

1 **Title**

2 EFFECTIVENESS OF A MIDWIFE-LED STANDARDISED LABOUR
3 ASSESSMENT PROGRAMME FOR APPROPRIATE HOSPITAL ADMISSIONS OF
4 LOW-RISK PREGNANT WOMEN AT TERM

5

6 **Short running title**

7 MIDWIFE-LED LABOUR ASSESSMENT PROGRAMME

8

9 **Abstract**

10 **Rationale, aims and objectives**

11 Discharging low-risk pregnant women is not usually contemplated in any procedure and
12 obstetricians are therefore fully responsible for making this decision. Thus, a protocol
13 establishing the procedures, tasks, aims, and activities of each healthcare professional
14 involved in such cases would allow to streamline the process of admission and
15 discharge of low-risk pregnant women with a normal pregnancy.

16 The aim of this study was to establish the effectiveness and safety of a standardised
17 assessment programme for the decision-making process of midwives in relation to the
18 admission of pregnant women in a hospital emergency department.

19 **Method**

20 Retrospective observational cohort study evaluating the decision-making process of
21 midwives when assessing pregnant women in an emergency department during the
22 study period 2016-2017.

23 The study population consisted of low- to moderate-risk pregnant women with a normal
24 pregnancy who presented to the obstetric emergency unit (labour and delivery room)
25 because of vaginal spotting, uterine contractions, bleeding, absence of foetal movements
26 and/or suspected rupture of membranes.

27 The primary study variable was the appropriateness of the decisions made by midwives
28 (whether discharging or admitting pregnant women) in an obstetric emergency unit.
29 Safety was assessed by the incidence of neonatal complications based on the Apgar test
30 for women who had previously been discharged.

31 **Results**

32 The performance of the instrument used was found to be excellent as both the negative
33 predictive value (appropriate discharge) and the positive predictive value (appropriate

34 admission) were greater than 95%. In the safety evaluation, only one in every 200
35 newborns had an Apgar score at five minutes less than seven.

36 **Conclusions**

37 The adequacy of our standardised assessment programme has been found to be
38 excellent, with an almost perfect performance based on the negative predictive value
39 and appropriate safety margins based on the Apgar scores at birth obtained for
40 previously discharged cases.

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42 **Keywords**

43 Midwifery, Emergency Nursing, Patient Safety, Pregnant Women, Outcome
44 Assessment, Healthcare

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47 None

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92 Introduction

93 Labour is a physiological process which combines a series of factors interacting in
94 harmony to give birth to a new life. However, this process does not always progress
95 normally and appropriate and timely identification and management of deviations from
96 normality can prevent maternal and perinatal complications, and even premature death.
97 It would be desirable for both pregnant women and healthcare professionals to be aware
98 of this and it should even be part of the education and training of midwives and
99 obstetricians.¹

100 Signs and symptoms of labour are, without any doubt, the most common reason for
101 admission of women with a normal, at term, pregnancy in any maternity unit, although
102 it is also common to find among this group of women a considerable number who, after
103 being admitted, are discharged because they have been found to be in false labour or
104 show false symptoms of labour. Occasionally, this serve as a strategy for the physician
105 or the midwife to free themselves from the burden of making a decision and, as a result,
106 the responsibility of the diagnosis is transferred back to the pregnant woman.²⁻⁴

107 Despite the availability of technical resources and qualified healthcare professionals, it
108 is sometimes difficult to diagnose the onset of active labour. A false diagnosis can lead
109 to multiple hospital visits, frustration and discomfort for the mother, decreased
110 confidence in physicians, and additional costs. Accurately identifying the onset of
111 labour with specific criteria to diagnose slow progress is essential to avoid unnecessary
112 interventions such as routine amniotomy (artificial rupture of membranes), use of
113 intravenous oxytocin to increase uterine contractions, etc., which contribute to a more
114 medicalised birth where women have less control and less satisfaction.⁵⁻⁸

115 Discharging low-risk pregnant women is not usually contemplated in any procedure and
116 obstetricians are therefore fully responsible for making this decision. Thus, a protocol
117 establishing the procedures, tasks, aims, and activities of each healthcare professional
118 involved in such cases would allow to streamline the process of admission and
119 discharge of low-risk pregnant women with a normal pregnancy.

