

The tortuous history of the implementation of early ambulation after delivery

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INTRODUCTION

One of earliest known risk factors for venous thrombosis is pregnancy. As long ago as 1718 Mauriceau described the 'milk leg'. He suspected that, in pregnant women, a venous thrombosis in the leg was caused by 'redundancy and metastasis' of breast milk causing the swelling and pain.^{1,2} This idea lasted for more than a century and is generally accepted as the first description of a venous thrombosis.² It was not until the 1850s that people realized venous thrombosis was not only a disease of women during or after pregnancy.² By the beginning of the twentieth century venous thrombosis occurred in approximately eight out of 1000 women who had just given birth and was fatal in about a third of the cases.³

For a long period, even until after the Second World War, most clinicians believed that venous thrombosis was an infectious disease and could be contagious.⁴ In 1856 Virchow described venous thrombosis as a disease caused by clotting of the blood.⁵ He developed the now famous Triad of Virchow in which he described three major causes for venous thrombosis—damage to the vessel wall, changes in the blood composition, and slowing down of the bloodstream. Currently it is believed that the latter two risk factors are the most important for venous thrombosis. During pregnancy and shortly after delivery coagulation factors are increased which ensures that bleeding during delivery is not prolonged.⁶ At the end of the pregnancy, the velocity of the bloodstream also falls by 50%^{7,8} due to compression of the inferior vena cava.^{7,9} To ensure that the circulation returns to normal after childbirth, women are nowadays stimulated to get out of bed as early as possible. However, even though stasis had been postulated as a potential cause of venous thrombosis as early as 1856, early ambulation only became widely accepted after the Second World War, whilst immediate ambulation after delivery has only become a general rule since the 1980s. In the Netherlands gymnastic exercises start on the first day after delivery.¹⁰ Women are advised to get out of bed early and

bruises, piles, and stitches are no reason not to participate. After a caesarean delivery exercises start on day two.¹⁰

Given that Virchow postulated the risk of venous stasis in 1856, and pregnancy was known to be an important risk factor for venous thrombosis, why was it not until the 1980s that early ambulation after delivery was generally implemented in hospitals? On what evidence was early mobilization based? These questions are the focus of our extensive literature search, the results of which are reported here.

METHODS

A literature search was being performed using Medline containing one of the following words: pregnancy, puerperium, postpartum, post-partum, obstetric, obstetrics, maternity, in combination with either ambulation, mobilisation, mobilization, bed rest, bedrest, exercise, move, moved, rise, rising or discharge. Medline was also checked for entries for 'milk leg' and 'phlegmasia alba dolens'. Similar terms were used in other bibliographic databases such as Embase, Web of Science, Scopus, and two journals, the Dutch *Nederlands Tijdschrift voor Geneeskunde* and the *Lancet*. Furthermore, Index Medicus (1879–1950), and the Dutch Central Catalogue were searched using the terms gynaecology, gynaecologie, obstetrics and verloskunde. References cited in other articles were checked. Whenever available, German, English, French, Dutch and Czech articles were read in their original language. Consecutive editions of widely used American, British and Dutch obstetrics and gynaecology textbooks, published between 1930 and 1975, were read and references cited in these books were traced if the topic concerned immobilization after childbirth. We interviewed well-known Dutch obstetricians, namely Professor Dr J F Schutte (in practice from 1930 to 1975), Professor Dr H J Huisjes (in practice from 1960 to 1990), Professor Dr P E Treffers (who remains in practice, having started in 1965), and Professor Dr J Bennebroek-Gravenhorst (who remains in practice, having started in 1968).

Most research in obstetrics and gynaecology at the end of the nineteenth and beginning of the twentieth century was performed in Germany and other European countries.

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The discussion emerged in the US literature only shortly before the Second World War.

