeutic use of levonorgestrel-releasing intrauterine system in women with menorrhagia: a pilot study. Contraception 2002;65:325–8.
64. Valle RF, Sciarra JJ. Role of hysteroscopy in evaluation of menorrhagia. In: Sheth SS, Sutton CJG, eds. Menorrhagia. Oxford: Isis Medical Media, 1999:43–52.
65. American College of Obstetricians and Gynecologists. Management of anovulatory bleeding. ACOG practice bulletin no. 14. Washington: ACOG, 2000.
66. Cameron IT. Dysfunctional uterine bleeding. Baillieres Clin Obstet Gynaecol 1989;3:315–27.
67. Crosignani PG, Rubin B. Dysfunctional uterine bleeding. Hum Reprod 1990;5:637–8.
68. Hurskainen R, Teperi J, Rissanen P, Aalto A-M, et al. Quality of life and cost-effectiveness of levonorgestrel-releasing intrauterine system versus hysterectomy for the treatment of menorrhagia: a randomised trial. Lancet 2001;357:273–7.
69. Long CA, Gast MJ. Menorrhagia. Obstet Gynecol Clin North Am 1990;17:343–59.
70. Bayer SR, DeCherney AH. Clinical manifestations and treatment of dysfunctional uterine bleeding. JAMA 1993;269:1823–8.
71. Ayers DM, Lappin JE, Liptok LM. Abnormal versus dysfunctional uterine bleeding: what's the difference? Nursing 2004;34(Suppl Guide):11–4.
72. Emanuel MH, Veredel MJ, Wamsteker K, Lammes FB, et al. A prospective comparison of transvaginal ultrasonography and diagnostic hysteroscopy in the evaluation of patients with abnormal uterine bleeding: clinical implications. Am J Obstet Gynecol 1995;172:547–52.
73. Stenchever MA. Comprehensive gynecology. 4th ed. St. Louis: Mosby, 2001:1079–82.
74. Ferri FF. Dysfunctional uterine bleeding. In: Ferri FF, ed. Ferri's clinical advisor. St. Louis: Mosby, 2001:264–6.
75. Arey LB. The degree of normal menstrual cycle irregularity. Am J Obstet Gynecol 1939;37:12–29.

76. Matsumoto S, Nogami Y, Ohkuri S. Statistical studies on menstruation: a criticism on the definition of normal menstruation. Gunma J Med Sci 1962;11:294–318.
77. Foster FP. The periodicity and duration of menstrual flow. N Y Med J 1889;49:610–1.
78. Maclaurin JC. Tentamen physiologicum inaugurale de fluxus menstrui indole, causique. Edinburgh: Balfour & Smellie, 1788.
79. Hefnawi F, Kandil O, El Tagi A, Zaki K. Hormonal profile, endometrial study and menstrual pattern after abdominal tubal sterilization. J Egypt Soc Obstet Gynecol 1979;5:37–41.
80. Rodriguez G, Faundes-Latham A, Atkinson L. An approach to the analysis of menstrual patterns in the clinical evaluation of contraceptives. Stud Fam Plan 1976;7:42–51.
81. Belsey EM, Machin D, d'Arcangues C. The analysis of vaginal bleeding patterns induced by fertility-regulating methods. Contraception 1986;34:253–60.
82. D'Arcangues C, Odlind V, Fraser IS. Dysfunctional uterine bleeding induced by exogenous hormones. In: Alexander NJ, d'Arcangues C, eds. Steroid hormones and uterine bleeding. Washington: American Association for the Advancement of Science, 1992:81–105.
83. Fraser IS. Bleeding arising from the use of exogenous steroids. In: Smith SK, ed. Dysfunctional uterine bleeding. Baillieres Clin Obstet Gynaecol 13:203–22.
84. Graves WP. Some observations on etiology of dysfunctional uterine bleeding. Am J Obstet Gynecol 1930;20:500–18.
85. Israel SL. Dysfunctional uterine bleeding of puberty and child-bearing age. In: Israel SL, ed. Diagnosis and treatment of menstrual disorders and sterility. New York: Paul B. Hoeber, 1959:389–417.
