www.journalmsr.com

الجمعية السعودية لجراحة العظام
Saudi Orthopedic Association

Journal of Musculoskeletal Surgery and Research

*Original Article*

# Knowledge, attitude, and practice of primary care physicians about developmental dysplasia of the hip in a tertiary referral hospital in Riyadh, Saudi Arabia

Tariq N. Alotaibi, MBBS.[1], Ayman H. Jawadi, MD.[1], Abdullah A. Alghamdi, MD.[2], Sarah A. Aldeghaither, MBBS.[1], Ali A. Alhandi, MBBS.[1]

Departments of [1]Surgery, Division of Orthopedic Surgery and [2]Family Medicine, King Abdulaziz Medical City-Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia.

***Corresponding author:**
Tariq N. Alotaibi,
Department of Surgery,
Division of Orthopedic Surgery,
King Abdulaziz Medical City-Ministry of National Guard Health Affairs, Riyadh,
Saudi Arabia.

alotaibiitariq@gmail.com

Received : 31 July 2021
Accepted : 01 October 2021
EPub Ahead of Print: 01 Nov 2021
Published : 13 November 2021

**DOI**
10.25259/JMSR_94_2021

**Quick Response Code:**

## ABSTRACT

**Objectives:** The aim of the study was to determine the current knowledge, attitude, and practice of developmental dysplasia of the hip (DDH) management among primary care physicians (PCP) in Saudi Arabia.

**Methods:** A cross-sectional study on PCP from a single health-care system in Riyadh, Saudi Arabia, was conducted using a survey questionnaire to evaluate the medical knowledge, attitude, and current practice in the clinics, including diagnosis and screening skills.

**Results:** Sixty-five PCPs participated in the survey, 32 (49.2%) were general practitioners and 33 (50.8%) were fellows and consultants. Only six physicians (9.2%) had formal training on DDH management. Twenty respondents (30.8%) had poor knowledge, while 45 (69.2%) had sufficient knowledge of DDH. Most of the respondents believed in the importance of asking about risk factors, the presence of DDH screening protocols and community awareness, and 89.2% of the respondents believed they need to go for further training about DDH. Fifty-nine respondents (90.8%) would refer a DDH case to an orthopedic surgeon when there are positive findings by a radiograph or ultrasound. Forty-two (64.6%) never examined the hip for DDH, and 30 (46.2%) never referred a DDH case.

**Conclusion:** Knowledge of DDH among our PCP directly involved in the screening and management of DDH is sufficient. However, there is a discordance between knowledge to attitude and practice.

**Keywords:** Developmental dysplasia of the hip, DDH, Knowledge, Attitude, Practice, Primary care physician

## INTRODUCTION

Developmental dysplasia of the hip (DDH) is a term that represents a broad spectrum of hip abnormalities such as acetabular dysplasia, subluxation, and true dislocation, which manifests as an unstable hip.[1,2] Incidence of DDH has been reported in developed countries to be around 4–6 cases/1000 live births, although two regional studies reported incidence rates around 3.2~3.5/1000 live births.[2,3] However, both studies were not conducted on a national level and their results cannot be extrapolated to represent the country. Another local study identified the

**How to cite this article:** Alotaibi TN, Jawadi AH, Alghamdi AA, Aldeghaither SA, Alhandi AA. Knowledge, attitude, and practice of primary care physicians about developmental dysplasia of the hip in a tertiary referral hospital in Riyadh, Saudi Arabia. J Musculoskelet Surg Res 2021;5:273-9.

most common risk factors for DDH in the region and showed that positive family history, parents' consanguinity, breech delivery, and baby swaddling are the most common.[4] Some other important risk factors that have been reported in the literature included genetic predisposition, oligohydramnios, breech presentation, female gender, and large birth weight and many other causes related to intra-uterine mechanical constraint.[3-6]

