

Shoulder dystocia simulation training: programme implementation and professional perceptions.

Formación mediante simulación en distocia de hombros: implementación del programa y percepción profesional.

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Abstract

Objective: To describe implementation and professional appraisal of a shoulder dystocia simulation programme, focusing on perceived preparedness, usefulness and satisfaction. **Methods:** A descriptive observational study evaluated six activities at a tertiary university hospital in northern Spain (2019-2025), with 130 accumulated attendances and 126 post-training questionnaires, not necessarily unique respondents. Two preparedness questions and 14 unvalidated Likert items were described. Both preparedness responses were collected after attendance; the baseline relied on recall. Historical neonatal outcomes were secondary and exploratory. **Results:** Questionnaires comprised 93 specialist, 27 midwife and six resident responses. Preparedness was reported in 55/126 questionnaires (43.7%) for the recalled baseline and 113/126 (89.7%) after training. Favourable Likert responses ranged from 87.3% to 100%; overall satisfaction was 98.4%. All midwife attendances occurred in May 2023. Among recorded shoulder dystocia cases, obstetric brachial plexus palsy occurred in 8/78 (10.3%) in 2016-2018 and 13/268 (4.9%) in 2019-2025 (risk ratio 0.47; 95% confidence interval 0.20-1.10). **Conclusions:** Responses show favourable professional appraisal and higher reported preparedness after attendance. They do not establish objective competence, retention or behavioural transfer. Historical clinical differences cannot be attributed to training.

Keywords: Simulation Training; Shoulder Dystocia; Education, Medical, Continuing; Interprofessional Education; Patient Care Team.

Resumen

Objetivo: Describir la implementación y valoración profesional de un programa de simulación sobre distocia de hombros, con énfasis en preparación percibida, utilidad y satisfacción. **Métodos:** Estudio observacional descriptivo de seis actividades en un hospital universitario de tercer nivel del norte de España (2019-2025), con 130 asistencias acumuladas y 126 cuestionarios posteriores a la formación, que no necesariamente corresponden a personas únicas. Se describieron dos preguntas sobre preparación y 14 ítems Likert sin validación psicométrica. Ambas respuestas sobre preparación se recogieron después de la asistencia; la valoración basal dependía del recuerdo. Los resultados neonatales históricos fueron secundarios y exploratorios. **Resultados:** Los cuestionarios incluyeron 93 respuestas de especialistas, 27 de matronas y seis de residentes. La preparación se manifestó en 55/126 (43,7 %) para la situación basal recordada y en 113/126 (89,7 %) después de la

formación. Las respuestas Likert favorables oscilaron entre el 87,3 % y el 100 %; la satisfacción global fue del 98,4 %. Las asistencias de matronas se concentraron en mayo de 2023. Entre las distocias registradas, la parálisis braquial obstétrica se documentó en 8/78 (10,3 %) en 2016-2018 y 13/268 (4,9 %) en 2019-2025 (riesgo relativo: 0,47; intervalo de confianza del 95 %: 0,20-1,10).

Conclusiones: Las respuestas muestran una valoración profesional favorable y mayor preparación declarada después de la asistencia. No demuestran competencia objetiva, retención ni transferencia al comportamiento clínico. Las diferencias clínicas históricas no pueden atribuirse a la formación.

Palabras clave: Formación mediante simulación; Distocia de hombros; Educación médica continuada; Educación interprofesional; Equipo de atención al paciente.

1. Introduction

Shoulder dystocia requires rapid recognition, coordinated assistance and an appropriate sequence of manoeuvres. Its low frequency limits opportunities for individual professionals to maintain experience through clinical exposure alone. Simulation provides opportunities to rehearse technical actions alongside communication, leadership and role allocation (1-3). Spanish evidence identifies a perceived training need and variation in institutional provision. Salvador López et al. trained 904 professionals and obtained 635 pre-course questionnaires; 61.8% of respondents to the preparedness question did not feel ready to resolve shoulder dystocia, and 87.1% recalled not feeling ready at the end of residency (4). Faundez-Inostroza et al. surveyed 67 Spanish hospitals; 55.2% had shoulder dystocia simulation programmes (5).

Obstetric simulation studies have evaluated performance as well as professional confidence and satisfaction (6). Debriefing supports reflection on decisions and interactions after the scenario (7). However, perceived usefulness and confidence do not establish correct performance, retention or transfer. Questionnaire interpretation requires attention to instrument design and validity (8), while repeated measurements are needed to examine change over time (9).

