

Gaps in Knowledge and Diagnostic Practice for Obstetric Anal Sphincter Injuries: A Multicountry Cross-Sectional Survey of Maternity Care Providers

Diaa Rizk

Arabian Gulf University

Angeleena Esther

Arabian Gulf University

Hussein Alhafnawi

Arabian Gulf University

Kacper Korzeniewski

Warsaw University of Technology

Katarzyna Borycka

kborycka@interia.pl

Lazarski University Faculty of Medicine

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Abstract

Background

Obstetric anal sphincter injuries (OASI) may remain unrecognised after vaginal birth. Limited evidence exists on maternity care providers' knowledge and diagnostic practices across Middle Eastern settings. We assessed gaps in OASI-related knowledge and practice and factors associated with awareness of clinically unrecognised injuries.

Methods

A multicountry cross-sectional online survey included 530 maternity care providers across seven Middle Eastern countries. The questionnaire assessed OASI knowledge, diagnostic practices, training, clinical experience and institutional guidance. Professional groups were compared, and multivariable logistic regression identified factors independently associated with self-reported awareness of clinically unrecognised OASI.

Results

Digital rectal examination (DRE) was the most commonly reported postpartum assessment method (78.4%), while 60.8% considered DRE sufficient for OASI detection. Only 37.0% reported awareness of the Sultan classification and 30.4% awareness of clinically unrecognised OASI. Among those reporting awareness, 63/161 (39.1%) provided a definition demonstrating understanding of injuries missed during initial clinical assessment. Respondents reporting screening with DRE were more likely to perform routine DRE after vaginal birth than those examining only when OASI was suspected (77.4% vs 51.2%; $p < 0.001$). Institution-specific OASI training was reported by 40.8%, and guideline availability by 29.4%. Multivariable analysis identified greater awareness associated with knowledge of the Sultan classification (aOR 2.20, 95% CI 1.42–3.39), higher confidence in DRE accuracy (aOR 2.14, 95% CI 1.35–3.39), more than seven years of clinical experience (aOR 1.77, 95% CI 1.14–2.74), and guideline availability (aOR 2.68, 95% CI 1.71–4.19). Conversely, considering DRE sufficient for OASI detection was associated with lower awareness (aOR 0.44, 95% CI 0.28–0.69).

Conclusions

Important gaps exist between reported diagnostic practice, provider knowledge and understanding of clinical assessment limitations. Higher confidence in DRE accuracy was associated with greater awareness, whereas considering DRE sufficient was associated with lower awareness of clinically unrecognised OASI. Improving detection requires structured training and clinical guidance that strengthen diagnostic reasoning, understanding of assessment limitations and recognition of potentially

missed injuries. These findings highlight opportunities to improve maternity care quality through targeted professional education and consistent implementation of evidence-based clinical assessment practices across participating healthcare settings.

Background

Obstetric anal sphincter injuries (OASI) are a major cause of maternal morbidity following vaginal birth. Injury to the external or internal anal sphincter may result in persistent anatomical and functional impairment, with anal incontinence representing the most important long-term consequence. The risk of subsequent anal incontinence increases with the extent of sphincter injury, making accurate recognition and classification at the time of birth clinically important.[1, 2] Beyond individual morbidity, consistent recognition of OASI is increasingly regarded as an important component of the quality and safety of maternity care.[3] Pelvic floor injury related to vaginal birth can be life-altering, reinforcing the importance of prevention and accurate recognition.[4] The occurrence of perineal trauma also varies according to maternal and intrapartum risk factors.[5] Long-term consequences of OASI inform counselling and decisions about subsequent mode of birth.[6, 7]

Clinical examination immediately after vaginal birth remains central to OASI detection. Current international guidance recommends systematic inspection of the perineum together with digital rectal examination (DRE) when assessing the extent of perineal trauma.[2, 8] However, accurate diagnosis depends not only on performing an examination, but also on the examiner's ability to recognise sphincter involvement, classify the injury correctly and understand the limitations of clinical assessment. OASI may be under-classified or remain unrecognised at birth, particularly when internal anal sphincter involvement or less apparent sphincter disruption is not identified.[9, 10] Imaging studies have shown that sphincter defects identified after delivery may represent injuries that were already present but were not recognised during the initial clinical assessment.[2] Failure to recognise the full extent of an injury may prevent appropriate classification, repair and subsequent follow-up.

Variation in OASI recognition is not solely a question of access to diagnostic technology. Provider knowledge, clinical experience, training and local care pathways all influence how perineal trauma is assessed and managed. Surveys from different healthcare systems have identified substantial variation in clinicians' knowledge of OASI classification, use of DRE, confidence in diagnosis, training opportunities and adherence to clinical guidance.[9, 11–16] More recent studies continue to demonstrate variation in training and clinical exposure, suggesting that these gaps persist even in healthcare systems with established OASI guidance.[17] Importantly, educational and quality improvement initiatives can improve knowledge and clinical practice, supporting the role of training and institutional systems in improving OASI care.[18–21]

Despite growing attention to OASI recognition and the publication of updated international guidance, evidence on provider knowledge and diagnostic practice across Middle Eastern maternity settings remains limited.[2] Meanwhile, understanding these practices is important before assuming that

recommendations developed in well-resourced or highly standardised maternity systems are properly implemented across different healthcare settings. In particular, little is known about the relationship between providers' clinical experience, training, use of diagnostic examination, access to guidance and their understanding that OASI may remain missed during routine clinical assessment.