1777 TO FIRST WORLD WAR

In 1777 an English obstetrician, by the name of Charles White, in his treatise on the *Arrest of Puerperal Fever*, recommended early mobilization after delivery.^{2,11} However this recommendation was not followed by other obstetricians and disappeared from use.^{2,12} Gooch, also from the UK, held the opposite opinion in 1820; this professor of obstetrics cautioned his student obstetricians not to allow their patients out of bed before the twenty-first day after delivery.¹¹ At the end of the nineteenth century women were advised to stay in bed for 28 days.¹³ Around 1900, German gynaecologists started early mobilization. This was based on the finding of Küstner in 1878.^{14,15} He wanted to reduce the risk of infection in women after childbirth. He wondered whether this risk could be reduced if women had the same 'bed regimen' after giving birth as healthy individuals, so he decided to encourage women to get out of bed at an early stage. He found less fever in these women. Moreover, he did not find any deep venous thrombosis in 600 women who were mobilized on the first day after delivery, when eight cases would have been expected.¹⁶ After this promising result other German obstetricians started to mobilize women at an early stage. The first to follow were Krönig and Bumm, who also reported beneficial results.^{2,17-20} In 1902, Krönig found that in a group of 416 women in his maternity clinic who were mobilized on the first day, no venous thrombosis or pulmonary embolism occurred. Of the 146 women who stayed in until at least the eleventh day, five had a venous thrombotic event (3.4%).² This led to the suggestion by Krönig that venous thrombosis was mainly caused by disturbances of the circulation.¹⁶

Bumm confirmed these results in 1907: he did not find any venous thrombosis among 900 women mobilized early.^{2,16} Around 1911, Klein found no cases of venous thrombosis in 2524 women who were mobilized between the first and third day; whereas in 2500 women who stayed in bed until at least the ninth day, four venous thromboses and one fatal pulmonary embolism occurred.² Gauss found similar results among 600 women. He did not find a single case of venous thrombosis among women who had been mobilized early, compared with eight cases of venous thrombosis among the women who had remained in bed for at least 6 days. However it is not known how many women remained in bed for that period.¹⁶

In all these studies, however, relatively healthy women were allowed out of bed at an early stage, while the women who had fever and other complications were generally kept in bed for a longer period.

After these results, many clinics—mainly German—adopted early mobilization, although every clinic had its own definition of early ambulation. While one clinic advised its patients to get out of bed on the first day after delivery, other clinics still spoke of 'early ambulation' when women stayed in bed until the eighth day.²

Prevention of venous thrombosis was not always the reason for early ambulation. In 1908, Hüffell, for example, mobilized his relatively healthy patients after 4 days to make it easier for them to return to daily life.¹⁶ Before this change, women were required to stay in bed until the eighth day and went home on the ninth day. At home, the daily activities had to be resumed leaving women little time to re-acclimatize to normal life.¹⁶

Besides the positive effects of prevention of venous thrombosis and acclimatization, some physicians like Hüffell,¹⁶ Velits,¹⁸ Simon,²¹ and Alvensleben²⁰ also saw other beneficial effects of early ambulation on general morbidity.^{16,21} Among these, postulated effects were more rapid involution of the uterus and genitals,^{2,18} fewer uterine prolapses and retroflexions,^{16,21} less fever,¹⁸ fewer pneumonias,² less blood in the lochia¹⁸ and a better state of mind.²

Despite these beneficial results in the early 1900s, European obstetricians became more careful in prescribing early ambulation after 1910. Four important reasons accounted for their reluctance. The main reason was that the abdominal organs were thought to be loosened by childbirth, and would put too much pressure on the uterus, increasing the risk of prolapses (Huisjes, Schutte, personal communication). Our review of the literature did not show any evidence that staying in bed prevented prolapses. However, until long after the Second World War, this was the main reason for not implementing early ambulation.²²

A second reason was a publication by Fromme, head of the university maternity clinic in Halle, Germany. He described a single lethal case of pulmonary embolism due to, in his opinion, premature ambulation.¹⁷ In 1908, after the experiences of Krönig and others, he had allowed women without fever or other complications to sit up in bed on the first day. One early ambulated woman died of a severe pulmonary embolism shortly after early mobilization. Since Fromme had never seen a lethal pulmonary embolism among his 6600 patients who had the old bed rest policy, he strongly advised caution in promoting early ambulation until more was known on the cause of pulmonary emboli.¹⁷ This report was influential: most obstetricians acted less enthusiastically in prescribing early ambulation after delivery.¹⁹ A third reason was that, although some German gynaecologists were convinced of the beneficial effects of early ambulation, some were afraid that a policy change would force women from the working class to return to their usual physical activities too

early.^{12,20,21} Finally, not all gynaecologists were convinced of the beneficial effects of early ambulation, as in most studies only the healthy women were allowed to get out of bed early.²¹