The primary objective was to describe programme implementation and professional perceptions of preparedness, usefulness, satisfaction and technical and non-technical educational content. A secondary exploratory objective was to describe selected neonatal outcomes in historical shoulder dystocia records. The study was not designed to establish educational or clinical effectiveness.

2. Methods

2.1. Design, setting and programme

This descriptive observational study evaluated activities from February 2019 to October 2025 at the Hospital Universitario Central de Asturias, a tertiary university hospital in northern Spain. Eligible survey respondents had attended a shoulder dystocia training activity. The educational unit of analysis was a completed questionnaire; attendance was counted per activity, without assuming unique professionals. A separate retrospective clinical series included documented shoulder dystocia cases from 2016 to 2025.

Six activities generated 130 accumulated attendances. Training was interrupted during the COVID-19 pandemic in 2020-2022 and resumed in May 2023. The programme included specialists, residents and midwives overall, but five workshops involved specialists and residents only. Programme-level multiprofessional participation should therefore be distinguished from mixed obstetrician-midwife teams in every activity (Table 1). Hospital workshops were preferentially held

in situ in the delivery suite or in an adjacent classroom when clinical activity required it. Gaumard Super OB SUSIE S500.300 was used routinely. The May 2023 activity, delivered with GESO, used PROMPT Flex simulators (Limbs & Things) with traction sensors; force measurements were not educational outcomes in this analysis. April 2024 was a congress workshop. The documented five-hour teaching programme allocated 30 minutes to crisis resource management, 30 minutes to checklists, one hour to recognition and management, two hours to supervised manoeuvre practice and one hour to debriefing. Teaching covered external and internal manoeuvres, escalation, communication, leadership, prioritisation, role allocation and documentation. The checklist supported teaching but did not generate individual performance scores.

Debriefing concluded the workshop and was led by the teaching team, comprising professionals experienced in obstetric care and simulation. During the planned hour, participants reflected on interpretation of the scenario, decisions, manoeuvre sequence, communication, leadership and task allocation. The discussion was supported by the checklist; no named formal debriefing model was documented. Facilitator composition could vary by edition. Debriefing was not an individual competence examination.

Table 1. Professional composition of the six training activities.

Session	Total, n	Specialists, n	Residents, n	Midwives, n	Context
February 2019	13	12	1	0	Initial hospital workshop
May 2019	8	7	1	0	Second hospital workshop
May 2023	71	39	5	27	Resumption; GESO collaboration
November 2023	8	7	1	0	Instituto Adolfo Posada accreditation
April 2024	15	14	1	0	XI National SESSEP Congress
October 2025	15	14	1	0	Hospital workshop
Total	130	93	10	27	Accumulated attendances

*, *Note.* Counts are accumulated attendances, not unique professionals. Residents were in Obstetrics and Gynaecology. GESO: Grupo Español de Seguridad Obstétrica; SESSEP: Sociedad Española de Simulación Clínica y Seguridad del Paciente. Training was interrupted in 2020-2022. Gaumard Super OB SUSIE S500.300 was used routinely; May 2023 used PROMPT Flex with traction sensors. The April 2024 simulator was not documented.

2.2. Questionnaire and educational outcomes

Email invitations described the research purpose and requested voluntary completion of a Google Forms questionnaire after attendance. Administration was not immediate and could occur several months after the workshop. Some invitations failed and not everyone responded. The form collected email addresses, so it was not anonymous at collection. A verified denominator of unique reachable professionals was unavailable; 126/130 was not interpreted as a response rate.

A professional could respond after more than one workshop. The number of repeated submissions and unique respondents was not established in the available aggregates. Although emails had been collected, individual identifiers were not available for deduplication in this analysis. The 126 questionnaires were therefore described without assuming independence or performing inferential educational comparisons.

Supplement S1 reproduces the complete Spanish questionnaire and its English translation. It contains professional category, two dichotomous shoulder dystocia preparedness questions, two instrumental-delivery questions and 14 five-point Likert statements. Instrumental-delivery responses were not analysed here. Both shoulder dystocia questions were answered after attendance: the baseline depended on recall, whereas the post-course question reflected appraisal at questionnaire completion. This was not a prospective pre-test/post-test evaluation.

