




Duration of the active phase of labor in spontaneous and induced labors

Journal:	<i>Acta Obstetrica et Gynecologica Scandinavica</i>
Manuscript ID	AOGS-16-0259.R1
Wiley - Manuscript type:	Original Research Article
Date Submitted by the Author:	n/a
Complete List of Authors:	Østborg, Tilde; Helse Stavanger HF, Department of Obstetrics and Gynecology Romundstad, Pål; Norwegian University of Science and Technology, Faculty of Medicine, Public Health Eggebo, Torbjørn; St. Olavs Hospital – Trondheim University Hospital, National Center for Fetal Medicine; Helse Stavanger HF, Department of Obstetrics and Gynecology
Keywords:	Delivery, Induction of labor, Cesarean


 SCHOLARONE™
 Manuscripts
 Review

Duration of the active phase of labor in spontaneous and induced labors

Running headline: Duration of active phase of labor

TILDE B. ØSTBORG¹, PÅL R. ROMUNDSTAD², TORBJØRN M. EGGEBO^{1,3}

¹ *Department of Obstetrics and Gynecology, Stavanger University Hospital, Stavanger, Norway*

² *Department of Public Health, NTNU, Trondheim, Norway*

³ *National Centre for Fetal Medicine, Trondheim University Hospital (St. Olavs Hospital), Trondheim, Norway*

Corresponding author:

Torbjørn Moe Eggebø, National Center Fetal Medicine, St. Olavs Hospital, 7006, Trondheim, Norway. Email address: tme@lyse.net Telephone number: + 47 92699433

Conflict of interest:

The authors have no conflicts of interest in connection with this article

Key words: labor duration, induction, cesarean delivery, ten group classification system

Key message: The active phase of labor was longer in induced labors compared to labors with spontaneous onset in nulliparous women. In parous women the difference was small and probably of little clinical importance.

Abbreviations: BMI, body mass index; TGCS, Ten group classification system; WHO, World Health Organization; Hazard Ratio (HR)

Abstract

Introduction. The aim of the study was to compare the duration of active phase of labor in women with spontaneous or induced start of labor. *Material and methods.* An observational cohort study was performed at Stavanger University Hospital in Norway between January 2010 and December 2013. Information related to pregnancies and deliveries were collected prospectively and recorded in an electronic birth journal. The hospital is serving an unselected population of 19 524 births. Women with a single fetus at term, cephalic presentation and no previous cesarean delivery were included (Ten Group Classification System 1-4). Duration of active phase of labor was compared in women with induced labor vs. women with spontaneous start of labor by the use of survival analyses. The main outcome measure was duration of active phase of labor. *Results.* Active phase of labor was longer in induced labors compared to labors with spontaneous onset in nulliparous women (unadjusted HR 0.76 (95% CI 0.71 – 0.82), adjusted HR 0.86 (95% CI 0.82-0.95). The estimated median duration was 108 minutes longer in the induced group. In parous women induced labors had shorter duration before six hours in active labor, but after six hours induced labors had longer duration. The overall difference in parous women was small and probably of little clinical importance. *Conclusion.* Active phase of labor was longer in induced than spontaneous labors in nulliparous women.

Introduction

There is ongoing discourse within the obstetrical community regarding the normal progression and duration of labor (1). Labor dystocia is one of the main indications of unplanned cesarean deliveries thus knowledge of the normal range of progression and duration is of utmost importance for a precise diagnosis and clinical management (2). The World Health Organization (WHO) recommends defining the start of the active phase of labor as when the cervix is effaced and dilated four cm in women with regular contractions (3). Accordingly, the time span between this event and delivery of the fetus constitutes the duration of active labor. However, in a contemporary cohort, a number of interventions take place, which shorten labor duration and will therefore interfere with calculation of mean and median duration. For this reason, survival analyses can be used when conducting such studies to ameliorate the effects of interventions on studies of duration (4). It is documented in previous studies that duration of labor is influenced by factors such as parity (5), age (6), ethnicity (5), BMI (7), fetal position (8), use of oxytocin (9, (10) and epidural analgesia (11).