We therefore conducted a multicountry cross-sectional survey of maternity care providers across seven Middle Eastern countries to assess gaps in OASI-related knowledge and diagnostic practice and to identify factors associated with awareness of injuries that may go unrecognised during routine clinical assessment.

Methods

Study design and participants

We conducted a multicountry cross-sectional online survey of maternity care providers across seven Middle Eastern countries: Bahrain, Egypt, Jordan, Kuwait, Lebanon, Saudi Arabia and the United Arab Emirates. Eligible participants were obstetricians, midwives and obstetric nurses directly involved in vaginal birth care and in the assessment or management of complications associated with vaginal birth, including OASI.

As no reliable estimate of the prevalence of OASI-related knowledge or diagnostic practices among maternity care providers in the participating countries was available, a conservative prevalence estimate of 50% was used for sample size calculation. Assuming a 95% confidence level and a 5% margin of error, the minimum required sample size was 385 participants. The final sample comprised 530 completed questionnaires, exceeding the minimum calculated sample size.

A non-probability purposive sampling approach was used to recruit maternity care providers from different professional groups and healthcare settings. Participants were approached through healthcare institutions, professional networks and societies, institutional email lists and social media groups for healthcare professionals in the participating countries. The survey was open from August 2024 to February 2025, with reminders circulated every two weeks during the recruitment period. Participation was voluntary, and no financial or other incentives were offered.

Questionnaire development and content

The study-specific questionnaire was developed collaboratively by two obstetricians with clinical and research experience in OASI. Its content was informed by a review of the relevant literature, current clinical guidelines and previously published surveys examining OASI knowledge, diagnosis, management and training. The two obstetricians reviewed and refined the questions through discussion to ensure that they were clinically relevant, clearly worded and covered the main areas of interest. The questionnaire collected information on demographic and professional characteristics, maternity care practice, OASI-

related knowledge, diagnostic assessment and management, training and education, interdisciplinary collaboration, and the availability of institutional or national policies and guidelines. It was developed and administered in English, which is widely used in medical education and professional healthcare communication across the participating settings.

The questionnaire included multiple-choice, Likert-scale and open-ended items. One item asked respondents whether they were aware of 'occult OASI', terminology used in the questionnaire at the time of study design. Respondents answering affirmatively were asked to provide a brief definition. In accordance with current terminology, the present manuscript refers to these injuries as OASI that may remain unrecognised during clinical assessment, except when reporting the wording of the original questionnaire. The final questionnaire is provided in Additional File 1.

Data collection and ethics

The questionnaire was administered electronically using Google Forms. Electronic informed consent was obtained before participants could proceed to the survey. Responses were collected confidentially, and no financial or other incentives were offered.

Ethical approval

was obtained from the Research and Ethics Committee of the College of Medicine and Health Sciences, Arabian Gulf University (E42-PI-03-24). The study was conducted in accordance with the Declaration of Helsinki and applicable institutional ethical standards.

Outcomes

The primary outcome was self-reported awareness of OASI that may remain unrecognised during routine clinical assessment, based on responses to the questionnaire item referring to 'occult OASI'.

Other variables of interest included awareness of the Sultan classification; reported use of DRE and endoanal ultrasound (EUS) for OASI assessment; perceived sufficiency of DRE for OASI detection; confidence in DRE; previous OASI-specific and DRE training; and reported availability of institutional or national OASI guidelines. Provider and institutional characteristics included professional role, years of clinical experience and healthcare setting.

Statistical analysis

Data were initially reviewed and cleaned in Microsoft Excel and subsequently exported to IBM SPSS Statistics, version 29 (IBM Corp., Armonk, NY, USA) for analysis. Categorical variables were summarised as frequencies and percentages. Ordinal variables were summarised according to their original response

categories. Continuous variables, where applicable, were summarised using appropriate measures of central tendency and dispersion according to their distribution.

Differences in OASI-related knowledge and diagnostic practices between professional groups were examined using chi-square tests for categorical variables. DRE confidence was analysed by response category and was also compared between consultant obstetricians and resident obstetric trainees using the Mann-Whitney U test. Associations between OASI-specific training and awareness of the Sultan classification, between formal DRE training and confidence in DRE accuracy or routine DRE, and between confidence in DRE accuracy and routine DRE were examined using chi-square tests.