Gynaecologists in the USA were also reticent about early ambulation. In 1910, Mosher surveyed views about early ambulation among many important American obstetricians.¹² Most obstetricians did not allow women to get out of bed before the tenth day. However, compared to the UK and the Netherlands, women were more often allowed to move freely in bed and to eat in the sitting position.^{12,23,24} Most clinicians in the USA had heard about the German practice. Nevertheless, they did not believe it would be useful—they even thought it could be dangerous. They reasoned that ‘as the practice [by White] did not find many imitators, it was not found advantageous.’¹² The appearance of several cases of lethal pulmonary emboli and the ideas that ‘rest is best’ and ‘the American women of the better class were no comparison to the German peasantry’ (Mosher, page 624) resulted in a more conservative approach in the USA.¹²

FIRST TO THE SECOND WORLD WAR

Probably the first semi-randomized controlled trial for women during puerperium was proposed by Baird around 1930 when he worked as an assistant obstetrician in Glasgow, Scotland. The legs of the women in that hospital were tied together for 14 days to prevent infection. Baird questioned the rationale of this regime and proposed that he might try, on alternate women after giving birth, not tying the legs with binders and see what would happen.^{25,26} According to one textbook, the subsequent comparison of these women with those who had their knees tied showed that there was no benefit from tying the legs and the practice was discontinued.²⁶ However, a second textbook suggests that this experiment was only proposed by Baird and that it is uncertain whether it was performed.²⁵

Wichmann wrote, in 1938, a manuscript promoting early ambulation after surgery and delivery.^{19,27} He obtained his ideas from the studies done by Küstner and Krönig, as well as new studies done by Scherf.¹⁹ Scherf had found in an autopsy series that deep veins were more often thrombotic in women who had a long bed rest compared to those with a short bed rest.¹⁹ Wichmann implemented early ambulation in his clinic and saw many beneficial effects. The women themselves preferred it, and less overall morbidity was found. Eight months after the policy change not a single woman had experienced a venous thrombosis or pulmonary embolism.¹⁹

In Helsinki, Finland, 4447 out of 4657 women were allowed out of bed within 48 hours after delivery between January 1938 and June 1939. Fewer cases of venous

thrombosis (0.11%) were found compared to women who had to remain in bed for the usual length of time (0.41%) after delivery between 1927 and 1936.^{11,27}

For a long time after the Second World War gynaecologists and obstetricians faced a dilemma. As it was becoming more and more accepted that early ambulation prevented the risk of venous thrombosis, they were also afraid that premature ambulation might lead to increased risks of prolapses of the uterus, bladder and even rectum (Huisjes, Bennebroek-Gravenhorst, personal communication).²⁸ This dilemma resulted in different approaches in different countries and hospitals. After a plea by Chalié, an advocate of early ambulation, a group of French clinics implemented early ambulation in the late 1930s.¹⁹ In Britain and the USA it was usual to let the women stay in bed for approximately 7–14 days; however women were allowed to move freely in bed.^{29–33} A remarkable fact is that gynaecologists in these countries did not advise elastoplast strapping or binders anymore, whilst in the Netherlands this was still common practice

THE SECOND WORLD WAR TO 1950

New reasons to practice early ambulation arose during the Second World War. During the Blitz, in 1940, women in a maternity hospital in London were encouraged to get out of bed on the first day, so that if there were a bombing they would be able to walk to the air-raid shelter themselves. Less morbidity, better involution and considerable less venous thrombosis occurred, although the latter was ascribed to the increased use of elastoplast strapping. It was believed that ‘a possible increased risk of prolapse was justified under these unusual circumstances’.³⁴