Induction of labor is becoming increasingly common in obstetrics. Different induction methods have been compared with regards to safety and efficacy (12). Retrospective studies indicate an increased risk of operative interventions in induced labors (13, (14), but it is unclear whether these interventions are due to the induction itself, or due to the pregnancy complications, which bring it about (15, (16, (17). Some studies indicate that prolonged labor has potential adverse effects on mother and fetus and duration of labor following labor induction warrants investigation (18).

The Ten Group Classification System (TGCS) was described in 2001 and originally used to assess cesarean delivery rates in different groups of laboring women (19). TGCS 1 comprises nulliparous women with a singleton fetus in cephalic presentation from 37 weeks

1
2 of gestation with spontaneous start of labor. TGCS 2a is equal to TGCS 1 except for induction
3
4 of labor. TGCS 3 comprises parous women with a singleton fetus in cephalic presentation
5
6 from 37 weeks of gestation without a previous cesarean delivery. TGCS 4a equals TGCS 3
7
8 except for induction of labor.
9

10
11 We aimed to compare the duration of active phase of labor in women with spontaneous
12
13 or induced start of labor using survival analyses. In order to achieve comparable groups, we
14
15 used the TGCS, focusing on comparisons between the nulliparous women in group 1 and 2a,
16
17 as well as the parous women in group 3 and 4a.
18
19

20 21 **Material and methods**

22
23 The labor ward at Stavanger University Hospital serves as the only delivery unit in the region
24
25 for a population of 320,000 people, with around 4800 deliveries yearly. Information related to
26
27 pregnancies and deliveries were collected prospectively and recorded in an electronic birth
28
29 journal (Natus), and continuously maintained using standardized procedures for data entry
30
31 and quality control. The study period was from 1st of January 2010 to 31st of December
32
33 2013. The study was in accordance with the Helsinki Declaration and approved by the
34
35 regional ethics committee in western Norway (REK 2014/1925).
36
37
38
39

40
41 The main outcome was duration of labor defined as time from start of active phase
42
43 until delivery. Estimated date of delivery was determined by a second trimester ultrasound
44
45 scan (eSnurra) (20) or from menstrual data when no ultrasound results were available. In
46
47 women with Bishop score <6 , misoprostol was used as induction agent, and 25 micrograms
48
49 were administered vaginally every four hours up to a maximum dose of 100 micrograms/day
50
51 over a maximum of two days. In women with Bishop score ≥ 6 , amniotomy was performed
52
53 and oxytocin added after four hours if regular contractions were not established.
54
55

56
57 The progress of labor was monitored using a partograph with a four-hour action line
58
59 as recommended by the WHO, and prolonged first stage diagnosed when the action line was
60

1
2
3
4
5
6
7
8
9
crossed. This definition was used in both nulliparous and parous women, and augmentation
with oxytocin during the first stage was only administered to women with a diagnosis of
prolonged labor. During the second stage, augmentation with oxytocin could be started at the
discretion of the birth attendant when the contractions were considered insufficient.

10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
Amniotomy was not routinely performed during the active phase of labor, but always prior to
oxytocin augmentation. Oxytocin was administered as an intravenous infusion of 5IE
(0.01 milligrams) oxytocin in 500 ml saline and the infusion rate started at 6 milliunits/min (30
ml/h), with a dose increment of 3 milliunits/minute (15ml/h) every 15 minutes to a maximum
of 40 milliunits/minute (180 ml/h) until progress of labor or regular contractions at a rate of 3-
5/10 minutes was achieved. A combination of low-dose ropivacaine/fentanyl was used for
epidural analgesia.

27
28
29
30
31
32
33
Operative vaginal delivery was considered in all women after 60 minutes of active
pushing, in accordance with national guidelines (21). The preferred device for operative
vaginal delivery in the department is the Malmstrom metal cup.

