

Validation of a scale to measure the workload of midwives

Validação de escala para mensurar a carga de trabalho das parteiras

Validación de escala para medir la carga de trabajo de las parteras

Lorena Gómez García¹  <https://orcid.org/0000-0002-3625-6054>Maria Dolores Roldan Valcarcel¹  <https://orcid.org/0000-0003-1087-0264>Ana Myriam Seva Llor¹  <https://orcid.org/0000-0002-0531-9227>Maria Fuensanta Hellín Gil²  <https://orcid.org/0000-0003-0402-0888>Guadalupe Ruiz Merino¹  <https://orcid.org/0000-0002-5265-1935>Francisco Javier Navarro Guerrero³  <https://orcid.org/0000-0002-9131-5766>Esperanza De La Iglesia Cano⁴  <https://orcid.org/0000-0002-8969-2909>

How to cite:

García LG, Valcarcer MD, Llor AM, Gil MF, Merino GR, Guerrero FJ, et al. Validation of a scale to measure the workload of midwives. Acta Paul Enferm. 2024;37:eAPE02632.

DOI

<http://dx.doi.org/10.37689/acta-ape/2024A000026322>



Keywords

Midwifery; Labor obstetric; Workloads; Standardized nursing terminology; Personnel management

Descritores

Tocologia; Trabalho de parto; Carga de trabalho; Terminologia padronizada em enfermagem; Gestão de recursos humanos

Descriptors

Partería; Trabajo de parto; Carga de trabajo; Terminología normalizada de enfermería; Administración de personal

Submitted

November 22, 2022

Accepted

October 10, 2023

Corresponding author

Lorena Gómez García
E-mail: lorenagomez_20@hotmail.com

Associate Editor (Peer review process):

Kelly Pereira Coca
(<https://orcid.org/0000-0002-3604-852X>)
Escola Paulista de Enfermagem, Universidade Federal de São Paulo, SP, Brazil.

Abstract

Objective: To validate the design of a scale to measure the workload of the midwives based on Classification of Nursing Interventions (NIC), through their multicentric application in different delivery units.

Methods: Quantitative, longitudinal, study multicentric character, conducted in three general university hospitals of the public system of health. The sample consisted of fifty midwives, who examined the validity of the construct of the designed scale, for a total of 370 births. Data collection began through the scale designed ad hoc by the research team, accounting for the time and average number of NIC interventions, performed at each birth.

Results: The midwives of the study, are subject to an increase in their workload regarding the number and average time spent conducting interventions NIC in each attended delivery. In their working day (12-hour shift) they allocate 960.61 minutes (16 hours in day shift) and 840.29 minutes (14 hours in night shift), to execute their roles in childbirth attendance.

Conclusion: The data indicate the validity of the scale designed ad hoc, as this instrument reflects the actual workload experienced by the midwives of the study.

Resumo

Objetivo: Validar a elaboração de uma escala para mensurar a carga de trabalho das parteiras com base na Classificação das Intervenções de Enfermagem (NIC) por meio da sua aplicação multicêntrica em diferentes unidades de parto.

Métodos: Estudo quantitativo, longitudinal, de caráter multicêntrico, realizado em três hospitais universitários gerais da rede pública de saúde. A amostra foi composta por cinquenta parteiras, que examinaram a validade de construto da escala elaborada, com um total de 370 partos. A coleta de dados iniciou-se por meio da escala elaborada *ad hoc* pela equipe de pesquisa, contabilizando o tempo e o número médio de intervenções NIC, realizadas a cada nascimento.

Resultados: As parteiras do estudo estão sujeitas a um aumento na sua carga de trabalho quanto ao número e ao tempo médio gasto na realização das NIC em cada parto atendido. Em sua jornada de trabalho (turno de 12 horas), elas destinam 960,61 minutos (16 horas no turno diurno) e 840,29 minutos (14 horas no turno noturno) para executar suas funções na assistência ao parto.

Conclusão: Os dados indicam a validade da escala elaborada *ad hoc*, pois esse instrumento reflete a real carga de trabalho vivenciada pelas parteiras do estudo.

¹Universidad de Murcia, Murcia, Spain.

²Hospital H.C.U.V, Arrixaca, Spain.

³Son Espases University Hospital, Palma, Illes Balears, Spain.

⁴Baptist Memphis, Tennessee, United States of America.

Conflicts to interest: nothing to declare.

Resumen

Objetivo: Validar la elaboración de una escala para medir la carga de trabajo de las parteras con base en la Clasificación de Intervenciones de Enfermería (NIC) a través de su aplicación multicéntrica en diferentes unidades de parto.