Pathologic hips can be diagnosed early and treated accordingly without long-term sequelae through neonatal screening examination, risk factors assessment, and appropriate imaging modalities.[2,7,8] The treatment aims to reduce the hip joint to avoid associated long-term morbidities, including muscle weakness, degenerative arthritis, chronic pain, and to maximize functional outcome.[8] As such, early detection and proper management at the primary care center are key to prevent further complications of the disease.[9] Active screening for DDH is not generally conducted and the literature provides little evidence of its efficacy.[10-12] This led to a lack of this practice and a drop-in the knowledge regarding proper DDH practices in primary care centers, as shown by Uzel *et al.*[13] Although their study has its regional limitations and cannot be applied to every population, it highlighted what the authors hypothesized regarding the possible misconceptions about proper DDH-related practice in primary care centers and the need for improvement in the knowledge, attitude and practice toward DDH management.[13] Several other studies reported very low knowledge of DDH in more than 50% of healthcare workers, including physicians, nurses and medical students.[14-17] Therefore, we conducted this study to determine the current knowledge, attitude and practice of management of DDH among primary care physicians (PCP) in Saudi Arabia. This will, in turn, provide insight to direct further research and educational efforts.

## MATERIALS AND METHODS

### Study design

This cross-sectional study was conducted on PCP in a single health-care system in Riyadh, Saudi Arabia, that belong to our institute. There are seven different primary health care clinics located in Riyadh, with a total of 110 physicians distributed among these clinics. It is a mixed practice that both adults and children are seen in the primary health care clinics by the same physicians. The study was conducted from March 2019 to December 2020 to evaluate three main aspects of DDH management (the practitioner's medical knowledge, attitude toward its prevalence in the region, and current practice in the clinic, including diagnosis screening and referral skills).

### Instrument description

After a literature review of current practice guidelines, a questionnaire was developed. The survey tool was reviewed by two pediatric orthopedic surgeons for clarity and content. Afterward, the questionnaire was piloted on ten nurses to test for the test-retest validity of the survey tool, and Cronbach's alpha was 0.85.

Closed-ended and multiple-choice questions were used to assess basic medical knowledge (13 questions), Likert scale questions were used to assess attitude toward DDH in the region (9 questions), and multiple-choice questions with open-ended choices when applicable were used to assess current practices in the primary care clinic (five questions).

### Participants' selection and sample size

All Hundred-ten PCPs in our institution were invited to participate in the study. All PCPs who are currently practicing regardless of age, gender, years of experience and professional level (general practitioners [GPs], fellows, consultants) who gave their consent to participate in the study were included in the study. Residents who are still under training were excluded from the study. Consent to participate in the study was taken before filling up the questionnaire. Sixty five (59%) PCPs were responded and included in the study.

### Questionnaire administration

The questionnaire was manually distributed. Each participant was given ample time to answer the questions. Participants were able to answer all the questions within 15 min.

### Data coding and analysis

Data entry was done using Microsoft Excel. The total knowledge score was calculated with 1 point for each correct answer; and 8–13 correct answers (out of 13) were coded as good/sufficient knowledge and 7 and below as poor knowledge). Total attitude score was also calculated and a total score of 5 and above (out of 9) was coded as a good attitude and below 5 as poor attitude. Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS) version 23.0 (SPSS Inc., IBM, Armonk, New York, USA). Descriptive analysis using means and standard deviations was used for numerical data. Counts and percentages were used for categorical data. Associations between total scores multiple demographic variables were assessed using the Chi-square test. Significant differences in the mean total scores were made using the independent *t*-test. $P < 0.05$ was considered statistically significant.

## RESULTS

A total of 65 participated in the survey, 34 (52.3%) males and 31 (47.7%) females. Thirty-two respondents (49.2%) were GPs and 33 (50.8%) were fellows and consultants. Thirty-six respondents (55.4%) received their education from Saudi universities, 8 (12.3%) from western countries, and 21 (32.3%) from other nearby Arab countries. In addition, 13 respondents (20.0%) had experience of 21 years and above in primary health care. Only six participants (9.2%) had formal training on DDH management. [Table 1] shows the detailed demographic profile of the 65 respondents.