Multivariable logistic regression was used to identify factors independently associated with self-reported awareness of OASI that may remain unrecognised during routine clinical assessment. Candidate variables were selected based on clinical relevance and the study objectives and included institution type, professional role, clinical experience, awareness of the Sultan classification, availability of institution-specific OASI training, confidence in the accuracy of DRE for detecting OASI, perceived sufficiency of DRE for OASI detection, perceived adequacy of OASI training, type of DRE training, interdisciplinary collaboration, and availability of national or institutional OASI guidelines. The DRE accuracy-confidence variable was dichotomised as lower confidence (not at all confident, not confident, or neutral) versus higher confidence (confident or extremely confident). Reference categories were government institution, physician, 7 years or less of clinical experience, no awareness of the Sultan classification, no OASI specific training, lower confidence in DRE accuracy, DRE not considered sufficient, inadequate training, non-formal DRE training, inadequate interdisciplinary collaboration, and no national or institutional OASI guidelines. Multicollinearity was assessed using the correlation matrix of candidate predictors; all pairwise coefficients were below 0.30 (maximum $r = 0.294$). Complete-case analysis was used, with no imputation. Unadjusted odds ratios were not calculated. Associations were expressed as adjusted odds ratios (aORs) with 95% confidence intervals (CIs). Model fit was assessed using the Hosmer-Lemeshow test and Nagelkerke R^2 . A two-sided p value < 0.05 was considered statistically significant.

Open-ended definitions provided by respondents who reported awareness of OASI described in the questionnaire as 'occult OASI' were coded by two reviewers using an agreed binary rule. A definition was considered correct if it clearly identified an anal sphincter injury or defect that was missed or not recognised during the initial clinical assessment at delivery. Blank and non-evaluable responses were excluded from the available response denominator. Responses entered by participants who answered 'No' to the awareness question were also excluded. Inter-rater agreement was assessed using percentage agreement and Cohen's kappa, with consensus review planned for any disagreement.

The relationship between reported intrapartum OASI screening practice and routine DRE after vaginal birth was assessed using a chi-square test of independence. Respondents selecting 'Do not know' for screening practice were excluded from this cross-tabulation. Other open-ended responses concerning perceived barriers to OASI care were coded manually, grouped thematically and summarised

descriptively. Because a response could contain more than one barrier, multiple categories could be assigned to a single response.

The extent of missing data was assessed for the principal variables and outcomes. Multivariable analyses used complete-case analysis.

The study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for cross-sectional studies.

Results

Participant characteristics

A total of 530 maternity care providers from seven Middle Eastern countries completed the survey. Consultant obstetricians constituted the largest professional group (332/530, 62.6%), followed by midwives (97/530, 18.3%), resident obstetric trainees (73/530, 13.8%) and obstetric nurses (28/530, 5.3%). Participants represented Bahrain, Egypt, Jordan, Kuwait, Lebanon, Saudi Arabia and the United Arab Emirates and worked across government, university and private healthcare settings. Their demographic and professional characteristics are summarized in Table 1.

Table 1
Participant characteristics (n = 530).

Characteristic	N	%
Country of practice		
Bahrain	120	22.6
Egypt	120	22.6
Jordan	120	22.6
Lebanon	60	11.4
Kuwait	60	11.4
UAE	25	4.7
Saudi Arabia	25	4.7
Institution Type		
Government hospitals	214	40.4
University hospital	187	35.3
Private hospital	129	24.3
Professional Role		
Consultant obstetrician	332	62.6
Midwife	97	18.3
Resident obstetric trainee	73	13.8
Obstetric nurse	28	5.3

Diagnostic practices for OASI

Reported approaches to OASI assessment varied considerably (Table 2). Routine assessment of OASI risk factors during vaginal birth was reported by 233/530 respondents (44.0%). Among respondents reporting that risk factors were not routinely assessed, 155/297 (52.2%) indicated that assessment was generally prompted by clinical suspicion, including visible perineal trauma, episiotomy, complicated delivery, perineal swelling or vaginal bleeding.

Table 2
Key diagnostic practice and knowledge findings (n = 530).

Section / Question	Response	N	%
I- General Obstetric Practice			
1. Are OASI risk factors assessed as standard for every woman giving vaginal birth in your hospital/clinic?	No	297	56.0
	Yes	233	44.0
2. Does your hospital have a protocol for perineal protection during delivery?	No	173	32.6
	Yes	357	67.4
II- Detection and Management of OASI			
1. How is OASI typically screened intrapartum in your practice?	No screening, examination only when suspicion of OASI	254	47.9
	Screening with DRE	266	50.1
	Do not know	10	2.0
2. How is OASI typically assessed postpartum in your practice?	DRE	416	78.4
	EUS	76	14.4
	MRI	15	2.8
	Do not know	23	4.4
3. Do you consider DRE a sufficient diagnostic tool for intrapartum OASI detection?	No	208	39.2
	Yes	322	60.8
4. Is DRE performed on every woman giving birth vaginally?	No	191	36.0
	Yes	339	64.0
5. How frequently is endoanal ultrasound used for OASI assessment in the postpartum follow-up of women with OASI in your institution?	Rarely	179	33.7
	Never	170	32.1
	Sometimes	134	25.3
	Often	40	7.6
	Always	7	1.3
6. What training do practitioners receive for detecting OASI via DRE?	Formal training	253	47.8
	No specific training	132	24.9
	On-the-job training	145	27.3
7. What types of surgical repairs are offered for OASI in your hospital?	Primary repair	460	86.7