Métodos: Estudio cuantitativo, longitudinal, de carácter multicéntrico, realizado en tres hospitales universitarios generales del sistema de salud pública. La muestra estuvo compuesta por 50 parteras, que examinaron la validez del constructo de la escala elaborada, con un total de 370 partos. La recopilación de datos comenzó mediante la escala elaborada *ad hoc* por el equipo de investigación y contabilizó el tiempo y el número de intervenciones NIC realizadas en cada nacimiento.

Resultados: Las parteras del estudio están sujetas a un aumento de su carga de trabajo con relación al número y al tiempo promedio utilizado en la realización de las NIC en cada parto atendido. En su jornada laboral (turno de 12 horas), destinan 960,61 minutos (16 horas en el turno diurno) y 840,29 minutos (14 horas en el turno nocturno) para ejecutar sus funciones en la atención al parto.

Conclusión: Los datos indican la validez de la escala elaborada *ad hoc*, ya que este instrumento refleja la real carga de trabajo que tienen las parteras del estudio.

Introduction

In the delivery service, prenatal, intrapartum, and postpartum care is provided with significant variations in the number of midwives, with respect to the number of interventions or activities performed by this staff.⁽¹⁾ Quantitative staffing of midwives within the delivery units it is of the utmost importance, to ensure the quality in the service provided and safety of the mother-child binomial.

The increase in the variation in the number of births, higher patient expectations, some social problems, medical comorbidities, and aspects concerning the organization of the unit, as well of the multi-disciplinary team, in short, general ones of the care system, has resulted in increased demand of these units, at a time of more restricted health expenditure.⁽²⁻⁶⁾ The Royal College of Obstetricians & Gynecologist (RCOG) and the Royal College of Midwives (RCM), suggested that women in labor should receive individual attention by midwives. A midwife/pregnant ratio of 1:1 recommended, and for women with high-risk pregnancies, the ratio between midwives and women should be up to 1.2-1.4:1 being the minimum ratio of midwives per women to be 1:2, -1.4:1 and, a ratio 1:2 for a safe level of care, to ensure the ability to achieve personalized care during labor. It is logical to assume that the gaps in the provision of experienced personnel in the daily practice could have a cumulative effect on patient satisfaction, clinical outcomes and even the health and morale of midwives.^(5,7,8)

The Midwives have an essential role during the birth process and experience. Are considered as one of the most important members of the health

care team, as they contribute to ensure high-quality maternity services by playing an essential role in improving the indicators of maternal and neonatal health.^(7,9-11) The United Nations places them at the center of the Millennium Development Goals, for their specific contribution to the normal physiological process in normal childbirth and its determined focus on the continuous care of the sexual-reproductive, maternal, and neonatal health.^(3,10) The impact of the lack of midwives is major, resulting in a loss in their professional skills in certain areas, due to heavy workload or time constraints for make its functions effective.^(1,12,13) This brings up the ethical dilemma of how to prioritize the attention.⁽¹⁴⁾ The appropriate staffing of midwives depends on the burden of work. In general, the workload can be understood as all activities performed by a team of midwives in the attention process during a determined time frame.

These activities are related to direct attention (performed in the presence of the patient), and to indirect care (occurring outside the interaction with the patient). This workload is influenced by several factors, such as: patient characteristics (patient classification system), characteristics of the role of health personnel (competences, skills, and attitudes) and the number of patients they see.

Due to frequent schedule changes in the flow of patients, the workload of midwives within the delivery unit it is often difficult to predict,^(4,14,15) so it is important to assess the burden of work of midwives within the hospital institution, more specifically in the delivery unit, to establish an effective link between the demand for care, the staffing and health outcomes.⁽⁹⁾

Over the past few years, managers have faced the challenge of collecting data on the various dimensions of the workload to make decisions regarding staffing. With the increased use of health information technology in the hospital setting, the measurement of workload using these technologies would be ideal. A fundamental component of most technologies' health information is standardized terminology.

The Classification of Nursing Interventions (NIC) is a standardized comprehensive nursing terminology that has been used to systematically to classify nursing care in the clinical setting.⁽¹⁶⁾ From this perspective, the use of NICs provides support to the planning and evaluation of personnel, identifying the workload of nursing, expressed in interventions,⁽¹⁷⁾ including direct patient care, patient and family education, and counselling.⁽¹⁶⁾ In line with the challenge of expanding the use of NICs, the studies that used it as a basis for measuring the workload, they indicated that, is an important resource for the planning of the staffing, as it constitutes an important theoretical point- methodological reference for drawing interventions and activities carried out in certain groups of patients, and thus establish reliable and valid measures on the workload, to assist managers in making personnel decisions evidence-based.⁽¹⁶⁻¹⁸⁾ The objective of this study was to validate the design of a scale to measure midwifery workloads based on interventions NIC, through its multicentric application in different delivery units.