120 Midwives have already been described as appropriately qualified to perform triage in
121 obstetric emergency units and to decide whether to admit or discharge pregnant
122 women.^{9,10}

123 Given the lack of established procedures or clinical practice guidelines that would
124 enable to decrease variability in the diagnosis of and admission for active labour, we
125 implemented a standardised protocol for midwives in a tertiary care hospital for the
126 management of low-risk pregnant women presenting with labour symptoms to the
127 hospital's obstetric emergency unit.

128 The aim of this study was to establish the effectiveness and safety of this standardised
129 assessment programme for the decision-making process of midwives in relation to the
130 admission of pregnant women in a hospital emergency department.

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132 **Methods**

133 Study design, data collection and instrumentation

134 This was a retrospective observational cohort study evaluating the decision-making
135 process of midwives when assessing pregnant women in an emergency department
136 during the study period 2016-2017.

137 The study was conducted in a National Health Service hospital in southern Spain
138 (Hospital Costa del Sol, HCS). In 2018, a total of 112,300 patients were seen at the
139 hospital's emergency department, of which 4081 were pregnant women (3.6% of the
140 total number of emergencies). There were 2696 births, of which 20.5% were by
141 caesarean section and 65.9% were spontaneous vaginal births.

142 The study population consisted of low- to moderate-risk pregnant women with a normal
143 pregnancy who presented to the obstetric emergency unit (labour and delivery room)
144 because of vaginal spotting, uterine contractions, bleeding, absence of foetal movements
145 and/or suspected rupture of membranes. Low- to moderate-risk pregnant women who
146 were seen and assessed by a midwife independently or in consultation with an
147 obstetrician at the obstetric emergency unit were included in the study.¹¹

148 The following sociodemographic and clinical variables were collected from the patients'
149 medical records: age, nationality, place of residence, shift during which the episode
150 happened, weeks of gestation, parity, body mass index (BMI), visual analogue scale
151 (VAS) to measure pain, Apgar test, clinically relevant personal history (listed per
152 disease), obstetric risk at admission, progression of pregnancy, and patient disposition.

153 The primary study variable was the appropriateness of the decisions made by midwives
154 (whether discharging or admitting pregnant women) in the obstetric emergency unit.
155 This was assessed by a midwife with more than 20 years' experience and an expert
156 medical record reviewer. The incidence of neonatal complications in women who had
157 previously been discharged was evaluated based on the Apgar test, with scores ≥ 7
158 considered as normal.

159 Discharge was defined as inappropriate when the midwife, independently or in
160 consultation with obstetricians from the obstetric emergency unit, sent the pregnant
161 woman home for observation and this episode was followed by an unplanned home
162 birth (out-of-hospital) or the woman returned to the hospital already in the active second
163 stage of labour (precipitous birth without intrapartum monitoring). Admission was
164 defined as inappropriate when the midwife, independently or in consultation with
165 obstetricians from the obstetric emergency unit, admitted a pregnant woman in the
166 hospitalisation unit and, following her admission based on symptoms of labour (latent
167 phase) was discharged without having given birth (false labour) (Figure 1).

An instrument developed at HCS aimed at providing an objective assessment of labour progression to guide the midwife's decision to admit or discharge a pregnant woman was applied. It involved an assessment of pain based on a visual analogue scale (VAS), the number of uterine contractions observed in the cardiotocography record, and vaginal examination to determine Bishop's score, a test predicting the probability of vaginal birth.^{4,12-16} A summary of this hospital admission decision-process algorithm used at the HCS obstetric emergency unit is provided in Table 1.