34 35 36 *Statistical analyses*

37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
Chi-square test was used to compare categorical variables, and continuous variables were
compared using Mann–Whitney U-tests. The duration of active phase of labor was evaluated
using survival analyses. Women with missing information about start of active phase of labor
or cesarean section performed during the latent phase were left censored. Women with active
phase of labor >24 hours or an operative delivery were right censored. The analyses were
performed by comparing TGCS 1 vs. 2a and 3 vs. 4a. Kaplan–Meier (one minus survival)
plots were created and the groups compared using the Log rank test. In multivariable Cox
regression analyses, maternal age, body mass index (BMI), gestational age and birth weight
>4000 g were included as possible confounders. Amniotomy, oxytocin augmentation and
epidural analgesia were initiated after start of active phase and considered as mediators and
not as confounders, and were therefore not included in the regression analysis. The

1
2 assumptions of proportional hazards for the Cox regression analyses were checked using log
3
4 minus log plots. Statistical analyses were performed with IBM SPSS Statistics for Windows,
5
6 v. 21.0 Armonk, NY: IBM Corp
7
8

9 10 **Results**

11 Out of a total of 19 524 women delivered at the hospital during the study period, 16 660
12
13 (85.3%) were in TGCS 1-4. The 359 (2.2%) women in group 2b and 4b with planned
14
15 cesarean section before onset of labor were not included. Fifty-three women were left
16
17 censored due to lacking information about the start of active phase of labor and 30 women
18
19 due to cesarean section performed in the latent phase. Three women were right censored due
20
21 to a labor duration recorded as more than 24 hours and 3238 women were right censored due
22
23 to operative deliveries. The study population is illustrated in Figure 1.
24
25
26
27

28 The women in the induction groups differed from their spontaneously laboring
29
30 counterparts by being older, having higher BMI and a higher gestational age (Table 1). The
31
32 women in this group gave birth to babies with higher birth weight, and there was more use of
33
34 oxytocin and epidural analgesia. The rates of both cesarean section and operative vaginal
35
36 delivery were higher in the induction groups.
37
38
39

40 The median duration of active phase of labor in TGCS 1 was 368 minutes, in TGCS 2a
41
42 335 minutes, in TGCS 3 it was 165 minutes and in TGCS 4a 134 minutes. Using Kaplan
43
44 Meier analysis the estimated median duration of active phase was longer in all groups. In
45
46 TGCS 1 the estimated median duration was 433 (95% CI 419-446) minutes, 541 (95% CI
47
48 502-580) minutes in TGCS 2a, 168 (95% CI 164-172) minutes in TGCS 3 and 142 (95% CI
49
50 135-149) minutes in TGCS 4a. Figure 2 illustrates 1-survival plots for TGCS 1 compared to
51
52 TGCS 2a ($p < 0.01$; Log rank test). After 12 hours in active labor 12.6 % (95% CI 11.8% -
53
54 13.5%) were undelivered in TGCS 1 vs. 13.4% (95% CI 11.9-15.1%) in TGCS group 2a.
55
56
57
58
59
60

1 The duration of the active phase of labor was significantly longer in TGCS 3
2 compared to 4a as illustrated in Figure 3 ($p=0.02$; Log rank test), but the lines were crossing.
3
4 Before six hours in active labor, induced labors had shorter duration, but after six hours
5
6 induced labors were slower. The difference in 1-survival plots illustrated in Figure 3 did not
7
8 differ substantially. The frequencies of undelivered women after 12 hours were 2.4% (95% CI
9
10 2.1-2.8%) vs. 3.7% (95% CI 3.0-4.4%) in TGCS 3 and TGCS 4a respectively.
11
12
13
14

15
16 Using Cox regression analysis the duration of active phase of labor in nulliparous
17
18 women was longer in induced labors. The unadjusted Hazard Ratio (HR) was 0.76 (95% CI
19
20 0.71 – 0.82) for TGCS 2a vs. TGCS 1. Increasing maternal age, gestational age and BMI, and
21
22 birth weight >4000 g were all factors associated with longer duration of active phase of labor.
23
24 The adjusted HR for duration of active phase of labor in TGCS 2a vs. 1 was 0.86 (95% CI
25
26 0.82-0.95). Details are presented in Table 2. We refrained from comparing group 3 and 4a
27
28 using Cox regression analysis due to violation of the proportional hazards assumption.
29
30
31