86. Cowan BD. Dysfunctional uterine bleeding: clues to efficacious approaches. In: Alexander NJ, d'Arcangues C, eds. Steroid hormones and uterine bleeding. Washington: American Association for the Advancement of Science, 1992:9–15.
87. American College of Obstetricians and Gynecologists. Menstruation in girls and adolescents: using the menstrual cycle as a vital sign. ACOG committee opinion no. 349. Washington: ACOG, 2006:1–6.
88. TeLinde RW. Endometrial pathology of functional bleeding. In: Engle ET, ed. Menstruation and its disorders. Springfield, IL: C.C. Thomas, 1950.
89. Bishop PMF, d'Almeida JCC. Treatment of functional menstrual disorders with norethisterone. Br Med J 1960;1:1103–6.
90. Fraser IS, Critchley HOD, Munro MG, Broder M. A process designed to lead to international agreement on terminologies and definitions to describe abnormalities of menstrual bleeding. Fertil Steril 2007;87: 466–76.
91. Sheth SS, Sutton CJG, eds. Menorrhagia. Oxford: Isis Medical Media, 1999:362.
92. Samuels AJ. Studies in patients with functional menorrhagia. The antihemorrhagic effect of the adequate repletion of iron stores. Isr J Med Sci 1965;1:851–3.
93. Hurskainen R. Managing drug-resistant essential menorrhagia without hysterectomy. Clin Obstet Gynaecol Best Prac Res 2006;20:681–94.
94. Ransom SB, McNeeley SG, White C, Diamond MP. A cost analysis of endometrial ablation, abdominal hysterectomy, vaginal hysterectomy, and laparoscopic-assisted vaginal hysterectomy in the treatment of primary menorrhagia. J Am Assoc Gynecol Laparosc 1996;4:29–32.
95. Kennedy AD, Sculpher MJ, Coulter A, Dwyer N, et al. Effects of decision aids for menorrhagia on treatment choices, health outcomes, and costs: a randomised controlled trial. JAMA 2003;288:2701–8.
96. Cooper J, Gimpelson R, Laberge P, Galen D, et al. A randomised, multicenter trial of safety and efficacy of the NovaSure system in the treatment of menorrhagia. J Am Assoc Gynecol Laparosc 2002;9:418–28.
97. Mercorio F, DeSimone R, Di Spiezio Sardo A, Cerrota G, et al. The effect of a levonorgestrel-releasing intrauterine device in the treatment of myoma-related menorrhagia. Contraception 2003;67:277–80.
98. Phillip CS, Dilley A, Miller CH, Evatt B, Baranwal A, Schwartz R, et al. Platelet functional defects in women with unexplained menorrhagia. J Thromb Haemost 2003;1:477–84.
99. Wright B, Gannon MJ, Greenberg M, House A, Rutherford T. Psychiatric morbidity following endometrial ablation and its association with genuine menorrhagia. BJOG 2003;110:358–6.
100. Aksel S, Jones GS. Etiology and treatment of dysfunctional uterine bleeding. Obstet Gynecol 1974;44:1–13.
101. Fraser IS. Menorrhagia—a pragmatic approach to the understanding of causes and the need for investigations. Br J Obstet Gynaecol 1994;101(Suppl 11):3–7.
102. Stabinsky SA, Einstein M, Breen JL. Modern treatments of menorrhagia attributable to dysfunctional uterine bleeding. Obstet Gynecol Surv 1999;54:61–72.
103. Fraser IS. The dysfunctional uterus—dysmenorrhoea and dysfunctional uterine bleeding. In: Shearman RP, ed. Textbook of clinical reproductive endocrinology. Edinburgh: Churchill Livingstone, 1985:578–98.
104. March CM. Bleeding problems and treatment. Clin Obstet Gynecol 1998;41:928–39.
105. Munro MG. Dysfunctional uterine bleeding: advances in diagnosis and treatment. Curr Opin Obstet Gynecol 2000;13:475–89.
106. Jones KD, Jermy K, Bourne T. What is the correct primary diagnostic tool in the "one-stop" clinic for the investigation of abnormal menstrual bleeding? Gynaecol Endosc 2002;11:27–32.
107. Singh RH, Blumenthal P. Hormonal management of abnormal uterine bleeding. Clin Obstet Gynecol 2005;48:337–52.