Methods

Quantitative, longitudinal, multicentric study, conducted between months of October, November and December 2021, in three delivery units of three public hospitals in the Region of Murcia, Spain. These hospitals present significant differences in terms of their physical and organizational structure. Hospital A, is considered of first level of care, regional, its delivery unit is structured in 2 delivery rooms, 2 dilation rooms, 1 emergency room and 1 epidural room, with an annual care of 480 deliv-

eries, with an endowment for a 12-hour day,⁽¹⁹⁾ of two midwives in the day shift (from 8 to 20 hours) and a midwife in night shift (from 20 to 8 hours), for the attendance at normal childbirth, as well as maternal-neonatal-gynecological emergencies, care at the end of gestation and breastfeeding, among its multiple professional competences. Hospital B, of third level of care, is structured in 8 delivery rooms and 5 postpartum and recovery beds, with an annual care of 2522 deliveries, therefore counts with an endowment of four midwives in day and night shift. And finally, the hospital C, of third level of care, and of reference within the sanitary area of Murcia, Spain. It is structured in 18 birthing centers, with an annual attention of 6828 deliveries for a crew of 7 midwives in day-night shift. The participants of the study were the midwives who worked in the network of the 3 selected public hospitals from the region of Murcia, performing a probabilistic sampling and of convenience, establishing a series of inclusion and exclusion criteria:

- Inclusion criteria: be over 18 years of age, have the qualification of nursing, as well as being a specialist in obstetrics – gynecology (midwife), and be in active service within the health field.
- Exclusion criteria: Midwifery professionals who are under the residence regime EIR (Resident Internal Nurse).

Achieving a total participation among the three hospitals of the study of fifty midwives. The sample of the size of deliveries studied was calculated according to the history of births attended by midwives, in the different units, in the year prior to the start of this study. A total of 370 births were established, to achieve statistical representativeness, assuming a ratio of 0.5 and an accuracy of 0.05. For a confidence level of 95% and a beta power of 0.8. Stratifying by hospitals, this sample was estimated at n=16 for hospital A, n=95 for hospital B and n=258 for hospital C.

The observation and accounting of the care activity itself by the midwives of the study, through a scale designed in standardized language (CIN), structured with correlation to the four functions of nursing (care, manager, coach, and researcher), and nursing care plans based on functional health pat-

terns by Marjory Gordon. Which was designed ad hoc by the team researcher. In order to achieve this, semi-structured interviews were conducted between May-June 2020, in virtual format, to a representative sample of midwives, to list the various activities that they conduct in their daily work.

Subsequently, a mapping of these activities, to catalog them with their corresponding NIC intervention. Once the instrument was built in standardized language (NIC), it was qualitatively validated in content and construct by three focus groups of expert midwives, or their competencies in the matter recognized within the Spanish legal framework,⁽²⁰⁾ national, regional, and senior, during the month of May 2021, through a digital format, by zoom platform, verifying that the NIC interventions were suitable and enough to show the great variety in the clinical practice of this guild professional. What influenced the acceptance of the instrument and the application in this clinical research.

The scale consists of 24 items, each item contains one or more NIC nursing interventions associated with the same time of application. The time assigned to each item was established by comparing the actual time it takes to execute each intervention with the time agreed upon by the focus groups.

To verify the quantitative validation of the content of the scale, as well as its effectiveness, relevance, and representativeness in determining the workload of the midwives within the selected delivery units, the accounting of the time and number of NIC interventions, carried out in each birth attended by the group of midwives who make up the study.

To do this, a notebook of data collection was created in Excel format grouping the time and number of interventions conducted in rows, and the description of each of the variables to measure in the study in columns. The midwives participating in the study completed a new scale in every shift. They considered the number of patients attended in each work shift.

Piloting was conducted prior to the total collection of the data, which, in addition, supposes the validation of the tool for a sample of 30 births, checking reliability and comprehension by the midwives of the study, identifying the collection of the data in relevance.

The data was entered into a Microsoft Excel 97-2003 spreadsheet, and analyzed using the statistical package SPSS version 23.0, performing a descriptive analysis with calculation of frequencies, percentages, means, standard deviations and medium. An inferential analysis of the independent variables “delivery unit” and “shift” was carried out with variables: sociodemographic, workload for care, management, teaching and research activity, and that corresponding to each of the items on the scale. To evaluate the differences in measured times, we use the analysis of variances (ANOVA) and Tukey’s subsequent test. It was set as the level of statistical significance 95% ($p < 0.05$). The study was conducted according to national and international ethical guidelines.

Prior to data collection, the study obtained initial evaluation and approval from the ethics research committees of the three hospitals participating in this study, following their protocol guidelines. Professionals who agreed to participate, received guidance on the purpose of the study and signed the free and informed consent form, always respecting the law 3/2018, of December 5, 2018, protection of personal data and guarantee of digital rights.