Cardiotocography monitoring is widely used to assess foetal heart rate and uterine contractions during pregnancy and the intra-partum period, and also as a way of assessing foetal wellbeing and detecting early signs of hypoxia, thus providing information for a successful birth.¹⁷

The study was approved by the Costa del Sol Research Ethics Committee at its meeting held on 29 September 2016, dossier number: 005_sep_PI – Egresos Bajo Riesgo.

A descriptive analysis was performed with measures of central tendency and dispersion for quantitative variables and frequency distribution for qualitative variables. The effectiveness of the admission/discharge decision-making process for low-risk pregnant women was evaluated using standard statistics for diagnostic tests: sensitivity, specificity, negative and positive predictive values, and validity index (proportion of items rated as valid), with 95% confidence intervals (95% CI) for all statistics. The sample of discharge episodes was stratified to show neonatal complications, with their 95% CI.

To assess differences in patient sociodemographic and clinical characteristics in relation to overall inappropriateness, inappropriate discharges, and inappropriate admissions, a chi-square test (or Fisher's test for less than 5 observations) for independent qualitative variables and Student's t-test (or Mann-Whitney-U test for non-normal data) for quantitative variables was used. Statistical significance was set at $p < 0.05$.

Results

During the study period, a total of 2753 episodes were assessed by the midwife of HCS obstetric emergency unit. Of these, 11 were excluded as they were not evaluable (10 out-of-hospital births and one discharge against medical advice), resulting in a total of 2742 episodes in 2083 different pregnant women. There was a total of 2094 low-risk episodes (76.4%, with the remaining 23.6% classified as moderate-risk episodes), and 76% of the episodes assessed led to admission.

Mean age of the 2083 pregnant women assessed was 31 years (SD: 5.5), BMI was 29 (SD: 4.7), and 40.8% were non-Spanish. A total of 7.2% had a history of previous illness, with asthma/bronchitis the most common one (60.7% of pregnant women with a medical history), while 37.2% had a clinically relevant surgical history. In addition, a

total of 511 (24.5%) pregnant women visited the obstetric emergency unit twice or more during the study period, and 135 (6.5%) were classified as at-risk at discharge (Table 2).

The decision made by midwives was considered appropriate in 2647 cases (96.5%, 95% CI: 95.8-97.2). Ninety-three of the 2084 cases of admissions should have been discharged, yielding a positive predictive value of 95.5% (95% CI: 94.6-96.5), compared with 2 of 658 cases that were inappropriately discharged, yielding a negative predictive value of 99.7% (95% CI: 99.2-100) (Table 3).

In relation to sociodemographic and clinical characteristics, mean age was significantly lower ($p=0.019$) for pregnant women with inappropriate decisions made by midwives (29.3 years, SD: 5.6) compared with the age of pregnant women with appropriate decisions (30.7 years, SD: 5.6). Significant differences ($p=0.014$) were also found in relation to the risk level at admission, with a higher incidence of inappropriate decisions for high-risk pregnancies (5.1%) compared with pregnant women not at high-risk (3.0%). Finally, differences were also found according to the day and shift during which the patient was seen, with differences ($p=0.004$) in the variability in inappropriateness according to the shift: decisions were found to be inappropriate in 2% of cases during morning shifts compared with 4.2% and 4.6% in afternoon and night shifts, respectively (Table 4).

Safety of discharges was assessed based on the Apgar test at birth: there were 653 births, of which 637 (97.5%) had a normal Apgar score at one minute, increasing to 650 (99.5%) at five minutes, and one foetal death following a previous discharge.

Discussion

The aim of this study was to assess the effectiveness of a procedure applied by midwives to appropriately classify admissions and discharges of at-term pregnant women in an obstetric emergency unit.

The novelty of this study is that the evaluation of pregnant women was not only based on the number of contractions and cervical measurements, but also on the intensity of pain reported by the patient and recorded on a VAS. The values of these parameters were rated using an evidence-based instrument developed at our hospital enabling midwives to make diagnoses of suspected active phase of labour and decide whether to admit a patient. Appropriate criteria for the diagnosis of active labour can prevent inaccurate diagnoses of dystocia.¹⁸⁻²⁰ Other studies have only analysed the presence of regular painful uterine contractions and cervical dilation greater than 3-4 cm.^{21,22}

The assessment approach used in this study had an excellent prognostic performance with an excellent probability of accurately classifying both pregnant women needing to be admitted and those needing to be discharged.