The Likert statements assessed usefulness, perceived technical improvement, reasoning, confidence, theory-practice integration, motivation, prioritisation, expected future competence, teamwork, the necessity of leadership, communication, debriefing, satisfaction and applicability outside work. Favourable responses combined agree and strongly agree. The questionnaire was developed ad hoc and was not psychometrically validated. No content-validity study, cognitive interviewing, factor analysis or reliability estimate was available. Items were analysed separately, without a composite or domain score. Table 3 maps their content conceptually; it is not validation evidence.

2.3. Secondary exploratory clinical component

All available records meeting the documented shoulder dystocia definition were included, without additional exclusions. One investigator reviewed maternal electronic partograms and newborn records, including paediatric reports. Partograms were examined individually in 2016-2018; from 2019, a dedicated shoulder dystocia field enabled electronic filtering. Recorded diagnostic criteria included failure of anterior shoulder delivery with gentle traction, a head-to-body interval exceeding 60 seconds or the turtle sign. Ascertainment thus changed when the programme was introduced.

Obstetric brachial plexus palsy (OBPP), clavicle fracture and humeral fracture were compared as proportions of recorded shoulder dystocia cases, not population incidence rates. Blank binary complication fields had been coded as absence in the source analysis, potentially underestimating incompletely documented outcomes. Each birth was not linked to attending professionals' prior training. Follow-up was available for 51/346 newborns but lacked a uniform interval and complete linkage to the 21 OBPP cases; persistence or severity at 6-12 months could not be classified.

2.4. Analysis and ethics

Educational variables were summarised as counts and percentages, using 126 questionnaires as denominator. Individual preparedness transitions and respondent identifiers were unavailable for a paired analysis accounting for repeat submissions. Joint item-by-profession or item-by-activity data were also unavailable; no subgroup comparison was performed.

Original clinical analyses used R version 4.5.1. Two-sided Fisher's exact tests were used for OBPP and humeral fracture; Pearson's chi-square test without continuity correction was used for clavicle fracture. Risk ratios for 2019-2025 versus 2016-2018 and 95% confidence intervals were calculated from aggregate tables using the logarithmic method. The exploratory threshold was $p < 0.05$, without multiplicity correction or confounding adjustment. There was no prospective sample-size calculation. Confidence intervals express precision instead of observed post-hoc power. Annual counts are provided descriptively in Supplement S2; no time-series model was fitted.

The Research Ethics Committee of the Principality of Asturias approved the research project on 29 June 2020 (2020.311). Survey invitations explained the purpose and requested voluntary participation. Hospital access to clinical records was authorised for the investigator. Clinical analysis used a pseudonymised dataset; the identifying linkage file was held separately under

password protection. Clinical and survey data were handled confidentially, with no directly identifying information reported.

3. Results

3.1. Attendance and questionnaire composition

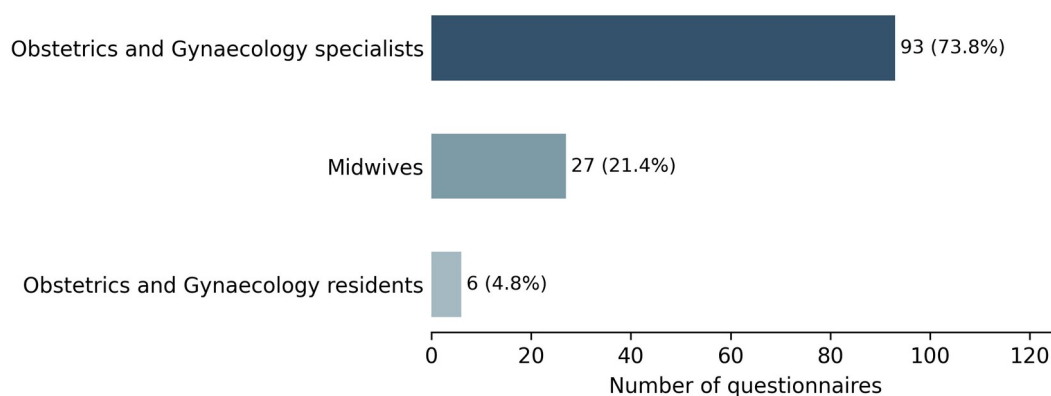


Figure 1. Professional categories in the 126 questionnaires; these are responses, not necessarily unique professionals.