Section / Question	Response	N	%
	Late repair	18	3.4
	Secondary repair/ Sphincteroplasty	26	5.0
	Referral to a specialized center	17	3.3
	Do not know	9	1.6
8. How and when are patients who have had OASI typically informed about their condition?	Verbal explanation by an obstetrician or midwife conducting delivery immediately postpartum	246	46.5
	Verbal explanation by a supervising senior gynecologist immediately postpartum	245	46.2
	Referral to a specialist for a detailed explanation	25	4.7
	Written Materials	14	2.6
9. What immediate postpartum care measures are typically provided to patients following OASI?	Perineal Care instructions (e.g., hygiene practices, wound care)	118	22.3
	Pain management options (e.g., medications, local infiltration anesthesia)	141	26.6
	Administration of laxatives	80	15.1
	Application of ice packs	77	14.5
	Dietary recommendations	28	5.3
	Counseling on potential complications (e.g., infection, fecal incontinence)	46	8.6
	Referral to pelvic floor physiotherapy	12	2.3
	All	28	5.3
10. How do you follow up with patients after OASI repair?	In-person visits with EUS monitoring and anorectal manometry	160	30.2
	Symptoms assessment by Telemedicine	103	19.5
	Follow-up and rectal examination	21	4.0
	In-person visits without EUS monitoring	240	45.3
	Follow up in the clinic	6	1.1

Section / Question	Response	N	%
11. Do you believe that patients commonly perceive OASI because of a doctor's / midwife's action or inaction?	No	176	33.2
	Yes	354	66.8

DRE was the most commonly reported method of postpartum OASI assessment (416/530, 78.4%). Endoanal ultrasound (EUS) and magnetic resonance imaging (MRI) were reported by 76/530 (14.4%) and 15/530 (2.8%), respectively. Despite the limited use of imaging, 322/530 respondents (60.8%) considered DRE alone sufficient for OASI detection. EUS was also infrequently used during postpartum follow-up, with 349/530 respondents (65.8%) reporting that it was rarely or never used.

Training in DRE varied: 253/530 respondents (47.8%) reported formal training, 145/530 (27.3%) reported learning through clinical practice or on-the-job training, and 132/530 (24.9%) reported no specific DRE training.

Reported intrapartum screening practice was significantly associated with routine DRE after vaginal birth. Among respondents reporting screening with DRE, 206/266 (77.4%) also reported routine DRE after every vaginal birth, compared with 130/254 (51.2%) of those reporting examination only when OASI was suspected ($\chi^2(1, N = 520) = 39.20, p < 0.001$). However, the responses were not fully aligned: 60/266 (22.6%) of those reporting screening with DRE did not report routine DRE, while 130/254 (51.2%) of those reporting examination only when OASI was suspected nevertheless reported routine DRE. The corresponding cross-tabulation is presented in Additional file 2 (Supplementary Table S1).

OASI-related knowledge, training and clinical guidance

Substantial variation was also observed in OASI-related knowledge and access to training and clinical guidance (Table 3). Only 196/530 respondents (37.0%) reported awareness of the Sultan classification. Awareness of injuries described in the original questionnaire as 'occult OASI' was reported by 161/530 respondents (30.4%).

Table 3
Training and education of obstetric care providers (n = 530).

Questions on training and education	Response	N	%
1. Are you aware of the recent Sultan classification of OASI?	No	334	63.0
	Yes	196	37.0
2. Do you know about 'Occult OASI after vaginal delivery?'	No	369	69.6
	Yes	161	30.4
3. Who repairs OASI in your institution?	Any obstetrician in the labor room	184	34.7
	Colorectal surgeon	37	7.0
	Consultant obstetrician only	309	58.3
4. Does your institution provide specific training on OASI management?	No	314	59.2
	Yes	216	40.8
5. How adequate do you feel the current training is for managing OASI? [5-point Likert scale from Very Inadequate (1) to Very Adequate (5)]	Very inadequate	65	12.3
	Inadequate	89	16.8
	Neutral	212	40.0
	Adequate	100	18.9
	Very Adequate	64	12.1
6. Do you think there is adequate interdisciplinary collaboration in obstetric care between the Obstetrics and Colorectal Surgery departments at your institution?	No	263	49.6
	Yes	267	50.4
7. Are there national or institutional guidelines for the management of OASI in your country?	No	374	70.6
	Yes	156	29.4

Of the 161 respondents who reported awareness, 60 did not provide a definition, leaving 101 submitted open-text entries. Four entries were non-evaluable because they contained only a punctuation mark, 'don't know', or 'none', leaving 97 evaluable definitions. Of these, 63/97 (64.9%) met the agreed definition as stated above; 34/97 (35.1%) did not meet this criterion. This corresponds to 63/101 (62.4%) of all submitted entries and 63/161 (39.1%) of all respondents who reported awareness. The two reviewers agreed on all 97 evaluable definitions after applying the final rule (100% agreement; Cohen's kappa = 1.000), and no consensus changes were required. Six participants who answered 'No' to the awareness question entered text in the follow-up field; these entries were excluded from the analysis.