243 In a systematic review of obstetric triage,²³ seven key categories were found: legal
244 issues, liability pitfalls, risk stratification (acuity tools), clinical decision aids, patient
245 flow and satisfaction, impact on interprofessional education and advanced nursing
246 practice, and management of selected clinical conditions. These components of a model
247 of best practices for obstetric triage are in line with our midwife-led assessment
248 procedure of pregnant women in relation to their admission or discharge.

249 Evidence from research studies is scarce in this field and most studies have shown both
250 performance bias by midwives and lack of compliance with admission criteria.^{21,24–26}

251 Good safety margins of midwives decisions to admit or discharge patients presenting to
252 the obstetric emergency unit were obtained. Although there was one foetal death
253 following an appropriate discharge that was made in consultation with an obstetrician,
254 the death was not related to the joint decision of discharging the patient (the event took
255 place 17 days later). The existing evidence suggests that serious adverse maternal
256 outcomes among low-risk women in midwife-led care versus obstetrician-led care at the
257 onset of labour are not different in a maternity care system in which risk factors are
258 accurately identified.²⁷ In another study similar to ours, safety outcomes were similar,
259 with 0.5% Apgar scores at 5 minutes <7 in women who had been discharged,²⁸
260 compared with a more recent study where this figure was higher (1.24%).²⁴

261 The differences in the inappropriateness of the decisions made by midwives according
262 to age may be associated with a risk of bias from healthcare professionals because of the
263 situations observed in these younger women: there is evidence that younger pregnant
264 women are less likely to complete and comply with their prenatal visits, to receive
265 maternal education, or to be followed by the same healthcare professional.²⁹ Lack of
266 information and understanding of the process, lack of pain control, and anxiety may
267 cause pregnant women to present with signs, symptoms, and emotional distress that
268 may be interpreted by midwives as indicative of requiring admission,³⁰ and, in addition,
269 lead to unfavourable labour progression.^{31,32}

270 The distribution of inappropriateness according to work shifts (better performance
271 during morning shifts than in afternoon and night shifts) is in line with the existing
272 evidence showing that physician-nurse communication varies according to the shifts
273 worked (or sleep).^{33,34} Similarly, this variability may be explained by the greater
274 availability of the staff on call and a better work performance during morning shifts
275 when there is less physical and mental fatigue.³⁵

276 One of the limitations of the study was that 40% of the sample was made up of non-
277 Spanish women –which may reduce the external validity of the study– and that the
278 population was mainly Mediterranean, with a high proportion of immigrants. Therefore,
279 our results may be more applicable to similar environments than to other areas with
280 more local populations.³⁶

281 Another limitation stems from the retrospective design of the study, as appropriateness
282 of admissions/discharges had to be assessed through medical records coming from

different information sources within the hospital. However, all information sources are computerised and therefore the quality of the information assessed was good. Appropriateness of the decision-making process could be studied prospectively in future studies.

Compared with other studies where limitations arise from small sample sizes and the lack of statistical power to show the effects of the intervention on unplanned out-of-hospital births or other outcome measures,^{21,24} the main strength of our study was the high power of our sample given that, although a sample size was estimated, the decision was made to assess all emergency episodes meeting the inclusion and exclusion criteria during a whole year.

The degree of acceptability of a decision-making protocol for midwife-led admission among pregnant women and healthcare professionals may affect midwives' independent decisions. Continuing professional training is essential for midwives to maintain up to date competences which change in the course of their clinical practice.^{37,38} Midwives were trained at our centre using competency maps focused on specific technical competences related to the management of the physiological process of labour (false labour and signs and symptoms of labour) and were motivated by the achievement of objectives in different competences, thus helping consolidation of this good practice (appropriate discharge/admission).