In the USA a shortage of hospital beds occurred at the beginning of the Second World War. A wartime baby boom occurred because women wanted to have children by their husbands before they went overseas. This resulted in an increase in births from 18.4 / 1000 population in the 1930s to 22.7 / 1000 at the height of the baby boom in 1943.^{35,36} The shortage of hospital beds became even more problematic, as not only rich women delivered in hospital, but other social classes could also afford a hospital stay. In 1935, 24.4% of the births took place in hospital, while in 1945 this increased to 78.8%. Supported by findings of the London hospitals during the Blitz, the only way to solve the shortage problem was believed to be early discharge. However, since early discharge was affecting not only lower economic classes but also the middle classes, physicians had to show that early ambulation was safe. In a hospital in Baltimore 150 women with no complications after normal childbirth were allowed out of bed on the third or fourth day postpartum. Women who got out of bed earlier had better involution and a similar morbidity rate compared to

women with similar characteristics in a second hospital in which the old bed rest regimen was practiced.^{11,36}

The baby boom in Europe started after the Second World War, but it resulted in the same problems as had been experienced a few years earlier in the USA. In Britain there were too few maternity beds in hospitals. As women were sent home on the fifth day, it was important that they were able to do easy tasks themselves.³⁷ Half a day after delivery women were stimulated to sit on the bedside and move their legs. Both physicians and patients eagerly accepted this policy. A survey showed that most general practitioners (69%) were in favour of early ambulation.³⁷ No differences in the occurrence of venous thrombosis were found in the new practice compared to the old regimen.³⁷

Even though the acute shortage of hospital beds was an important problem for hospitals, not all agreed with the idea of early discharge. Hospitals were advised in the *Journal of the American Medical Association* not to discharge patients before the seventh or eighth day and with printed instructions about their future care.³⁸

1950 TO 1980

Around 1950, the attitude of physicians and clinics to women giving birth changed. In Britain and the USA a transition occurred from late to early ambulation. Where some were reluctant to prescribe early ambulation³⁹⁻⁴³ others were more progressive.⁴⁴⁻⁵⁰ Women were no longer regarded as patients, and were restricted less.¹³ Babies were allowed to be in the same rooms as their mothers, visitors were welcomed, and women were discharged at an early stage.¹³ Many physicians allowed women to move in bed, and to have a say about when to get up. Most women left their bed on the first day to sit in a chair. After this transitional period, most British and American obstetricians were convinced of the negative effects of stasis of the blood on the risk of venous thrombosis and adjusted their policies. In the 1950s it was common practice to leave bed on the first or second day after giving birth.

In contrast, in 1953, Mayes in Australia described early ambulation as a controversial, very old idea which had been abandoned years previously.⁵¹ He required women to remain in bed for four to five days, probably because he was afraid that early mobilization would increase the risk of prolapses. Notwithstanding this, he thought full ambulation at the earliest reasonable time after confinement was responsible for greatly reducing the morbidity of venous thrombosis.⁵¹

Some Dutch textbooks, such as that by Amesz published in 1963, still referred to the mainly negative effects of early ambulation, such as prolapses, and mentioned only a few negative effects after bed rest lasting 8-9 days.⁵² However,

during this time period more hospitals started implementing early ambulation in daily practice.⁵³⁻⁵⁶ From 1958 onwards, women were advised to get out of bed at an early stage. From the first hours after delivery, women were allowed to move freely. From the second day onwards they were allowed to get out of bed for short periods, while later on women were allowed out of bed for longer periods of time.^{53,54,57-60} Binders or elastoplast strapping were less often prescribed and usually not bound as tightly as in the old days.^{56,61} From 1973 onwards binders were no longer advised.^{55,60} Moreover, deliveries among otherwise healthy women with uncomplicated pregnancies in the Netherlands increasingly took place at home; it can safely be assumed that all kinds of restrictions will have been somewhat less strict. Therefore, when a woman gave birth at home she would probably not have been in bed for the prescribed period. As only very healthy women gave birth at home, the occurrence of venous thrombosis in this group cannot be compared to that of those who gave birth in the hospital.