Results

Over a period of 3 months, a sample of 408 deliveries was recruited, distributed in the three hospitals that make up the study; 20 of these births correspond to Hospital A collected over a 1-month time period, 99 to Hospital B, collected for 2 months and 289 to Hospital C, collected for 3 months. In the set of the three hospitals and attending the work shift, a sample of 238 deliveries was collected in the day shift, 120 in the night shift, 38 in the day-night shift and 12 in the shift night-day. The most attended ethnic group during the birth process was the Spaniard ($n=317$), followed by Arabic ($n=66$) and South American ($n=22$), of which 188 they were nulliparous, 155 secondary and 65 multiparous. Hospital admission to the more repeated births were active birth ($n=208$), pregnancy in the process of prolongation ($n=75$) and premature rup-

ture of membrane (n=58). Therefore, 221 births presented a spontaneous onset, and 187 were induced. Finishing 188 in a normal child delivery, 70 in dystocia delivery and 99 in cesarean section. The number of NIC interventions performed by the midwives at each birth, and the average time in the execution of these NIC interventions. In addition, we measure the workload of midwives within the delivery unit, with regarding the work shift, finding important significant differences in terms of the shift. According to the items of the scale, a greater workload was obtained for the items corresponding to the care function, those that include the NICs of “fetal monitoring”, “accompaniment”, “emergencies”. We also observe that the care load is greater in the day shift compared to the night shift (Table 1).

Also, the workload of midwives was measured with respect to the sociodemographic variables studied (Table 2).

Stand out among the variables studied, those that imply a greater dedication, and, therefore, an increase in the function of care, such as: working in a hospital of great technification (hospital C), in day-night work shift (24 hours), attending women of South American ethnicity, nulliparous and with twin births, and attendance at childbirth with induced onset and ending in dystocia. For the statistical analysis and to determine the levels of significance, inferences were made between the average time dedicated to each of the variables investigated in the study. Finding statistically significant differences in the variables shown in the following table (Table 3).

Discussion

The results of the study, show us how midwives in hospitals, the focus of this study, is subject to an increase in its workload, regarding the number and average time spent carrying out NIC interventions. The NIC interventions studied, which bring a greater workload, both in day and night shift, are the fetal monitoring, companionship, and action in emergency situations. Findings consistent with other studies,^(12,21) suggest that midwives have to

Table 1. NIC interventions and time of implementation of such interventions and to the four functions by the midwives during attendance at the birthing process

Items	Day Shift		Night Shift	
	Average number of NIC intervention	Half Times (minutes)	Average number of NIC intervention	Half Times (minutes)
Self-care	6.08	18.87	5.53	16.25
Prevention	10.52	10.52	9.35	9.35
General medication	4.29	17.15	3.45	13.94
Epidural medication	2.14	6.42	1.97	5.87
Sample	1.22	2.44	1.16	2.30
Health Education (HE)	11.53	137.92	10.40	123.71
HE lactation	2.37	28.44	2.47	30.11
Deletion	2.14	4.32	2.00	3.98
Invasive procedures natural	1.78	9.08	1.57	7.75
Wounds	1.03	14.38	1.08	14.18
Maternal monitoring	4.07	8.19	3.72	7.48
Fetal monitoring	5.00	294.04	4.19	252.23
Position	5.70	5.70	4.87	4.87
Comfort	3.79	3.79	3.48	3.48
Accompaniment	12.64	151.64	11.06	132.84
Patient support and care	2.78	130.03	2.63	123.83
Patient management	2.31	53.62	2.00	46.16
Unit management	3.59	21.27	3.07	18.43
Teaching	3.64	83.34	3.23	74.03
Research	1.00	23.80	1.00	23.00
Nutrition	2.50	28.80	2.25	27.00
Emergency	2.50	150.00	a	a
Alternatives to pain	2.27	27.20	5.00	60.00
Complex	a	a	a	a
Insulation	8.00	24.00	a	a
Instrumental	a	a	a	a
Breastfeeding	1.00	38.00	a	a

Midwife functions	Day shift		Night Shift		Full Day- Night Shift	
	Average number of Nic	Half Times (minutes)	Average number of Nic	Half Times (minutes)	Average number of Nic	Half Times (minutes)
Hethcare function	72.98	822.16	63.86	725.78	78.06	887.64
Management function	5.70	73.84	4.98	63.47	6.13	79.21
Educational function	b	46.75	b	32.97	1.82	41.48
Research function	b	23.29	b	23.00	1.11	25.59
Total of the 4 functions.	80.41	960.61	70.01	840.29	87.34	1034.20

a. Not observed during the data collection period; b. Low counts to produce reliable estimates

constantly evaluate and redefine the mode of delivery of care, as the birth experience influences not only the woman, but her partner, the relationship with the child and the whole family. Therefore, the importance of the continuous presence of the midwife during the birthing process. In addition, the intended actions, and the improvement in the workflow, by this professional organization, reduce clinical risks for the mother and the newborn. But