In conclusion, the adequacy of our standardised labour assessment programme for the decision-making process of midwives in relation to hospital admission of low-risk pregnant women at term in the obstetric emergency unit (labour room) of our hospital was excellent. It is also worth highlighting its almost perfect performance based on the negative predictive value and appropriate safety margins based on the Apgar scores at birth obtained for previously discharged cases.

References

1. Wahlberg A, Andreen Sachs M, Bergh Johannesson K, et al. Self-reported exposure to severe events on the labour ward among Swedish midwives and obstetricians: A cross-sectional retrospective study. *Int J Nurs Stud*. 2016;65:8-16. doi:10.1016/j.ijnurstu.2016.10.009
2. Corchs S, Martínez C, Vela E DS. Prácticas habituales de las matronas en el parto en los hospitales públicos de Barcelona. *Matronas profesión*. 2006;7 (3):5-11.
3. O'Driscoll K, Meagher D, Boylan P. *Active Management of Labour: The Dublin Experience*. Mosby; 2003.
4. Gokturk U, Cavkaytar S, Danisman N. Can measurement of cervical length, fetal head position and posterior cervical angle be an alternative method to Bishop score in the prediction of successful labor induction? *J Matern Fetal Neonatal Med*. September 2014:1-6. doi:10.3109/14767058.2014.954538

- 323 5. Brown HC, Paranjothy S, Dowswell T, Thomas J. Package of care for active
324 management in labour for reducing caesarean section rates in low-risk women.
325 In: Brown HC, ed. *Cochrane Database of Systematic Reviews*. Chichester, UK:
326 John Wiley & Sons, Ltd; 2008. doi:10.1002/14651858.CD004907.pub2
- 327 6. Ministerio de Sanidad y Política Social del Gobierno Vasco. *GPC Sobre La*
328 *Atención Al Parto Normal*.; 2010.
329 [https://www.msssi.gob.es/organizacion/sns/planCalidadSNS/pdf/equidad/](https://www.msssi.gob.es/organizacion/sns/planCalidadSNS/pdf/equidad/guiaPracClinPartoCompleta.pdf)
330 [guiaPracClinPartoCompleta.pdf](https://www.msssi.gob.es/organizacion/sns/planCalidadSNS/pdf/equidad/guiaPracClinPartoCompleta.pdf).
- 331 7. Wei S, Wo BL, Qi H-P, et al. Early amniotomy and early oxytocin for prevention
332 of, or therapy for, delay in first stage spontaneous labour compared with routine
333 care. *Cochrane Database Syst Rev*. August 2013.
334 doi:10.1002/14651858.CD006794.pub4
- 335 8. Rota A, Antolini L, Colciago E, Nespoli A, Borrelli SE, Fumagalli S. Timing of
336 hospital admission in labour: latent versus active phase, mode of birth and
337 intrapartum interventions. A correlational study. *Women and Birth*.
338 2018;31(4):313-318. doi:10.1016/j.wombi.2017.10.001
- 339 9. Austin DA. The Process of Obstetric Triage: Management by Certified Nurse-
340 Midwives. *J Perinat Neonatal Nurs*. 1996;10(1):1-9. doi:10.1097/00005237-
341 199606000-00003
- 342 10. O'Rourke K, Teel J, Nicholls E, Lee DD, Colwill AC, Srinivas SK. Improving
343 Staff Communication and Transitions of Care Between Obstetric Triage and
344 Labor and Delivery. *J Obstet Gynecol Neonatal Nurs*. 2018;47(2):264-272.
345 doi:10.1016/j.jogn.2017.11.008
- 346 11. NICE. Antenatal care for uncomplicated pregnancies. *Clin Guidel*. 2008;(March
347 2008):1-55. [https://www.nice.org.uk/guidance/cg62/resources/antenatal-care-for-](https://www.nice.org.uk/guidance/cg62/resources/antenatal-care-for-uncomplicated-pregnancies-975564597445)
348 [uncomplicated-pregnancies-975564597445](https://www.nice.org.uk/guidance/cg62/resources/antenatal-care-for-uncomplicated-pregnancies-975564597445).
- 349 12. Bishop E. Pelvic scoring for elective induction. *Obs Gynecol*. 1964;24:266-268.
- 350 13. Raghuraman N, Stout MJ, Young OM, et al. Utility of the Simplified Bishop
351 Score in Spontaneous Labor. *Am J Perinatol*. 2016;33(12):1176-1181.
352 doi:10.1055/s-0036-1585413
- 353 14. Ivars J, Garabedian C, Devos P, et al. Simplified Bishop score including parity
354 predicts successful induction of labor. *Eur J Obstet Gynecol Reprod Biol*.
355 2016;203:309-314. doi:10.1016/j.ejogrb.2016.06.007
- 356 15. Uygun D, Ozgu-Erdinc AS, Debeer R, Aytan H, Mungan MT. Fetal fibronectin is
357 more valuable than ultrasonographic examination of the cervix or Bishop score in
358 predicting successful induction of labor. *Taiwan J Obstet Gynecol*.
359 2016;55(1):94-97. doi:10.1016/j.tjog.2014.06.009
- 360 16. Kehila M, Bougmiza I, Ben Hmid R, Abdelfatteh W, Mahjoub S, Channoufi MB.
361 Bishop Score vs. ultrasound cervical length in the prediction of cervical ripening
362 success and vaginal delivery in nulliparous women. *Minerva Ginecol*.
363 2015;67(6):499-505.
- 364 17. Terré Rull C, Frances Ribera L. Control del bienestar fetal: monitorización