Institution-specific training in OASI management was reported by 216/530 respondents (40.8%), while 156/530 (29.4%) reported the availability of national or institutional OASI guidelines.

Differences by professional group and clinical experience

OASI-related knowledge and diagnostic practices differed between professional groups (Tables 4 and 5). Compared with midwives and obstetric nurses (n = 125), obstetricians (consultants and resident trainees; n = 405) were more likely to report performing DRE after every vaginal birth (69.1% vs 47.2%, $p < 0.001$), awareness of the Sultan classification (41.7% vs 21.6%, $p < 0.001$), and awareness of OASI that may remain unrecognised during routine clinical assessment (33.8% vs 19.2%, $p = 0.002$). Institution-specific OASI training was also reported more frequently by obstetricians than by midwives and obstetric nurses (43.2% vs 32.8%, $p = 0.048$).

Table 4

Comparison of OASI-related practice and knowledge between obstetricians (n = 405) and nursing providers (n = 125).

Question	Category	Obstetricians (n = 405)	Nursing providers (n = 125)	P- Value
1. Is DRE performed on every woman giving birth vaginally?	No	125 (30.9%)	66 (52.8%)	< 0.001
	Yes	280 (69.1%)	59 (47.2%)	
2. Are you aware of the recent Sultan classification of OASI?	No	236 (58.3%)	98 (78.4%)	< 0.001
	Yes	169 (41.7%)	27 (21.6%)	
3. Do you know about "Occult OASI after vaginal delivery"	No	268 (66.2%)	101 (80.8%)	0.002
	Yes	137 (33.8%)	24 (19.2%)	
4. Does your institution provide specific training on OASI management?	No	230 (56.8%)	84 (67.2%)	0.048
	Yes	175 (43.2%)	41 (32.8%)	

Table 5

Comparison of OASI-related knowledge and confidence between consultant obstetricians (n = 332) and resident obstetric trainees (n = 73).

Question	Category	Role		P-Value
		Consultant obstetricians (n = 332)	Resident obstetric trainees (n = 73)	
1. How confident are you in the accuracy of digital rectal examination for detecting OASI? (5-point Likert scale from Not at all confident to Extremely confident)	Not at all confident	13 (3.9%)	5 (6.8%)	< 0.01
	Not confident	22 (6.6%)	17 (23.3%)	
	Neutral	103 (31.0%)	31 (42.5%)	
	confident	139 (41.9%)	11 (15.1%)	
	Extremely confident	55 (16.6%)	9 (12.3%)	
2. Are you aware of the recent Sultan classification of OASI?	No	185 (55.7%)	51 (69.9%)	0.035
	Yes	147 (44.3%)	22 (30.1%)	
3. Do you know about "Occult OASI after vaginal delivery"?	No	211 (63.6%)	57 (78.1%)	0.02
	Yes	121 (36.4%)	16 (21.9%)	

Differences were also observed between consultant obstetricians and resident obstetric trainees (Table 5). Confidence in the accuracy of DRE for detecting OASI was significantly higher among consultants than resident trainees (Mann-Whitney U = 8145, Z = -4.604, $p < 0.001$). Consultants were also more likely than resident trainees to report awareness of the Sultan classification (147/332, 44.3% vs 22/73, 30.1%; $p = 0.035$) and awareness of OASI that may remain unrecognised during routine clinical assessment (121/332, 36.4% vs 16/73, 21.9%; $p = 0.020$).

Participants with access to OASI-specific training were more likely to report awareness of the Sultan classification than those without such training (111/216, 51.4% vs 85/314, 27.1%; $\chi^2(1) = 32.47$, $p < 0.001$). Formal DRE training was associated with higher confidence in the accuracy of DRE for detecting OASI (55.7% vs 45.6%; $\chi^2(1) = 5.41$, $p = 0.020$) and with more frequent routine DRE after vaginal birth (70.0% vs 59.3%; $\chi^2(1) = 6.53$, $p = 0.011$). Confidence in DRE accuracy was higher among participants who routinely performed DRE than among those who did not, although this difference was not statistically significant (52.8% vs 45.5%; $\chi^2(1) = 2.57$, $p = 0.109$).

Factors associated with awareness of clinically unrecognised OASI

In multivariable logistic regression, several factors were independently associated with self-reported awareness of OASI that may remain unrecognised during routine clinical assessment (Table 6). Awareness of the Sultan classification was associated with greater odds of self-reported awareness of clinically unrecognised OASI (aOR 2.20, 95% CI 1.42–3.39; $p < 0.001$). Higher confidence in the accuracy of DRE for detecting OASI (aOR 2.14, 95% CI 1.35–3.39; $p = 0.001$), more than seven years of clinical experience (aOR 1.77, 95% CI 1.14–2.74; $p = 0.011$), and reported availability of national or institutional OASI guidelines (aOR 2.68, 95% CI 1.71–4.19; $p < 0.001$) were also independently associated with greater awareness. In contrast, respondents who considered DRE sufficient for OASI detection had lower odds of reporting awareness of clinically unrecognised OASI (aOR 0.44, 95% CI 0.28–0.69; $p < 0.001$).