There were 93 specialist, 10 resident and 27 midwife attendances (130 in total). May 2023 accounted for 71 attendances (54.6%), including all 27 midwife attendances; each other workshop included one resident and no midwives. The 126 questionnaires comprised 93 specialist responses (73.8%), 27 midwife responses (21.4%) and six resident responses (4.8%) (Figure 1). Questionnaire counts, attendances and numbers of unique people are distinct denominators.

3.2. Preparedness and educational appraisal

Fifty-five questionnaires (43.7%) indicated preparedness before the workshop, as recalled afterwards; 71 (56.3%) indicated no preparedness. For appraisal after the course, 113 (89.7%) indicated preparedness and 13 (10.3%) did not. These are descriptive marginal proportions collected in the same post-training form, not prospective change, individual improvement or retention over a standardised interval (Figure 2).

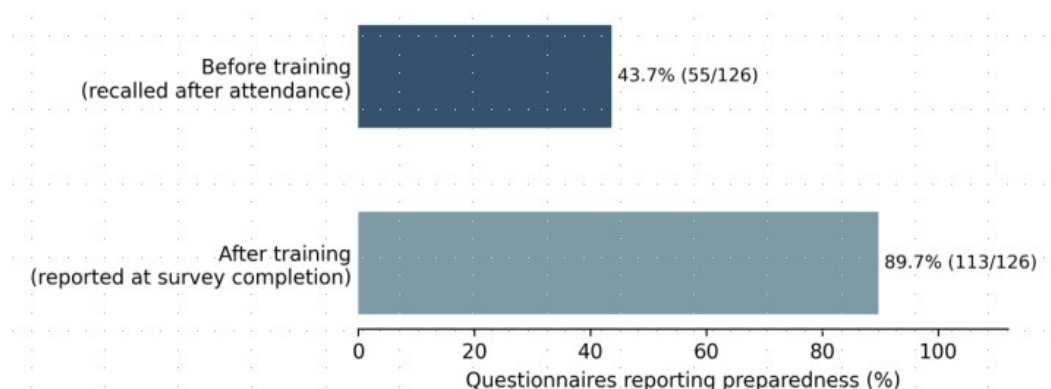


Figure 2. Both preparedness responses were collected after attendance: the baseline was recalled and the post-course appraisal was reported at questionnaire completion. Denominator: 126 for each question.

All 14 Likert statements were completed in all 126 questionnaires. Favourable responses ranged from 87.3% to 100%. Usefulness was rated favourably in all questionnaires; satisfaction reached 98.4% (124/126). Teamwork and the necessity of a leadership role each reached 99.2%; the latter did not ask whether leadership ability improved. Communication and reasoning/decision-making reached 98.4%. Perceived technical improvement was 95.2%, confidence 93.7%, theory-practice integration and prioritisation 96.8%, and motivation 96.0%. Expected future competence and debriefing each reached 97.6%. Applicability outside work reached 87.3%, with 15 neutral responses (11.9%). Strong agreement predominated (Table 2).

Table 2. Responses to the 14 Likert statements, n (%), with 126 questionnaires per item.

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Simulation is a useful teaching method for learning.	0 (0.0)	0 (0.0)	0 (0.0)	10 (7.9)	116 (92.1)
2. The simulation experience has improved my technical skills.	0 (0.0)	1 (0.8)	5 (4.0)	24 (19.0)	96 (76.2)
3. Simulation helps develop critical reasoning and decision-making.	1 (0.8)	0 (0.0)	1 (0.8)	18 (14.3)	106 (84.1)
4. The experience with the simulator has increased my sense of security and confidence.	0 (0.0)	2 (1.6)	6 (4.8)	24 (19.0)	94 (74.6)
5. Simulation has helped me integrate theory and practice.	0 (0.0)	1 (0.8)	3 (2.4)	14 (11.1)	108 (85.7)
6. The clinical simulation workshops have motivated me to learn.	0 (0.0)	1 (0.8)	4 (3.2)	18 (14.3)	103 (81.7)
7. Clinical simulation has helped me prioritise actions.	0 (0.0)	1 (0.8)	3 (2.4)	15 (11.9)	107 (84.9)
8. Interaction with simulation will improve my clinical competence.	0 (0.0)	0 (0.0)	3 (2.4)	16 (12.7)	107 (84.9)
9. Clinical simulation enhances teamwork.	0 (0.0)	0 (0.0)	1 (0.8)	10 (7.9)	115 (91.3)
10. A leadership role in simulation is necessary for teamwork.	0 (0.0)	1 (0.8)	0 (0.0)	12 (9.5)	113 (89.7)
11. Simulation promotes communication between team members.	0 (0.0)	0 (0.0)	2 (1.6)	10 (7.9)	114 (90.5)
12. Debriefing (analysis and discussion of the cases) provides verbal feedback and constructive criticism.	0 (0.0)	0 (0.0)	3 (2.4)	18 (14.3)	105 (83.3)
13. Overall, the simulation experience has been satisfactory.	1 (0.8)	0 (0.0)	1 (0.8)	12 (9.5)	112 (88.9)
14. Methods applied in simulation help improve the management of problems outside professional practice.	1 (0.8)	0 (0.0)	15 (11.9)	16 (12.7)	94 (74.6)