32 Discussion

33
34 We found that active phase of labor was longer in induced labors compared to labors with
35
36 spontaneous onset in nulliparous women. In parous women we also observed a difference, but
37
38 it was small and probably of little clinical importance.
39
40
41

42 It is clinically important in counseling nulliparous women before induction to balance
43
44 pros and cons, and they should be informed that the length of active phase of labor is longer
45
46 in induced labors. Induction is known to take time, but often it is presumed that it is the
47
48 establishment of active labor, rather than the active phase that takes the time. This knowledge
49
50 is also important when it comes to the logistics and management of a labor and delivery suite
51
52 regarding labor ward design, planning and bed management.
53
54

55
56 The strengths of our study are a high number of women included, prospectively
57
58 gathered data, an unselected population, and clear guidelines for defining start of active phase
59
60

1 of labor in the hospital. Furthermore, a consistent definition and diagnosis of prolonged first
2 stage of labor was used, and oxytocin augmentation performed in accordance with the WHO
3 partograph. The use of TGCS to categorize laboring women into well-defined groups for
4 comparison to other delivery units is also important.
5
6
7
8
9

10
11 Survival analyses are a useful method when interpreting data with a high number of
12 interventions. Cases with interventions are not excluded, but censored at the time of
13 intervention. However, survival analyses do have limitations and rely on rather strong
14 assumptions such as independent censoring. The frequencies of operative interventions varied
15 between groups, and especially cesarean sections performed in the first stage of labor have
16 important influence on the remaining time in labor. Nevertheless, the results from this study
17 clearly demonstrate how comparing simple medians of duration will yield unreliable results in
18 a contemporary birthing cohort. Epidural analgesia and oxytocin augmentation might
19 influence duration, but could not be included in the Cox regression analysis because they
20 were started during the active phase and should be considered as moderators and not as
21 confounders. The importance of epidural analgesia and oxytocin augmentation is difficult to
22 investigate because slow progress is an indication for starting these interventions.
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38

39 The study was conducted within a single hospital, which is a limitation. Furthermore,
40 Norwegian national guidelines recommend considering operative vaginal delivery after 60
41 minutes of active pushing regardless of parity and epidural use (21); which differs from other
42 guidelines, i.e. guidelines from the National Institute for Health and Care Excellence (22).
43 This reduces the external validity of the study for hospital units with a longer duration of
44 bearing down. The Friedman partograph with WHO alert and action lines (3, (23) and its
45 definition of start of active labor has been used for labor management of both nulliparous and
46 parous women throughout the study period. Accordingly, the results are not necessarily
47 representative of a cohort managed with a parity specific partograph.
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2 Advantages and disadvantages related to labor induction are frequently a part of the
3
4 obstetrical discourse. Induction of labor one week past term might reduce the frequencies of
5
6 intrauterine fetal death, but according to some studies, induction of labor leads to a higher
7
8 cesarean delivery frequency (13, (14). However, a recent meta-analysis reported reduced
9
10 frequencies of cesarean sections in induced labors (17).
11

12
13
14 There is no established definition of labor dystocia, though it is one of the main
15
16 indications of unplanned cesarean sections (10). The active management of labor concept
17
18 recommends active phase of labor to be limited to 12 hours (24); however, a high proportion
19
20 of nulliparous women need augmentation with oxytocin to achieve this (10). It is important
21
22 to note that our study is observational and does not imply causality between induction and
23
24 longer duration of labor in nulliparous women, merely an association.
25
26

27
28 A reduction of interventions in uncomplicated deliveries is warranted. The risks of
29
30 complications associated with long duration of active phase of labor such as postpartum
31
32 hemorrhage (25) have to be weighed against potential adverse effects of augmenting labor
33
34 with oxytocin such as fetal distress (10, (26) and anal sphincter injuries (27). Childbirth
35
36 satisfaction is another important outcome, and in some studies long duration is associated
37
38 with lower maternal satisfaction (28); which might lead to cesarean section due to maternal
39
40 request in later pregnancies. However, a systematic review shows that rather than labor
41
42 duration, the most important factors in women's satisfaction in childbirth are personal
43
44 expectations, support from caregivers, quality of the caregiver-patient relationship and
45
46 involvement in decision making (29, (30).
47
48
49

50
51 In conclusion, we found that that the duration of active phase of labor differs in
52
53 spontaneous and induced labors in nulliparous women and clinicians should take this into
54
55 account when counseling women before labor induction and management during prolonged
56
57 labor.
58
59
60

ACKNOWLEDGMENTS

We thank Elsa Lindtjørn for continuous quality assurance of data.