Table 6

Multivariable logistic regression of factors associated with awareness of OASI that may remain clinically unrecognised

Predictor variable	Adjusted OR	95% CI	P - value
I - Demographics and Professional Characteristics			
1. Institution type (non-government vs government)	0.89	0.57–1.36	0.579
2. Role (non-physician vs physician)	0.61	0.35–1.05	0.074
3. Clinical experience (> 7 years)	1.77	1.14–2.74	0.011
II – Knowledge, Training, and Practice			
4. Awareness of Sultan Classification (yes)	2.20	1.42–3.39	< 0.001
5. Institution provides OASI-specific training (yes)	1.15	0.71–1.84	0.574
6. Higher confidence in the accuracy of DRE for detecting OASI	2.14	1.35–3.39	0.001
7. DRE considered a sufficient diagnostic tool for intrapartum OASI detection (yes)	0.44	0.28–0.69	< 0.001
8. Respondents perceived adequacy of training	0.62	0.37–1.04	0.067
9. Type of training received (formal vs non-formal)	0.76	0.49–1.16	0.197
10. Adequate interdisciplinary collaboration (Obstetrician–Colorectal)	1.43	0.92–2.23	0.115
11. Availability of national or institutional OASI guidelines (yes)	2.68	1.71–4.19	< 0.001
Model fit: Hosmer–Lemeshow $p = 0.387$; Nagelkerke $R^2 = 0.225$.			

Institution type, professional role, institution-specific OASI training, perceived adequacy of OASI training, type of DRE training and interdisciplinary collaboration were not independently associated with awareness after adjustment (all $p > 0.05$; Table 6). Model fit statistics were Hosmer–Lemeshow $p = 0.387$ and Nagelkerke $R^2 = 0.225$.

Reported barriers to OASI care

A total of 415/530 respondents (78.3%) provided an open-ended response regarding challenges in OASI management. Difficulty in diagnosis was the most frequently reported barrier (104/415, 25.1%), followed

by lack of training or clinical experience (94/415, 22.7%). Responses were coded manually, and more than one barrier could be assigned to a response.

Discussion

This multicountry survey identified important gaps in OASI-related knowledge and diagnostic practice among maternity care providers across seven Middle Eastern countries. Although DRE was widely used for postpartum assessment, approximately three in five respondents considered DRE alone sufficient for OASI detection, while awareness of the Sultan classification and of the possibility that sphincter injury may remain unrecognised during routine clinical assessment was limited. Fewer than half of respondents reported institution-specific OASI training, and fewer than one-third reported access to institutional or national guidance. Importantly, greater confidence in the accuracy of DRE for detecting OASI, longer clinical experience, awareness of the Sultan classification and reported availability of OASI guidelines were independently associated with greater awareness of clinically unrecognised OASI, whereas considering DRE sufficient for OASI detection was associated with lower awareness. Together, these findings suggest that the challenge is not simply whether clinical examination is performed, but whether providers have the knowledge, experience and organisational support required to interpret its findings appropriately and recognise the limitations of clinical assessment.

A particularly important finding was the contrasting association between confidence in the accuracy of DRE for detecting OASI and the belief that DRE alone is sufficient for OASI detection. Higher confidence in DRE accuracy was independently associated with greater awareness of clinically unrecognised OASI, whereas considering DRE sufficient for detection was associated with substantially lower awareness. This distinction is clinically important. DRE remains an essential component of systematic examination following vaginal birth and is recommended in current international guidance.[2] Our findings therefore do not question the value of DRE. Instead, they suggest that confidence in the diagnostic accuracy of DRE and the belief that DRE alone is sufficient to exclude sphincter injury represent distinct dimensions of diagnostic knowledge. The latter may indicate over-reliance on clinical examination and incomplete recognition of its limitations.

This interpretation is consistent with evidence that the extent of anal sphincter injury may be underestimated at birth. Roper et al. demonstrated that OASI may be under-classified, while O'Leary et al. showed that internal anal sphincter injury may remain unrecognised following vaginal delivery.[9, 10] Current international guidance similarly recognises that defects historically described as 'occult' frequently represent injuries that were not identified clinically at delivery.[2] These diagnostic challenges, including the limitations of clinical examination and the potential role of adjunctive diagnostic methods, have also been discussed from a urogynaecology perspective.[22] Accurate diagnosis therefore requires both competent clinical examination and awareness of its limitations, including recognition of situations in which further evaluation may be warranted. This is clinically relevant because increasing OASI severity, particularly involvement of the internal anal sphincter, is associated with a greater subsequent risk of anal incontinence.[23]

Although 30.4% of respondents reported familiarity with injuries described as 'occult OASI' in the original questionnaire, only 63/161 (39.1%) of those reporting awareness provided a definition demonstrating the core concept of an anal sphincter injury or defect missed or not recognised during the initial clinical assessment at delivery. Among the 97 evaluable definitions, 63 (64.9%) met this criterion. Thus, self-reported familiarity should not be assumed to represent clinical understanding. Educational interventions should strengthen understanding of how injuries may be missed, the limitations of clinical assessment, and the role of further evaluation where indicated.