Bonnar showed that the number of lethal pulmonary emboli after delivery decreased in England and Wales between 1972 and 1981 compared with the situation in 1952. This was ascribed, among other reasons, to the policy changes regarding early ambulation, since the number of lethal pulmonary emboli during pre-partum period remained stable (Figure 1).⁷ A similar study by Treffers also found a remarkable decrease in thromboembolic disease in the postpartum period over the years. The main decrease of cases of venous thrombosis was seen in the years 1973 to 1979. However, the early ambulation policy had already been implemented in the late 1950s and early 1960s. Compared to 1952-1957, the 1958-1962 and 1963-1967 periods did not show any decrease in the occurrence of venous thrombosis (Figure 1).⁶² This led to the conclusion by van Bouwtdijk-Bastiaanse that early ambulation did not help in the reduction of the risk of venous thrombosis.⁶³ The decrease in the 1970s was ascribed to a decreasing age of pregnant women and to the provision of anticoagulant therapy to women who had a caesarean section.⁶²

In Czechoslovakia, Dvorak performed a study in 1977 on the effects of early ambulation after delivery, much like the German obstetricians in the beginning of that century, by comparing two time periods. From 1955 to 1964, 9774 women were kept in bed for 6 weeks. Two percent of them experienced a venous thrombosis: 0.09% a pulmonary embolism, 0.66% a deep venous thrombosis and 1.34% a superficial thrombophlebitis. From 1970 to 1975, 10235 women were mobilized within 24 hours after delivery. No deep vein thrombosis or pulmonary embolisms occurred, while only 0.34% of the women got a thrombophlebitis.⁶⁴ However, as with the other studies, no corrections for

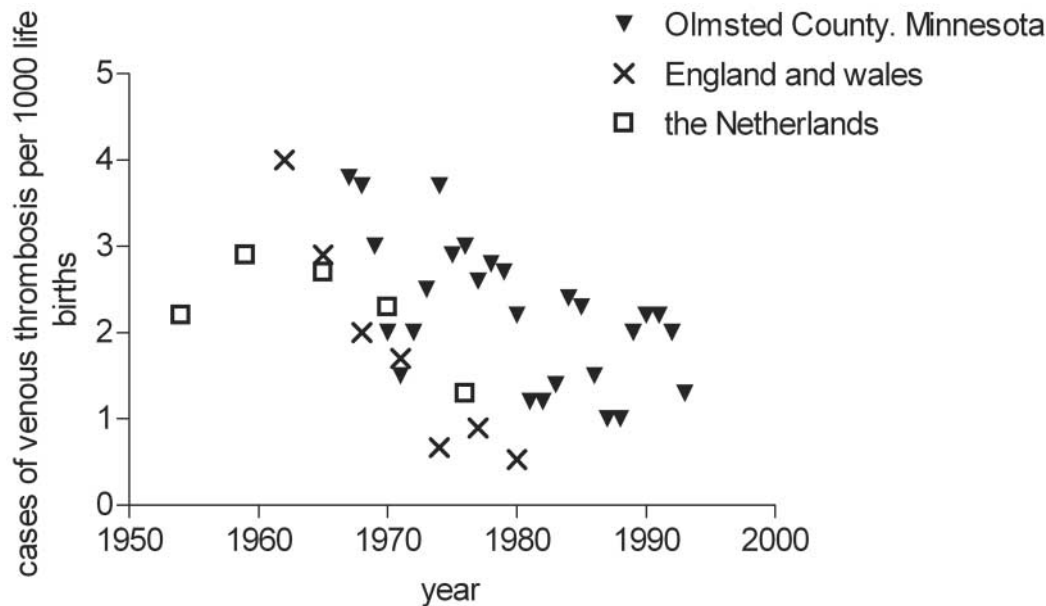


Figure 1 Trends over time for the incidence of venous thrombosis and pulmonary embolism among post partum women in three different countries (References 26, 62, 68, 69)

other changes in practice, such as anticoagulation therapy, were taken into account.