For Peer Review

References

1. Zhang J, Troendle JF, Yancey MK. Reassessing the labor curve in nulliparous women. *Am J Obstet Gynecol.* 2002;187:824-8.
2. Lowe NK. A review of factors associated with dystocia and cesarean section in nulliparous women. *J Midwifery Womens Health.* 2007;52:216-28.
3. World Health Organization. Recommendations for augmentation of labour. 2014. http://apps.who.int/iris/bitstream/10665/112825/1/9789241507363_eng.pdf.
4. Vahratian A, Troendle JF, Siega-Riz AM, Zhang J. Methodological challenges in studying labour progression in contemporary practice. *Paediatr Perinat Epidemiol.* 2006;20:72-8.
5. Greenberg MB, Cheng YW, Hopkins LM, Stotland NE, Bryant AS, Caughey AB. Are there ethnic differences in the length of labor? *Am J Obstet Gynecol.* 2006;195:743-8.
6. Rasmussen S, Bungum L, Hoie K. Maternal age and duration of labor. *Acta Obstet Gynecol Scand.* 1994;73:231-4.
7. Vahratian A, Zhang J, Troendle JF, Savitz DA, Siega-Riz AM. Maternal prepregnancy overweight and obesity and the pattern of labor progression in term nulliparous women. *Obstet Gynecol.* 2004;104:943-51.
8. Senecal J, Xiong X, Fraser WD, Pushing Early Or Pushing Late with Epidural study g. Effect of fetal position on second-stage duration and labor outcome. *Obstet Gynecol.* 2005;105:763-72.
9. Bugg GJ, Siddiqui F, Thornton JG. Oxytocin versus no treatment or delayed treatment for slow progress in the first stage of spontaneous labour. *Cochrane Database Syst Rev.* 2013;6:CD007123.
10. Rossen J, Ostborg TB, Lindtjorn E, Schulz J, Eggebo TM. Judicious use of oxytocin augmentation for the management of prolonged labor. *Acta Obstet Gynecol Scand.* 2016;95:355-61.
11. Zhang J, Yancey MK, Klebanoff MA, Schwarz J, Schweitzer D. Does epidural analgesia prolong labor and increase risk of cesarean delivery? A natural experiment. *Am J Obstet Gynecol.* 2001;185:128-34.
12. Kehl S, Ziegler J, Schleussner E, Tuschy B, Berlitz S, Kirscht J, et al. Sequential use of double-balloon catheter and oral misoprostol versus oral misoprostol alone for induction of labour at term (CRBplus trial): a multicentre, open-label randomised controlled trial. *BJOG.* 2015;122:129-36.
13. Grivell RM, Reilly AJ, Oakey H, Chan A, Dodd JM. Maternal and neonatal outcomes following induction of labor: a cohort study. *Acta Obstet Gynecol Scand.* 2012;91:198-203.
14. Jonsson M, Cnattingius S, Wikstrom AK. Elective induction of labor and the risk of cesarean section in low-risk parous women: a cohort study. *Acta Obstet Gynecol Scand.* 2013;92:198-203.
15. Danilack VA, Dore DD, Triche EW, Muri JH, Phipps MG, Savitz DA. The effect of labour induction on the risk of caesarean delivery: using propensity scores to control confounding by indication. *BJOG.* 2015;
16. Rasmussen OB, Rasmussen S. Cesarean section after induction of labor compared with expectant management: no added risk from gestational week 39. *Acta Obstet Gynecol Scand.* 2011;90:857-62.
17. Wood S, Cooper S, Ross S. Does induction of labour increase the risk of caesarean section? A systematic review and meta-analysis of trials in women with intact membranes. *BJOG.* 2014;121:674-85; discussion 85.
18. Kjaergaard H, Olsen J, Ottesen B, Dykes AK. Incidence and outcomes of dystocia in the active phase of labor in term nulliparous women with spontaneous labor onset. *Acta Obstet Gynecol Scand.* 2009;88:402-7.