Table 2. Average workload time based on the four functions of the midwives with respect to the sociodemographic variables of the study

Variables		n Half Times (minutes)	Hethcare Half Times (minutes)	Managemet Half Times (minutes)	Educational Half Times (minutes)	Research Half Times (minutes)	Total ^a
Hospital	A	20	818.85	87.45	9.20	29.90	945.40
	B	99	866.41	81.94	26.26	26.25	1001.36
	C	289	899.68	77.72	48.92	25.07	1051.60
	Total	408	887.64	79.21	41.48	25.59	1034.20
Work shift	Day	238	889.71	80.84	46.75	23.29	1041.11
	Night	120	822.23	72.28	32.97	23.00	950.06
	Day-Night	38	1064.79	88.74	40.58	41.76	1236.71
	Night- Day	12	940	86.42	24.92	46.00	1097.33
	Total	408	887.64	79.21	41.48	25.59	1034.20
Ethnicity	Spanish	317	902.38	80.16	42.64	25.83	1051.68
	Arab	66	802.45	73.91	26.88	24.39	927.59
	African	2	925.50	76.00	.00	23.00	1024.50
	South American	22	942.95	79.41	71.09	26.14	1113.77
	Eastern Europe	1	547.00	134.00	69.00	23.00	801.00
	Total	408	887.64	79.21	41.48	25.59	1034.20
Obstetric formula	Nullipara	188	894.63	80.53	49.51	25.45	1049.59
	Seconded	155	881.94	78.42	35.31	26.12	1022.54
	Multipara	65	881.05	77.28	32.95	24.77	1017.52
	Total	408	887.64	79.21	41.48	25.59	1034.20
Medical diagnostic	Active Labor	208	897.38	74.62	39.27	24.77	1036.64
	RPM	58	921.16	77.84	44.41	26.97	1071.97
	HTA	6	967.50	85.50	19.17	30.67	1102.83
	CIR	11	999.73	91.55	39.73	27.18	1158.18
	Diabetes	3	809.67	79.67	61.33	23.00	973.67
	Previous Placenta	1	1134.00	41.00	.00	23.00	1198.00
	Prolonged Pregnancy	75	956.57	80.89	44.77	26.37	1107.09
	Stillbirth	2	529.50	55.00	.00	23.00	607.50
	Cholestasis	2	1043.50	67.00	80.50	23.00	1214.00
	Previous Caesarean	9	488.56	95.00	38.33	23.00	644.78
	Podalic	23	539.26	105.09	31.00	24.00	698.39
	Altered amniotic fluid	5	1000.20	96.80	90.40	32.20	1220.80
	Chorioamnionitis	5	892.00	92.00	92.00	23.00	1099.00
	Twin	1	1064.33	89.33	46.00	38.33	1237.33
	Total	408	887.64	79.21	41.48	25.59	1034.20
Start of labor	Spontaneous	221	891.84	75.68	39.77	24.77	1032.74
	Induced	187	882.69	83.41	43.50	26.57	1035.94
	Total	408	887.64	79.21	41.48	25.59	1034.20
Type of delibery	Eutocic	238	901.75	76.22	43.50	25.32	1047.07
	Dystocic	70	901.75	73.24	43.26	24.64	1104.41
	Caesarean section	99	803.08	91.19	34.39	26.95	955.42
	Total	407	888.20	79.32	41.24	25.60	1034.64

a. Total workload of midwives with respect to the 4 functions

the results of this study show us how the presence and attention of the midwife, cannot be continuous, due to the increased pressure to which they are exposed. Well, the midwives of the study, must attend regularly and constantly to three women during their birth process, which it involves maintaining a midwife/surrogate ratio of 1:3. By studying the clinical practice of midwives, integrated by the four functions, it is evident how, the healthcare

function implies a greater time of dedication both in the day shift and night, followed by the function of management, teaching and research.

Total time means invested by midwives, with respect to the four functions in the care of a woman in the process of childbirth is 960.61 minutes (16 hours) for the day shift and 840.29 minutes (14 hours) for the night shift. This supposes, an excess in time dedicated to the execution of its functions,

Table 3. Comparisons of the multiple study variables with each other, with their level of significance