*, Note. Statements are translated from Spanish; the complete original is in Supplement S1. Neutral corresponds to “Indiferente”. Favourable responses combine agree and strongly agree. Percentages are calculated from counts and rounded independently to one decimal place.

3.3. Secondary exploratory clinical observations

Among 346 recorded shoulder dystocias, OBPP occurred in 8/78 (10.3%) in 2016-2018 and 13/268 (4.9%) in 2019-2025 (risk ratio 0.47; 95% confidence interval 0.20-1.10; Fisher $p = 0.103$). Clavicle fracture occurred in 15/78 (19.2%) and 17/268 (6.3%) (risk ratio 0.33; 95% confidence interval 0.17-0.63; Pearson $p < 0.001$). Humeral fracture occurred in 0/78 and 2/268 (0.7%) (Fisher $p = 1.00$). Annual frequencies fluctuated: OBPP was recorded in 0/42 cases in 2023 and 7/60 (11.7%) in 2024 (Supplement S2). No uniform progressive decline was observed.

Table 3. Conceptual mapping of each Likert item and its interpretive limit.

Item	Educational domain	Interpretive limit
1	Teaching usefulness	Acceptability; no learning test
2	Perceived technical improvement	No observed manoeuvre performance
3	Reasoning and decisions	No assessed decision-making
4	Confidence and security	Confidence does not establish competence
5	Theory-practice integration	No demonstrated clinical transfer
6	Motivation to learn	No subsequent learning behaviour measured
7	Prioritisation	No observed or timed prioritisation
8	Expected future competence	Expectation; no demonstrated competence gain
9	Teamwork	No observed team performance
10	Necessity of leadership	Belief about leadership; no measured improvement
11	Team communication	No observed communication behaviour
12	Debriefing and feedback	Appraisal; no comparison of debriefing models
13	Overall satisfaction	Reaction; no effectiveness measure
14	Applicability outside work	No assessment of actual application

*, *Note.* This mapping organises item content; it does not establish construct validity, factor structure, reliability or validated subscales. Preparedness was assessed by separate dichotomous questions.

4. Discussion

4.1. Professional appraisal in the Spanish educational context

The programme generated favourable appraisals of usefulness, satisfaction and opportunities to practise shoulder dystocia management. Preparedness was reported more often after attendance than for the recalled baseline, but the findings concern perceptions rather than demonstrated competence. Professional composition varied substantially, with midwife attendance confined to the largest activity.

Our 56.3% recalled absence of baseline preparedness can be placed alongside the 61.8% reported by Salvador López et al. (4). Their survey was administered before training; 635 questionnaires were returned from 904 professionals trained, and 87.1% also recalled inadequate preparation at residency completion. These findings identify a shared perceived training need. Differences in administration, populations and denominators preclude treating the percentages as equivalent measures or comparing them inferentially.

Hernández et al. studied 30 obstetric professionals in Spain, reporting 100% favourable responses on eight satisfaction items and improvement in externally rated simulated performance (6). Our overall satisfaction of 98.4% supports high acceptability, but a different instrument was used. Their skills assessment used video recordings; our checklist did not produce analysed performance scores, so their performance findings cannot be transferred to this sample. In REEM, Ramos and Ardila Botero reported that 89.4% of medical students considered postpartum haemorrhage simulation positive and confidence-building (10). Our confidence item received 93.7% favourable responses, with different wording, professional level and emergency. These are contextual comparisons rather than common effect estimates. Studies specifically assessing shoulder dystocia performance and retention illustrate the need to measure these outcomes separately (11, 12).