19. Robson MS. Can we reduce the caesarean section rate? *Best Pract Res Clin Obstet Gynaecol.* 2001;15:179-94.
20. Gjessing HK, Grottum P, Eik-Nes SH. A direct method for ultrasound prediction of day of delivery: a new, population-based approach. *Ultrasound Obstet Gynecol.* 2007;30:19-27.
21. Norwegian society of obstetrics and gynecology. Norwegian guidelines in obstetrics; augmentation of labor. 2014. nfog.org/files/guidelines/34%20NGF%20Obst%20Augmentation%20of%20labour%20Eggebo.pdf. Assessed March 1st 2016.
22. National Institute for Health and Clinical Excellence. Intrapartum care: care of healthy women and their babies during childbirth. 2014. http://www.ncbi.nlm.nih.gov/books/NBK290736/pdf/Bookshelf_NBK290736.pdf. Assessed March 1st 2016.
23. Philpott RH. Graphic records in labour. *Br Med J.* 1972;4:163-5.
24. O'Driscoll K, Meagher D, Robson M. *Active Management of Labour.* Elsevier Limited, 2003.
25. Le Ray C, Fraser W, Rozenberg P, Langer B, Subtil D, Goffinet F, et al. Duration of passive and active phases of the second stage of labour and risk of severe postpartum haemorrhage in low-risk nulliparous women. *Eur J Obstet Gynecol Reprod Biol.* 2011;158:167-72.
26. Berglund S, Grunewald C, Pettersson H, Cnattingius S. Severe asphyxia due to delivery-related malpractice in Sweden 1990-2005. *BJOG.* 2008;115:316-23.
27. Rygh AB, Skjeldestad FE, Korner H, Eggebo TM. Assessing the association of oxytocin augmentation with obstetric anal sphincter injury in nulliparous women: a population-based, case-control study. *BMJ Open.* 2014;4:e004592.
28. Nystedt A, Hildingsson I. Diverse definitions of prolonged labour and its consequences with sometimes subsequent inappropriate treatment. *BMC Pregnancy Childbirth.* 2014;14:233.
29. Bergqvist L, Dencker A, Taft C, Lilja H, Ladfors L, Skaring-Thorsen L, et al. Women's experiences after early versus postponed oxytocin treatment of slow progress in first childbirth--a randomized controlled trial. *Sex Reprod Healthc.* 2012;3:61-5.
30. Hodnett ED. Pain and women's satisfaction with the experience of childbirth: a systematic review. *Am J Obstet Gynecol.* 2002;186:S160-72.

Table 1 Characteristics of the study population

	Nulliparous women			Parous women		
	Spontaneous start (TGCS 1)	Induced (TGCS 2a)	<i>p</i> -value	Spontaneous start (TGCS 3)	Induced TGCS 4a)	<i>p</i> -value
	<i>n</i> = 5417	<i>n</i> = 1769		<i>n</i> = 7189	<i>n</i> = 1840	
<i>Characteristics related to the mother</i>						
Maternal age in years ; median (IQ-range)	27 (7)	28 (7)	< 0.01	31 (6)	32 (6)	< 0.01
Prepregnant BMI (weight/m ²) : median (IQ-range)	22.3 (4.4)	23.6 (5.9)	< 0.01	23.0 (4.7)	24.0 (6.3)	< 0.01
Gestational age in days ; median (IQ-range)	283 (10)	287 (14)	< 0.01	282 (9)	283 (18)	< 0.01
<i>Characteristics related to labour</i>						
Delivery method						
Spontaneous (%)	68.5%	49.5%	< 0.01	94.1%	87.2%	< 0.01
Operative vaginal (%)	24.5%	31.9%	< 0.01	3.8%	7.3%	< 0.01
Cesarean section (%)	7.0%	18.6%	< 0.01	2.1%	5.5%	< 0.01
Augmentation (%)	32.9%	62.5%	< 0.01	6.4%	37.2%	< 0.01
Epidural analgesia (%)	43.3%	70.5%	< 0.01	19.0%	44.4%	< 0.01
<i>Characteristics related to the newborn</i>						
Mean birth weight (g) ; median (IQ-range)	3450 (570)	3525 (675)	< 0.01	3618 (595)	3700 (710)	< 0.01
Head circumference (cm) ; median (IQ-range)	35 (2)	36 (2)	< 0.01	35 (2)	36 (2)	< 0.01