Dependent variables		I ^a	J ^b	Mean difference (I-J)	Significance	
Hospital	Educational	A	C	-39.72	0.005	
		B	C	-22.66	0.001	
		C	A	39.72	0.005	
	Research	C	B	22.66	0.001	
		B	A	4.83	0.017	
		B	A	-4.83	0.017	
Work shift	Hethcare	Day Shift	Night Shift	67.48	0.049	
			Day-Night Shift	-175.08	0.00	
		Night Shift	Day Shift	-67.48	0.049	
			Day-Night Shift	-242.56	0.00	
		Day-Night Shift	Day Shift	175.08	0.00	
			Night Shift	242.56	0.00	
		Management	Day Shift	Night Shift	8.56	0.030
			Night Shift	Day Shift	-8.56	0.30
				Day-Night Shift	-16.46	0.008
			Day-Night Shift	Night Shift	16.46	0.008
			Day Shift	Day-Night Shift	-18.47	0.00
				Day-Night Shift	-22.71	0.00
	Research	Night Shift	Day-Night Shift	-18.76	0.00	
			Day-Night Shift	-23.00	0.00	
		Day-Night Shift	Day Shift	18.47	0.00	
			Night Shift	18.76	0.00	
		Day-Night Shift	Day-Night Shift	-4.23	0.10	
		Day-Night Shift	Day Shift	22.71	0.00	
			Night Shift	23.00	0.00	
			Day-Night Shift	4.23	0.10	
		Total (4 functions)	Day Shift	Night Shift	91.05	0.005
				Day-Night Shift	-195.59	0.00
			Night Shift	Day Shift	-91.05	0.005
				Day-Night Shift	-286.65	0.00
Day-Night Shift	Day Shift		195.59	0.00		
	Night Shift		286.65	0.00		
Obstetric formula	Educational	Nullipara	Seconded	14.20	0.048	
		Seconded	Nullipara	-14.20	0.048	
Type of delibery	Hethcare	Eutocic	Caesarean section	98.65	0.001	
		Dystocic	Caesarean section	159.43	0.00	
		Caesarean section	Eutocic	-98.65	0.001	
			Dystocic	-159.43	0.00	
		Management	Eutocic	Caesarean section	-14.97	0.00
			Dystocic	Caesarean section	-17.95	0.00
	Caesarean section		Eutocic	14.97	0.00	
			Dystocic	17.95	0.00	
	Total (4 functions)		Eutocic	Caesarean section	91.64	0.007
			Dystocic	Caesarean section	148.99	0.001
		Caesarean section	Eutocic	-91.64	0.007	
			Dystocic	-148.99	0.001	

Dependent variables		Comparative	Significance
Ethnicity	Hethcare	Intergroup-Intragroup ^d	0.013
	Educational		0.015
	Total ^c		0.003
Medical diagnostic	Hethcare	Intergroup-Intragroup ^d	0.000
	Management		0.001
	Research		0.049
	Total ^c		0.000
			0.000
Start of labor	Hethcare	Intergroup-Intragroup ^d	0.028
	Research		0.000
	Total ^c		0.011

a.Sociodemographic variable 1; b. Sociodemographic variable 2; c. Total workload of midwives with respect to the 4 functions; d. Considering intergroup (comparisons between the same variable) and intragroup (comparisons between different variables)

with respect to the duration of its working day labor (12 hours); and, therefore, affects the midwife/surrogate ratio default.

Data in line with other studies,^(5,7,8) as it shows us how the ratio prefixed (1:2) of the study hospitals, it is not well established to lend those quality care, so demanded today. If, in addition, we take into account the results extracted, in terms of the relationship between the workload of the midwives during the care of a woman in childbirth (ratio 1:1), with respect to the variables sociodemographic of the study, we found significant discrepancies in terms of type of hospital, work shift, ethnicity, parity, medical diagnosis, onset and completion of labor.

If we address the type of hospital, hospital C (third level of care, and reference), presents average times of midwives' workloads (1051.60 min - 17.5 hours) older than, hospital B (1001.36 min - 16.7 hours) and hospital A (945.40 min - 15.7 hours). Results compatible with the literature, which indicates how the organizational structure, the size of the delivery units and the increase in the technification of the birth process, varies the frequency and number of interventions performed by midwives.⁽²²⁾

By exploring into the work shift and type of patient they are assisting, we find that during the day work shift, the workload increases significantly with respect to night shift. This situation is due to two factors: an increase in number of processes scheduled as elective caesarean sections, external cephalic versions and inductions to the childbirth; this is consistent with the current evidence-based research.^(21,23-25) And second factor is depending on the type of patient assisted, such as: the Sub-American ethnicity, the nulliparous and the women who present medical-obstetric comorbidities. This increase in the burden of work observed is consistent with other studies findings^(1,2,8,21,23) as we are currently facing an increase in attention to chronic processes, generated by the increase in twinning, the increase in maternal age, preterm births, as well as the rise of assisted reproduction techniques.

If we evaluate the results with respect to, at the beginning and end of labor, the workload in induced labor (1035.94 minutes - 17.3 hours) is de-

tected to be higher than the spontaneous delivery (1032.74 minutes - 17.2 hours), as exposed by certain studies⁽¹⁹⁾ stating that the increase in the rate of induction of labor has led to an increased workload of midwives in maternity units, and the guide of the National Institute of Clinical Excellence (NICE), recognizes that the inductions of the childbirth, exert an increase in pressure on the delivery room than childbirth spontaneous onset.