Clinical experience was independently associated with greater awareness of clinically unrecognised OASI. Respondents with more than seven years of clinical experience had higher odds of awareness, while consultant obstetricians also reported greater awareness of the Sultan classification and of clinically unrecognised OASI than resident trainees. Differences in confidence in DRE accuracy were also observed between these groups. These findings are consistent with previous evidence showing variation in exposure to OASI diagnosis and management during professional training.[11, 17, 24] Clinical experience may contribute to greater familiarity with sphincter injury assessment; however, opportunities to encounter, recognise and manage OASI are likely to vary between clinicians and institutions. Structured education may therefore be important in reducing dependence on variable clinical exposure. Recent studies suggest that targeted teaching, simulation and structured training can improve OASI-related knowledge and clinical skills.[20, 21, 25]

The association between clinical guidance and awareness is also noteworthy. Only 29.4% of respondents reported the availability of national or institutional OASI guidelines, yet reported guideline availability was independently associated with greater awareness of clinically unrecognised OASI. The cross-sectional design does not establish that access to guidelines improves knowledge, and guideline availability was self-reported rather than independently verified. Nevertheless, this association suggests that OASI-related knowledge may reflect not only individual clinical experience but also the organisational context in which maternity care is delivered. Surveys from other healthcare settings have similarly documented variation in OASI training, clinical practice and implementation of guidance.[11–15] Quality improvement programmes further suggest that structured approaches combining education, standardised assessment and implementation support can influence clinical practice.[18, 19]

Access to training showed a somewhat different pattern. Fewer than half of respondents reported institution-specific OASI training, and training availability was not independently associated with awareness of clinically unrecognised OASI in the multivariable model. However, OASI-specific training was associated with greater awareness of the Sultan classification, while formal DRE training was associated with greater confidence in DRE accuracy and more frequent routine DRE after vaginal birth. These findings suggest that training may be associated with specific knowledge and practice measures even though its availability was not independently associated with the primary outcome. Importantly, the survey did not characterise training content, intensity, frequency, recency or formal competency assessment.

Reported intrapartum screening practice was significantly associated with routine DRE after vaginal birth, suggesting some consistency between the two practice measures. However, the responses were not fully aligned, which may reflect different interpretations of 'screening' and 'routine examination', variation between stated policy and individual practice, or inconsistent implementation within institutions. Clearer terminology, standardised postpartum examination protocols and training that distinguishes routine assessment from suspicion-triggered examination may therefore improve consistency in diagnostic practice.

In a UK national survey of 302 obstetric physicians, Roper et al. found that knowledge of standard OASI classification was generally high, although training exposure remained variable and approximately one in five respondents reported no previous training in obstetric perineal trauma.[26] In the present study, only 37.0% of respondents reported awareness of the Sultan classification. Although direct comparison is limited by differences in study populations and methods of knowledge assessment, this contrast suggests that gaps in OASI education may concern both access to training and the translation of training into core diagnostic knowledge.

These findings also have implications for how OASI rates are interpreted as indicators of maternity care quality. Differences in reported incidence may reflect not only underlying obstetric risk but also variation in how consistently sphincter injuries are sought, recognised, classified and documented. Increased detection should therefore not automatically be interpreted as poorer obstetric performance; it may instead indicate greater clinical vigilance and more reliable recognition of injury.[3] Our results add a provider perspective to this concept. Variation in clinicians' knowledge of classification, understanding of diagnostic limitations and access to training or guidance may contribute to variation in recorded OASI rates between institutions and healthcare systems.

The findings help to define priorities for educational and quality improvement initiatives. They do not support replacing systematic clinical examination with routine specialist imaging, nor can this survey determine whether wider access to any specific diagnostic technology would improve outcomes. The immediate priority is to ensure that maternity care providers can perform appropriate clinical assessment, recognise and classify sphincter injury, understand the limitations of clinical examination, and identify situations in which further evaluation is warranted. Training should therefore be competency-based and should assess knowledge and diagnostic reasoning in addition to self-reported confidence. Current international guidance provides an evidence-based framework for this approach, although implementation will need to reflect local resources, professional roles and referral pathways.[2] Alongside these improvements in clinical assessment, emerging objective diagnostic approaches may provide an additional diagnostic layer where clinical examination alone does not reliably identify or exclude sphincter injury. Recent prospective studies of machine learning-assisted impedance spectroscopy have shown promising diagnostic performance immediately postpartum as an adjunct to clinical assessment; however, further evaluation of its role within diagnostic pathways and its impact on clinically meaningful outcomes is required.[27, 28]

Strengths and limitations

This study has several strengths. It included a relatively large, multiprofessional sample of 530 maternity care providers from seven Middle Eastern countries and examined OASI-related knowledge and diagnostic practice across different professional roles and healthcare settings. The questionnaire addressed multiple components relevant to OASI recognition, including clinical assessment, knowledge of injury classification, training, clinical experience and access to institutional or national guidance. In addition to descriptive comparisons between professional groups, the study used multivariable analysis to examine factors independently associated with awareness of OASI that may remain unrecognised during routine clinical assessment. The inclusion of an open-ended question also provided an opportunity to distinguish self-reported awareness from demonstrated understanding of this concept.