1980 TO DATE

Nowadays, it is generally accepted that early mobilization has mainly advantages. Nevertheless, over the last few years, since the discussion started whether bedridden pregnant women should be prescribed prophylactic anti-coagulants or stasis-reducing treatment, a number of new studies have been performed. Since it is not justified anymore to keep healthy women in bed after giving birth to a child, most studies on early ambulation are performed with pregnant women who have to remain in bed for diseases or complications.⁶⁵ A small increased risk of venous thrombosis of extended bed rest has been found.⁶⁵⁻⁶⁷ However, similar to studies performed in the beginning of the twentieth century, women who are obligatorily bedridden most often have a poorer health status, which results in a higher risk of venous thrombosis, compared to those who are allowed to leave the bed at an early stage. For this reason, no accurate risk estimations have been made for comparable groups of women.

DISCUSSION

After Virchow described venous stasis as a risk factor for venous thrombosis, German obstetricians started encouraging women to get out of bed early after childbirth. The first individual promoting this practice was probably Küstner in 1878. He was followed by only a few German

obstetricians: other obstetricians were reluctant for several reasons, of which fear of prolapses was the most important. Therefore the practice of early ambulation virtually disappeared.

The Second World War and the accompanying baby boom led to a shortage of hospital beds, resulting in a strong practical reason for early ambulation. Early ambulation was implemented in many hospitals. Since no negative effects were found, there was no reason to return to the old practice. After the Second World War a decrease was found in cases of postpartum venous thrombosis. However, besides early ambulation, other factors, such as anti-coagulation and the age of child-bearing women, changed as well. Therefore it is not known whether early ambulation was responsible for this decrease.

We performed an extended literature review and we did not find studies which provided ‘evidence-based proof’ according to current standards. As most of the research discussed in this article was old, mostly performed before the Second World War, it is possible that we may have missed some studies. However, we did check all the relevant references in articles and handbooks. We therefore believe that if these studies have been performed, their impact was likely to be limited.

Mainly practical reasons, and not profound scientific arguments, were the most important factor in changing the treatment of child-bearing women. We do not suggest that more research is needed to study whether extended bed rest is more beneficial than early ambulation as nothing indicates that the former might be better. However, we believe that it is important to note that other factors than

evidence-based practice have played the major role in the past in shaping the best, currently used, practice.