365 biofísica intraparto. *Rev ROL Enfermería*. 2015;38(2):131-138.
366 <http://diposit.ub.edu/dspace/bitstream/2445/96195/1/652822.pdf>.

367 18. Hanley GE, Munro S, Greyson D, et al. Diagnosing onset of labor: a systematic
368 review of definitions in the research literature. *BMC Pregnancy Childbirth*.
369 2016;16(1):71. doi:10.1186/s12884-016-0857-4

370 19. Lauzon L, Hodnett E. Labour assessment programs to delay admission to labour
371 wards. *Cochrane database Syst Rev*. 2001;(3):CD000936.
372 doi:10.1002/14651858.CD000936

373 20. Scotland GS, McNamee P, Cheyne H, Hundley V, Barnett C. Women's
374 Preferences for Aspects of Labor Management: Results from a Discrete Choice
375 Experiment. *Birth*. 2011;38(1):36-46. doi:10.1111/j.1523-536X.2010.00447.x

376 21. McNiven PS, Williams JI, Hodnett E, Kaufman K, Hannah ME. An Early Labor
377 Assessment Program: A Randomized, Controlled Trial. *Birth*. 1998;25(1):5-10.
378 doi:10.1046/j.1523-536x.1998.00005.x

379 22. World Health Organization. WHO recommendations for augmentation of labour.
380 *World Heal Organ*. 2014;1-57. doi:10.1016/0140-6736(93)92727-B

381 23. Angelini D, Howard E. Obstetric Triage. *MCN, Am J Matern Nurs*.
382 2014;39(5):284-297. doi:10.1097/NMC.0000000000000069

383 24. Sandall J, Soltani H, Gates S, Shennan A, Devane D. Midwife-led continuity
384 models versus other models of care for childbearing women. In: Sandall J, ed.
385 *Cochrane Database of Systematic Reviews*. Chichester, UK: John Wiley & Sons,
386 Ltd; 2015. doi:10.1002/14651858.CD004667.pub4

387 25. Davey M-A, McLachlan HL, Forster D, Flood M. Influence of timing of
388 admission in labour and management of labour on method of birth: Results from
389 a randomised controlled trial of caseload midwifery (COSMOS trial). *Midwifery*.
390 2013;29(12):1297-1302. doi:10.1016/j.midw.2013.05.014