Several limitations should also be considered. First, participants were recruited using non-probability purposive sampling through participating institutions, professional networks, medical societies, email and social media. The total number of potentially eligible providers who received or encountered the survey invitation could not be determined, precluding calculation of a conventional response rate. Participation may therefore have been influenced by interest in OASI or perineal trauma, introducing selection bias. In addition, the number of respondents varied between countries, and the sample was not designed to be nationally representative within individual countries or representative of the Middle East as a whole. The findings should therefore be interpreted as describing patterns within this multicountry sample rather than population prevalence estimates for maternity care providers across the region.

Second, the study relied primarily on self-reported knowledge, training and clinical practice. Responses may therefore be affected by recall and social desirability bias and may not correspond directly to observed clinical behaviour or institutional practice. Reported availability of guidelines and training was not independently verified, and the survey did not characterise the content, duration, frequency or quality of OASI-specific training. Similarly, measures of confidence should not be interpreted as objective measures of clinical competence. These limitations are particularly relevant when interpreting associations between provider characteristics, organisational factors and reported diagnostic practice.

Third, the questionnaire was developed specifically for this study by two obstetricians, based on the relevant literature, clinical guidelines and previously published surveys. Although its content and wording were reviewed and refined by the investigators, it was not subjected to formal psychometric validation. The survey was administered in English across participating countries, and differences in interpretation of individual questions cannot be excluded.

Fourth, the original questionnaire used the term 'occult OASI'. More recent international guidance indicates that sphincter defects historically described as occult frequently represent injuries that were not recognised clinically at delivery rather than a distinct category of inherently undetectable injury.[2] We therefore use the term clinically unrecognised OASI in the present manuscript while retaining the

original questionnaire terminology where necessary for transparency. The brief responses and absence of a formally validated scoring instrument may have led to some misclassification.

Finally, the cross-sectional design allows identification of associations but cannot establish their direction or causality. For example, the association between guideline availability and greater awareness does not demonstrate that access to guidelines caused greater knowledge, and greater clinical experience may be associated with other unmeasured characteristics. Residual confounding therefore remains possible despite multivariable adjustment. Institutional characteristics were also reported by individual respondents rather than obtained from independently verified institutional data, and more than one respondent may have represented the same institution. Such variables should therefore be interpreted as respondent-reported characteristics of the clinical environment rather than independent facility observations.

Conclusions

This multicountry survey identified important gaps between reported OASI diagnostic practice, provider knowledge and understanding of the limitations of clinical assessment. Although DRE was widely used, awareness of OASI classification and of injuries that may remain unrecognised during routine clinical assessment was limited. Greater confidence in the accuracy of DRE, longer clinical experience, awareness of the Sultan classification and reported availability of OASI guidelines were independently associated with greater awareness of clinically unrecognised OASI, whereas considering DRE sufficient for OASI detection was associated with lower awareness.

Improving OASI detection therefore requires more than ensuring that postpartum clinical examination is performed. The discrepancy between self-reported awareness and demonstrated understanding further highlights the need to strengthen clinically relevant knowledge and diagnostic reasoning. Maternity care providers need to recognise sphincter injury, classify it appropriately and understand when clinical assessment may not be sufficient to exclude injury. Structured, competency-based education supported by clear clinical guidance may help address these gaps and promote more consistent recognition of OASI across maternity care settings.

Abbreviations

aOR

Adjusted odds ratio

CI

Confidence interval

DRE

Digital rectal examination

EUS

Endoanal ultrasound

MRI

Magnetic resonance imaging

OASI

Obstetric anal sphincter injury

STROBE

Strengthening the Reporting of Observational Studies in Epidemiology

UAE

United Arab Emirates

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Research and Ethics Committee of the College of Medicine and Health Sciences, Arabian Gulf University (approval number: E42-PI-03-24). The study was conducted in accordance with the Declaration of Helsinki and applicable institutional ethical standards. Participation was voluntary, and electronic informed consent to participate was obtained from all participants before they completed the online questionnaire.

Clinical trial number

Clinical trial number: not applicable.

Patient and public involvement

Patients and members of the public were not involved in the design, conduct, reporting, or dissemination plans of this study, as the study population comprised obstetric care providers.

Consent for publication

Not applicable

Availability of data and materials

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests, except for K.B., who is the founder and a shareholder of OASIS Diagnostics S.A., a company developing diagnostic technologies for the detection of obstetric anal sphincter injuries.

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Authors' contributions

D.R.: Conceptualization, Funding acquisition, Methodology, Supervision, Writing – review and editing.

A.E.: Investigation, Project administration, Writing – original draft, Writing – review and editing.

H.A.: Data curation, Formal analysis, Investigation, Validation.

K.K.: Data curation, Methodology, Validation.

K.B.: Conceptualization, Methodology, Supervision, Writing – review & editing.

Declaration of Generative AI

During the preparation of this manuscript, Grammarly, NotebookLM, and ChatGPT were used for grammar, language refinement, and manuscript organisation. The authors reviewed and edited the content and take full responsibility for the final manuscript.

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