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REFERENCES

- White C. *An Inquiry Into The Nature and Cause of That Swelling, In One Or Both of the Lower Extremities, Which Sometimes Happens To Lying-In Women Together With an Examination Into The Property of Drawing the Breasts of Those Who Do and Also of Those Who Don't Give Suck.* Warrington: Dilly, 1784
- van Vugt D. *Bijdrage Tot De Aetiologie, Kliniek En Therapie Van De Phlegmasia Alba Dolens.* 1929
- Ashton WE, McGlenn JA. *Essentials of Obstetrics: Arranged in the Forum of Questions and Answers Prepared Especially for Students of Medicine.* Philadelphia and London: WB Sanders, 1911
- de Snoo K. *Leerboek Der Verloskunde.* Groningen: Wolters, 1933
- Virchow. Phlogose und thrombose im gefässsystem. In: *Gesammelte Abhandlungen zur Wissenschaftlichen Medizin.* Frankfurt: Staatsdruckerei, 1856
- Heineman MJ, Bleker OP, Evers LH, Heintz APH. *Obstetrie & gynaecologie.* In: *Obstetrie en Gynaecologie. De voortplanting van de mens.* Maarssen: Elsevier Gezondheidszorg, 2001
- Bonnar J. Venous thrombo-embolism and pregnancy. *Clin Obstet Gynaecol* 1981;**8**:455–73
- Kerr DB, Scott DB, Samuel E. Studies of the inferior vena cava in late pregnancy. *BMJ* 1964;**i**:532–3
- Toglia MR, Weg JG. Venous thromboembolism during pregnancy. *N Engl J Med* 1996;**335**:108–14
- Huisjes HJ. *Inleiding Tot de Obstetrie.* Alphen aan den Rijn: Samsan Stafleu, 1987
- Rotstein ML. Getting patients out of bed early in the puerperium. *JAMA* 1944;**125**:838–40
- Mosher GC. Posture of the lying-in patient. *Am J Obstet Gynecol* 1911;**44**:617–25
- Rush J, Chalmers I, Enkin M. Care of the new mother and baby. In: Chalmers I, Enkin M, Keirse MJNC, eds. *Effective Care In Pregnancy and Childbirth.* Oxford: OUP, 1989
- Küstner O. An welchem Tage soll die Wöchnerin das Bett verlassen? *Klin Wochensh* 1878;**23**
- Koller TH, Haefeli H, Merz. Sofortaufstehen im Wochenbett zur Prophylaxe thrombo-embolischer Erkrankungen. *Gynaecologia* 1968;**166**:10–19
- Hüffel. Zum frühauftreten der Wöchnerinnen. *Zentrabl Gynäkol* 1909;**33**:764–9
- Fromme. Thrombose und frühauftreten im wochenbett. *Zentrabl Gynäkol* 1908;**33**:15–21
- Velits. Über das frühauftreten der wöchnerinnen. *Zentrabl Gynäkol* 1910;**34**:845–8
- Wichmann ?initial?. Über die bedeutung des frühauftretens in der prophylaxe der Thrombose und Embolie. *Acta Soc Mec Fenn Douecim* 1938;**1**(Ser B fase 1–2 art 2.27):1–11
- Alvensleben V. Das aufstehen der Wöchnerinnen in den ersten Tagen des Wochenbettes. *Zentrabl Gynäkol* 1907;**36**:1184–91
- van de Poll CN. Nog eens: "rust in het kraambed". *Medisch Weekbl* 1910
- Pereira-D'Olivera E. Het mobiliseren van de kraamvrouw. *Ned Tijd Geseskd* 1948;**92**:4207
- de Lee JB. *The Principles and Practice of Obstetrics.* Philadelphia: Saunders, 1915
- Grandin EH, Jarman JG. *A Text-Book on Practical Obstetrics.* Philadelphia: Saunders, 1900
- Dennis J. The physiology and management of the puerperium. In: Sir Alec Turnbull, Chamberlain G, eds. *Obstetrics.* Edinburgh, London, Melbourne, New York: Churchill Livingstone, 1989
- Grant A, Sleep J. Relief of the perineal pain and discomfort after childbirth. In: Chalmers I, Enkin M, Keirse MJNC, eds. *Effective Care In Pregnancy and Childbirth.* Oxford: Oxford University Press, 1989
- Vara P. Beobachtungen über das "Frühauftreten" nach gynäkologischen Operationen bezw. Entbindungen. *Acta Obstet Gynecol Scand* 1941;**21**:168–79
- Redactie. Vraag en antwoord. *Ned Tijd Geneesk* 1948;**92**:3422
- Curtis AH. *Obstetrics and Gynecology.* Philadelphia: Saunders, 1933
- Salomons B, Falkiner NM. *Tweedy's Practical Obstetrics.* Revised. Toronto: McAinsh, 1937
- Carnac RL. Queen Charlotte's maternity hospital. *The Queen Charlotte's Textbook of Obstetrics.* London: J & A Churchill Ltd, 1943
- Irving FC. *Outline of Normal Obstetrics.* Boston: JW Edwards Brothers, 1944
- Browne O. *A Manual of Practical Obstetrics.* London: Bristol, 1948
- Basden M. A maternity hospital at the home front. *BMJ* 1940;**788**:453
- Shorter hospital period after child birth. *JAMA* 1942;**120**:631
- Temkin E. Driving through: postpartum care during World War II. *Am J Public Health* 1999;**89**:587–95
- Soldenhoff de R, Edin MB. Early ambulation in obstetric and gynaecological cases. *Lancet* 1948;**i**:961–4