391 26. McLachlan H, Forster D, Davey M, et al. Effects of continuity of care by a
392 primary midwife (caseload midwifery) on caesarean section rates in women of
393 low obstetric risk: the COSMOS randomised controlled trial. *BJOG An Int J*
394 *Obstet Gynaecol*. 2012;119(12):1483-1492. doi:10.1111/j.1471-
395 0528.2012.03446.x

396 27. de Jonge A, Mesman JAJM, Manniën J, et al. Severe Adverse Maternal
397 Outcomes among Women in Midwife-Led versus Obstetrician-Led Care at the
398 Onset of Labour in the Netherlands: A Nationwide Cohort Study. Crispi-Brillas
399 F, ed. *PLoS One*. 2015;10(5):e0126266. doi:10.1371/journal.pone.0126266

400 28. Cuenca C, Santamaría JI DM. La matrona ante el cribado y la atención de la
401 urgencia obstétrica. *Matronas Profesión*. 2011;12(1):18-23.

402 29. Cesar JA, Mendoza-Sassi RA, Gonzalez-Chica DA, Mano PS, Goulart-Filha SM.
403 Socio-demographic characteristics and prenatal and childbirth care in southern
404 Brazil. *Cad Saude Publica*. 2011;27(5):985-994. doi:10.1590/S0102-
405 311X2011000500016

30. Martínez HT, Silva MAI, Cabrera IP, Mendoza AJ. Obstetric profile of pregnant adolescents in a public hospital: risk at beginning of labor, at delivery, postpartum, and in puerperium. *Rev Lat Am Enfermagem*. 2015;23(5):829-836. doi:10.1590/0104-1169.0316.2621
31. Busanello J, Kerber NP da C, Mendoza-Sassi RA, Mano P de S, Susin LRO, Gonçalves BG. Humanized attention to parturition of adolescents: analysis of practices developed in an obstetric center. *Rev Bras Enferm*. 2011;64(5):824-832. doi:10.1590/S0034-71672011000500004
32. Enderle C de F, Kerber NP da C, Susin LRO, Gonçalves BG. Delivery in Adolescents: Qualitative Factors of Care. *Rev da Esc Enferm da USP*. 2012;46(2):287-294. doi:10.1590/S0080-62342012000200004
33. Lyndon A, Zlatnik MG, Wachter RM. Effective physician-nurse communication: a patient safety essential for labor and delivery. *Am J Obstet Gynecol*. 2011;205(2):91-96. doi:10.1016/j.ajog.2011.04.021
34. Daemers DOA, van Limbeek EBM, Wijnen HAA, Nieuwenhuijze MJ, de Vries RG. Factors influencing the clinical decision-making of midwives: a qualitative study. *BMC Pregnancy Childbirth*. 2017;17(1):345. doi:10.1186/s12884-017-1511-5
35. Ruiz-Fernández MD, Pérez-García E, Ortega-Galán ÁM. Quality of Life in Nursing Professionals: Burnout, Fatigue, and Compassion Satisfaction. *Int J Environ Res Public Health*. 2020;17(4):1253. doi:10.3390/ijerph17041253
36. Villar-Vidal M, Amiano P, Rodríguez-Bernal C, et al. Compliance of nutritional recommendations of Spanish pregnant women according to sociodemographic and lifestyle characteristics: a cohort study. *Nutr Hosp*. 2015;31(4):1803-1812. doi:10.3305/nh.2015.31.4.8293
37. Attard J, Baldacchino DR, Camilleri L. Nurses' and midwives' acquisition of competency in spiritual care: A focus on education. *Nurse Educ Today*. 2014;34(12):1460-1466. doi:10.1016/j.nedt.2014.04.015
38. Casey M, Cooney A, O'Connell R, et al. Nurses', midwives' and key stakeholders' experiences and perceptions on requirements to demonstrate the maintenance of professional competence. *J Adv Nurs*. 2017;73(3):653-664. doi:10.1111/jan.13171

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Conflict of interest

The authors declare that they have no competing interest.

444 Figure 1. Algorithm for decision-making and discharge appropriateness.