And as for the completion of it, the average time for dystocia delivery (1104.41 minutes - 18.4 hours), eutocia delivery (1047.07 minutes - 17.45 hours) and caesarean section (955.42 minutes - 16 hours). This difference in time observed is the result of the action and coordination of numerous professionals in the same care process. This is the time spent on coordination and communication between the different units involved in the process of childbirth.⁽²²⁻²⁵⁾

Midwives are at the front line of services of births and must be perceived as such by the Nursing Departments and Directorates of hospitals. The standard 12-hour shifts set for midwives condense the care that should be performed, between an average of 2 hours and 6.5 more hours, outside that shift.

This translates into work overload, so the use of this scale by the supervisor in the Delivery Service in any moment allows to show the need to reinforce or increase the staff of the shift. This works for both shifts: the one in which it is measured, and for the next one.

The provision of human and material resources, including a good working environment, is essential to ensure the provision of quality services. Staffing should be an integrated process, incorporating a broad demographic, epidemiological, cultural, and social perspective, to meet the demand of the current society by health clinicians.

The evidence found by this research provides a valuable contribution to the analysis and evaluation in terms of staffing, workload of midwives and the risks to the safety of the mother-child binomial. It shows us how the ratio midwife/surrogate must be redefined to take charge of the current situation of overload. This research offers us objective data corroborating theoretical or alleged claims based on

subjective experiences. By not finding studies to analyze the findings in the national literature and in the international context, new multicenter studies on the subject should be carried out in order to allow comparisons. Although, we may find studies that highlight the importance of implementing a tool for planning and staffing for nursing in certain units, they are not oriented for midwifery specifically.

We found a major limitation in not being able to compare this research with others. Given the scarcity of studies to measure burdens on midwives. This study could be the basis for developing later ones, applying this scale in other situations, and start the path towards a more objective management of midwifery workloads, so that their workforce is based on an accurate care demanded by women during their birth process. It is relevant to continue with this line of research in future studies, which would contemplate other hospital units where the midwives are integrated.

Conclusion

The results obtained indicate the validity of the scale designed to measure the workload of midwives, as this instrument reflects the workload experienced by the midwives of the study in the different hospitals included. Using a standardized, user-friendly, highly contributed language (NIC) for clinical practice, this scale allows quantifying the work done by the midwives in the provision of care to the woman, during the birthing process, shows the real working time, which needs a midwife in each type of delivery according to the context sanitary. Therefore, this scale allows an improvement of human resources management, adapting the care demands to the patients and guides the midwifery to satisfy this demand, guaranteeing the safety and quality of care.

Collaborations

García LG, Valcarcer MDR, Llor AM, Gil MFH, Merino GR, Guerrero FJN and Cano EDLI contributed equally to the present paper, namely to the

conception and design, data collection or analysis, interpretation of data, writing of the article, and review of the intellectual content. Therefore, all authors approved the final version to be published.