p-values from Mann–Whitney U-test or Chi-squared test. Values are median with interquartile range given in parantheses, or percentages.

Table 2 Hazard ratio for duration of active phase of labour

	<i>Unadjusted values</i>		<i>Adjusted values</i>	
	<i>HR</i>	<i>95% CI</i>	<i>HR</i>	<i>95% CI</i>
TGCS 1	1.0		1.0	
TGCS 2	0.76	0.71-0.82	0.86	0.82-0.95
Maternal age	0.96	0.96-0.97	0.97	0.96-0.97
BMI	0.97	0.97-0.98	0.99	0.98-0.99
Gestational age	0.97	0.97-0.98	0.98	0.97-0.98
Birth weight >4000g	0.54	0.49-0.60	0.64	0.57-0.71

*HR = Hazard ratio, BMI = body mass index. TGCS = ten group classification system
p<0.05 for all unadjusted and adjusted values*

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

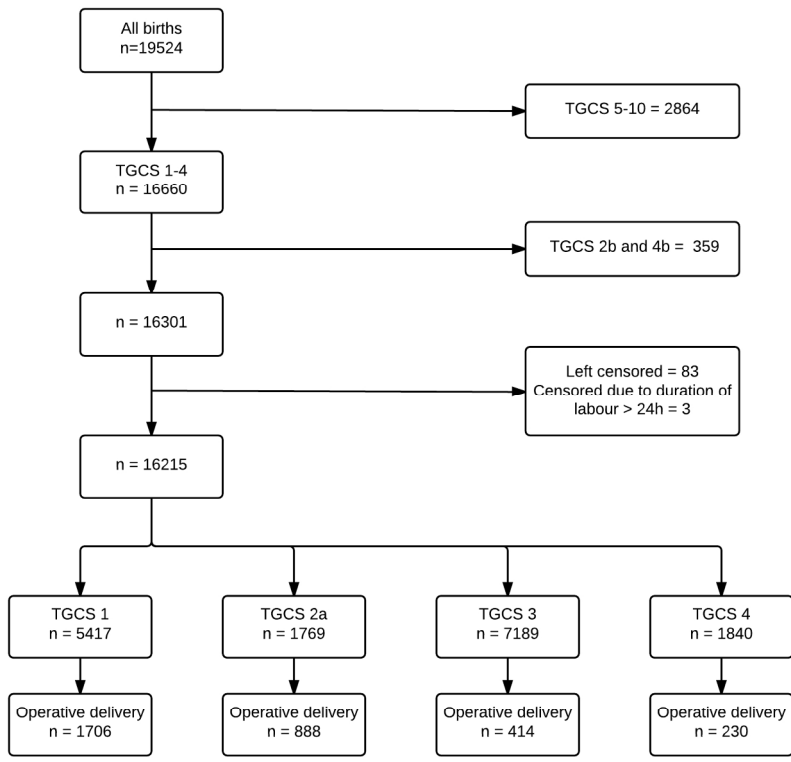


Figure 1: Flow chart of study population

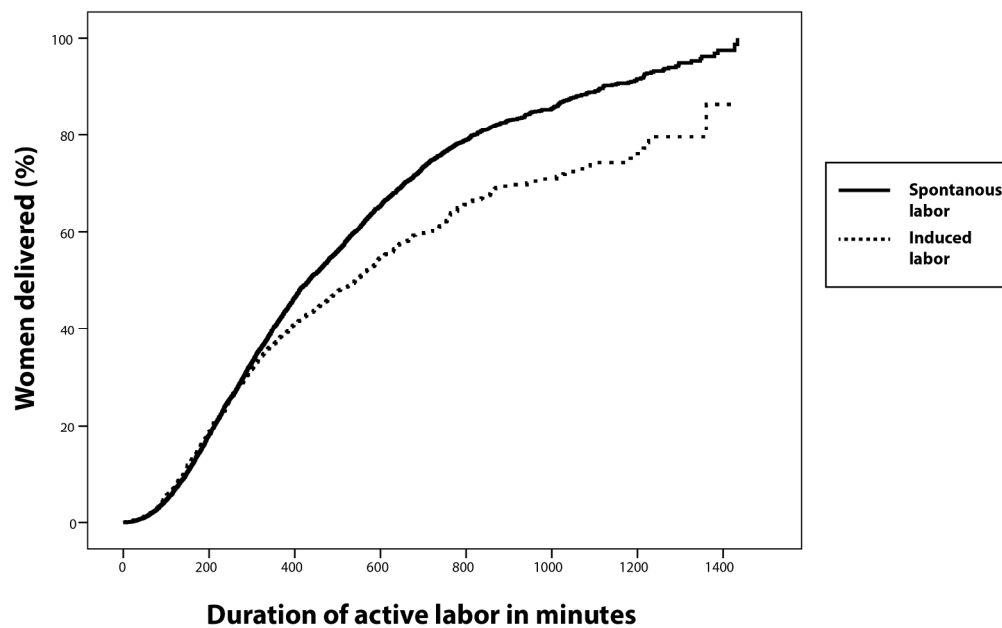
Figure 2

Figure 2: Kaplan-Meier plot (1-survival) illustrating duration of active phase of labour in the primiparous groups 1 (continuous line) and 2a (dotted line) using ten group classifications system

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Figure 3

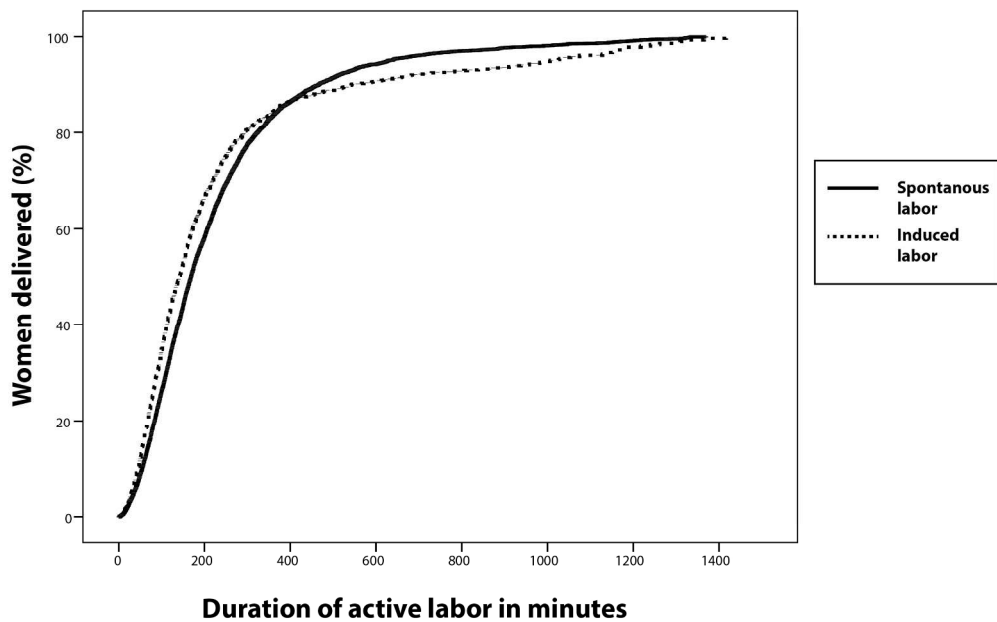


Figure 3: Kaplan-Meier plot (1-survival) illustrating duration of active phase of labour in the parous groups 3 and 4a using ten group classifications system

Review