4.2. Item interpretation, teamwork and debriefing

Teamwork and communication were highly valued, consistent with their role in emergency simulation (3, 13). Agreement that leadership is necessary is a belief about organisation, not improved leadership skill. The future-tense competence item expresses an expectation, not an acquired competence. Table 3 makes these distinctions explicit. Concentration of midwives in one workshop and the lack of crossed item data prevent profession-specific comparisons or claims of equivalent interprofessional learning across sessions.

Debriefing received 97.6% favourable appraisal for feedback and constructive discussion. The planned hour allowed reflection on manoeuvres, decisions and interactions. Standards and reviews support specifying aims, facilitation and structure (7, 14). Losey Pelayo et al., in REEM, examined participants' reflections during instructor training (15), highlighting another way to investigate learning processes. Our single feedback item cannot establish facilitation quality or the superiority of a particular debriefing model.

Padilla et al., in REEM, evaluated a satisfaction survey in 122 medical students, reporting internal consistency of 0.924 and structural analyses (16). Their results concern a different instrument and population and do not validate ours. Content review, response-process investigation, reliability and structural assessment would be needed before constructing composite or domain scores (8, 17). High agreement may reflect satisfaction, ceiling effects, social desirability or response tendencies; these explanations cannot be distinguished here.

In Kirkpatrick's framework, this evidence chiefly concerns reaction, including satisfaction and perceived usefulness. Self-appraised confidence and skills do not establish objectively measured learning (level 2), behavioural transfer (level 3) or patient-level effectiveness (level 4) (18). The clinical series is contextual rather than proof of higher-level educational effects. Future evaluation should collect confidential longitudinal respondent records, prospective baseline and follow-up measures, independent performance ratings and standardised retention intervals. The repeated-measurements perspective discussed in REEM provides a useful methodological basis (9).

4.3. Scope of the secondary clinical findings

The lower OBPP point estimate is imprecise, with only 21 events and a confidence interval including no difference. A non-significant result does not establish equal frequencies; a lower point estimate does not establish benefit. Salvador López et al., reporting for the Grupo Multiprofesional de Simulación Obstétrica PDH, documented 14 OBPPs among 125 shoulder dystocias after training (11.2%), none permanent or requiring treatment beyond six months; the earlier period contained seven OBPPs, two permanent (19). Persistence is a distinct endpoint. Our later-period 4.9% cannot

be compared with their 11.2% as relative programme effectiveness, and our incomplete, non-standardised follow-up prevents a comparable persistence analysis.

Crofts et al. reported 7.4%, 2.3% and 1.3% OBPP across successive periods of sustained training (20); our annual series fluctuated. The institutional account of Faundez-Inostroza's 2026 multicentre thesis describes progressive OBPP reduction in centres with structured simulation (21), but does not provide effect estimates for a numerical comparison. Her published 2024 survey quantifies provision: 55.2% of responding hospitals had programmes, not 55.2% showing reduced OBPP (5). Changes in ascertainment from 2019, interrupted training, absent linkage between births and trained staff, incomplete follow-up, unadjusted comparisons and potentially incomplete outcome fields prevent attributing either clinical contrast to this programme.

4.4. Strengths and limitations

The study documents a real programme, provides the complete instrument and response distributions, and separates attendance and questionnaire counts. Limitations include an unvalidated instrument, self-report, no objective competence or retention assessment, recalled baseline, variable survey delay, unknown unique respondents, potentially dependent repeat submissions and an unquantifiable response rate. Recall, selection and response bias may affect the findings. Aggregate results also prevent profession-specific and session-specific comparisons. Clinical observations derive from an uncontrolled historical series with changing ascertainment and heterogeneous exposure. The findings support local acceptability and future evaluation design, without establishing effectiveness or broad generalisability.

5. Conclusions

- Professional responses showed high perceived usefulness and satisfaction, and preparedness was reported more often after attendance than for the recalled baseline. The programme reached several professional categories, with mixed participation concentrated in one activity.
- These findings document professional appraisal, not acquired or retained competence. Prospective performance assessment, longitudinal response tracking and broader participation across activities are needed to evaluate learning and clinical transfer.

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Supplementary material: S1: complete Spanish questionnaire and English translation. S2: annual recorded shoulder dystocia cases and complication frequencies.

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