References

1. Turner L, Griffiths P, Kitson-Reynolds E. Midwifery and nurse staffing of inpatient maternity services – a systematic scoping review of associations with outcomes and quality of care. *Midwifery*. 2021;103:103118.
2. Yelland A, Winter C, Draycott T, Fox R. Midwifery staffing: Variation and mismatch in demand and capacity. *Br J Midwifery*. 2013;21(8):579–89.
3. Hanley A, Davis D, Kurz E. Job satisfaction and sustainability of midwives working in caseload models of care: An integrative literature review. *Women Birth*. 2022;35(4):e397-e407.
4. Campos MS, Oliveira BA, Perroca MG. Workload of nurses: observational study of indirect care activities/interventions. *Rev Bras Enferm*. 2018;71(2):297–305.
5. Gialama F, Saridi M, Prezerakos P, Pollalis Y, Contiades X, Souliotis K. The implementation process of the Workload Indicators Staffing Need (WISN) method by WHO in determining midwifery staff requirements in Greek Hospitals. *Eur J Midwifery*. 2019;3(1):1.
6. Rottenstreich M, Rotem R, Mor P, Reichman O, Rottenstreich A, Grisaru-Granovsky S, et al. Midwife annual delivery workload and maternal and neonatal adverse outcomes, is there an association? *Eur J Obstet Gynecol Reprod Biol*. 2021;262:147–54.
7. Bradfield Z, Hauck Y, Kelly M, et al. “De eso se trata la partería”: las experiencias de las parteras de Australia Occidental de estar ‘con la mujer’ durante el trabajo de parto y el nacimiento en el modelo de partera conocido. *BMC Embarazo Parto*. 2019;19(1):29.
8. Brenne Fehn M, Dahlø R, Nielsen R, Laache I, Vanky E. Proactive versus standard support of labour in nulliparous women; study protocol for a randomized, controlled trial. *Trials*. 2020;21(1):358.
9. Cucolo DF, Perroca MG. The qualitative dimension of nursing workload: a measurement proposal. *Rev Lat Am Enfermagem*. 2019;27:e3238.
10. Xie M, Lao TT, Ma J, Zhu T, Liu D, Yu S, et al. Impact of childbirth policy changes on obstetric workload over a 13-year period in a regional referral center in China - implications on service provision planning. *BMC Pregnancy Childbirth*. 2021;21(1):610.
11. Kyrou M. Mode of delivery and traumatic birth experience: the role of the midwife. *Eur J Midwifery*. 2020;4(2):39.
12. Jeniawaty S, Mairo RK, Ginarsih Y. Analysis midwife workload with Nasa-TLX method. *Med-Leg Update*. 2020;20(2):697–702.
13. Bloxsome D, Ireson D, Doleman G, Bayes S. Factors associated with midwives’ job satisfaction and intention to stay in the profession: an integrative review. *J Clin Nurs*. 2019;28(3-4):386–99.
14. Oliveira AP, Ventura CA, Galante ML, Padilla M, Cunha A, Mendes IA, et al. The Current state of obstetric Nursing in Brazil. *Rev Lat Am Enfermagem*. 2021;29:e3510.
15. De Oliveira Salgado P, De Fátima Januário C, Vieira Toledo L, Miranda Brinati L, Sérgio de Araújo T, Tavares Boscarol G. Carga de trabalho da enfermagem requerida por pacientes durante internação numa UTI: estudo de coorte. *Enfermería Global*. 2020;19(3):450–78

16. de Cordova PB, Lucero RJ, Hyun S, Quinlan P, Price K, Stone PW. Using the Nursing Interventions Classification as a Potential Measure of Nurse Workload. *J Nurs Care Qual.* 2010;25(1):39–45
17. Possari JF, Gaidzinski RR, Lima AF, Fugulin FM, Herdman TH. El uso de la clasificación de Intervenciones en enfermería para identificar la carga laboral de un equipo de enfermería de un centro quirúrgico. *Rev Lat Am Enfermagem.* 2015;232(5):781-8. .
18. Magalhães AM, Costa DG, Riboldi CO, Mergen T, Barbosa AD, Moura GM. Association between workload of the nursing staff and patient safety outcomes. *Rev Esc Enferm USP.* 2017;51(0):e03255.
19. Ley 55/2003, de 16 diciembre, del Estatuto Marco del Personal Estatutario de los Servicios de Salud. 17 de diciembre 2003. BOE-A-2003-23101; 2021.[citado 2021 Dec12]. Disponible en: <https://www.boe.es/boe/dias/2003/12/17/pdfs/A44742-44763.pdf>
20. Orden SAS/1349/2009, 6 mayo, por la que se aprueba y publica el programa formativo de la especialidad de Enfermería Obstétrico-ginecológica (matrona). 28 mayo 2009. BOE-A-2009-8881.[citado 2020 Feb 2]. Disponible en: <https://www.boe.es/boe/dias/2009/05/28/pdfs/BOE-A-2009-8881.pdf>
21. Robertson K, Hardingham I, D'Arcy R, Reddy A, Clacey J. Delay in the induction of labour process: a retrospective cohort study and computer simulation of maternity unit workload. *BMJ Open.* 2021;11(9):e045577.
22. Martín-Arribas A, Vila-Candel R, O'Connell R, Dillon M, Vila-Bellido I, Beneyto MÁ, et al. Transfers of care between healthcare professionals in obstetric units of different sizes across Spain and in a hospital in Ireland: The MidconBirth Study. *Int J Environ Res Public Health.* 2020 ;17(22):8394.
23. Coates D, Donnelly N, Henry A. The Attitudes and Beliefs of Australian Midwives and Obstetricians About Birth Options and Labor Interventions. *J Midwifery Womens Health.* 2021;66(2):161–73.
24. Vila-Candel R, Martín A, Escuriet R, Castro-Sánchez E, Soriano-Vidal FJ. Analysis of caesarean section rates using the Robson classification system at a university hospital in Spain. *Int J Environ Res Public Health.* 2020;17(5):1575.
25. de Wolff MG, Midtgaard J, Johansen M, Rom AL, Rosthøj S, Tabor A, et al. Effects of a Midwife-Coordinated Maternity Care Intervention (ChroPreg) vs. Standard Care in Pregnant Women with Chronic Medical Conditions: results from a randomized controlled trial. *Int J Environ Res Public Health.* 2021;18(15):7875.