- 38 Bed rest and exercise restrictions after childbirth. *JAMA* 1942;**120**: 801
- 39 Baird D. *Combined Textbook of Obstetrics and Gynaecology*. Edinburgh: E & S Livingstone, 1950
- 40 Bergqvist D, Lowe G. Venous thromboembolism in patients undergoing laparoscopic and arthroscopic surgery and in leg casts. *Arch Intern Med* 2002;**162**:2173–6
- 41 Strachan GI. *Textbook of Obstetrics*. London: Lewis, 1947
- 42 Stander HJ. *Textbook of Obstetrics: Designed For the Use of Students and Practitioners*. New York: Appleton-Century, 1945
- 43 de Lee JB, Greenhill JP. *The Principles and Practice of Obstetrics*. Philadelphia: Saunders, 1945
- 44 Greenhill JP. *Obstetrics in General Practice*. Chicago: Year Book Publishers, 1945
- 45 Williams JW, Eastman NJ. *Obstetrics*. New York: 1950
- 46 Mengert WF. *Postgraduate Obstetrics*. New York: London, 1947
- 47 Carter B, Davis M. *Gynecology and Obstetrics*. Hagerstown: WF Prior, 1947
- 48 Dobbie BMW. *Obstetrics and Gynaecology: a Synoptic Guide To Treatment*. London: H K Lewis Company Ltd, 1948
- 49 Claye AM. *Management in Obstetrics*. London: Oxford University Press, 1948
- 50 Browne FJ. *Postgraduate Obstetrics and Gynaecology*. London: Butterworth, 1950
- 51 Mayes BT. *A Textbook of Obstetrics*. Sydney: Australasian Publishing Company, 1953
- 52 Amesz HJ. *Verloskunde*. Lochem: de Tijdstroom, 1963
- 53 Verboom A. *Verloskunde in Een Huisartsenpraktijk*. Leiden: Stenfert Kroese, 1968
- 54 Berge BS. *Leerboek der Verloskunde*. Amsterdam: van Holema & Warendorf, 1958
- 55 Assche van A. *De Voortplanting Van De Mens: Leerboek Voor Obstetrie En Gynaecologie*. Bussum: Centen, 1973
- 56 Eskes TKAB. *Gynaecologie & Obstetrie*. Leiden: Spruyt, van Mantgem en de Does, 1968
- 57 Berge BS. *Leerboek der Verloskunde*. Bussum: van Dishoeck, van Holkema & Warendorf, 1967
- 58 Berge BS. *Leerboek der Verloskunde*. Amsterdam: van Holkema & Warendorf, 1963
- 59 Cunningham FG, Grant NF, Leveno KJ. *Williams Obstetrics*. New York: McGraw-Hill, 2001
- 60 Kloosterman GJ. *De Voortplanting Van De Mens: Leerboek Voor Obstetrie en Gynaecologie*. Bussum: Centen, 1974
- 61 Eskes TKAB. *Gynaecologie & Obstetrie*. Leiden: Spruyt, van Mantgem en de Does, 1973
- 62 Treffers PE, Huidekoper BL, Weenink GH, Kloosterman GJ. Epidemiological observations of thrombo-embolic disease during pregnancy and in the puerperium, in 56,022 women. *Int J Gynaecol Obstet* 1983;**21**:327–31
- 63 van Bouwdijk Bastiaanse MA, ten Berge BS, et al. *Leerboek der Vrouwenziekten*. Amsterdam: Scheltema & Holkema, 1965
- 64 Dvorak V, Novotny A. Prevention of thromboembolism in the puerperium. *Cesk Gynecol* 1977;**42**:697–8
- 65 Danilenko-Dixon DR, Heit JA, Silverstein MD et al. Risk factors for deep vein thrombosis and pulmonary embolism during pregnancy or post partum: a population-based, case-control study. *Am J Obstet Gynecol* 2001;**184**:104–10
- 66 Kovacevich GJ, Gaich SA, Lavin JP et al. The prevalence of thromboembolic events among women with extended bed rest prescribed as part of the treatment for premature labor or preterm premature rupture of membranes. *Am J Obstet Gynecol* 2000;**182**:1089–92
- 67 Carr MH, Towers CV, Eastenson AR, Pircon RA, Iriye BK, Adashek JA. Prolonged bedrest during pregnancy: does the risk of deep vein thrombosis warrant the use of routine heparin prophylaxis? *J Matern Fetal Med* 1997;**6**:264–7
- 68 Heit JA, Kobbervig CE, James AH, Petterson TM, Bailey KR, Melton LJ, III. Trends in the incidence of venous thromboembolism during pregnancy or postpartum: a 30-year population-based study. *Ann Intern Med* 2005;**143**:697–706
- 69 Bonnar J. Can more be done in obstetric and gynaecologic practice to reduce morbidity and mortality associated with venous thromboembolism? *Am J Obstet Gynecol* 1999; **180**:784–91