### Knowledge

The mean total knowledge score for all 65 respondents was 8.39 ± 1.77. Of the possible 13 correct answers, 20 respondents (30.8%) had a total knowledge score of 7 and below (poor knowledge), and 45 (69.2%) scored 8 and above (sufficient knowledge). There was no significant difference in the knowledge based on gender. There were 22/34 males (48.9%) and 23 of 31 females (51.1%) who had sufficient knowledge of DDH ($P$ = 0.408). According to knowledge grouping, age was not significantly different (respondents who had sufficient knowledge of DDH = 43.80 ± 7.19 years versus 41.60 ± 5.25 years old of those who had poor knowledge of DDH ($P$ = 0.224). There was also no significant difference in the knowledge according to job title groups ($P$ = 0.247), country where they received their education and training ($P$ = 0.684), years of experience ($P$ = 0.989) and whether they received DDH training or not ($P$ = 0.4332) [Table 2].

**Table 1:** Demographic profile of the 65 primary care physicians who participated in the survey.

| Variables | Mean (SD) | *n* (%) |
|---|---|---|
| Age in years | 43.53 (6.90) | |
| Years of experience | 15.95 (6.95) | |
| Gender | | |
| Male | | 34 (52.3%) |
| Female | | 31 (47.7%) |
| Job title | | |
| General practitioners | | 32 (49.2%) |
| Fellows and consultants | | 33 (50.8%) |
| Years of experience | | |
| 10 and below | | 17 (26.2%) |
| 11–20 years | | 35 (53.8%) |
| 21 and above | | 13 (20.0%) |
| Country where they received their education | | |
| Saudi Arabia | | 36 (55.4%) |
| Western countries (US, UK, Canada, etc.) | | 8 (12.3%) |
| Nearby Arab countries | | 21 (32.3%) |
| Had formal training on DDH | | |
| Yes | | 6 (9.2%) |
| No | | 59 (90.8%) |

DDH: Developmental dysplasia of the hip

### Attitude

The responses to the nine questions on their attitude toward DDH are shown in [Table 3]. One-third of the respondents (33.3%) believed that DDH in Saudi Arabia is more common than in Western countries. In addition, most of the respondents believed in the importance of asking about risk factors, the presence of DDH screening protocols and community awareness. On the other hand, the majority of the respondents believed that they needed to go for further training about DDH.

There were no significant differences in the positive responses (agree/strongly agree) to the attitude questions according to gender ($P > 0.05$). There were significantly more GPs (compared to consultants and fellows) who believed that; DDH is more common in Saudi Arabia than in other

**Table 2:** Demographic characteristics according to the knowledge of DDH among the 65 surveyed primary care physicians.

| Variables | Poor knowledge *n*=20 | Sufficient knowledge *n*=45 | *P* value |
|---|---|---|---|
| Age in years | 41.6 ± 5.3 | 43.8 ± 7.2 | 0.224 |
| Years of experience | 14.9 ± 6.7 | 16.4 ± 7.1 | 0.398 |
| Gender | | | |
| Male | 12 (60.0%) | 22 (48.9%) | 0.408 |
| Female | 8 (40.0%) | 23 (51.1%) | |
| Job title | | | |
| General practitioners | 12 (60.0%) | 20 (44.4%) | 0.247 |
| Fellows and consultants | 8 (40.0%) | 25 (55.6%) | |
| Years of experience | | | |
| 10 and below | 5 (25.0%) | 12 (26.7%) | 0.989 |
| 11–20 years | 11 (55.0%) | 24 (53.3%) | |
| 21 and above | 4 (20.0%) | 9 (20.0%) | |
| Country where they received their education | | | |
| Saudi Arabia | 12 (60.0%) | 24 (53.3%) | 0.684 |
| Western countries (US, UK, Canada, etc.) | 3 (15.0%) | 5 (11.1%) | |
| Nearby Arab countries | 5 (25.0%) | 16 (35.6%) | |
| Had formal training on DDH | | | |
| Yes | 1 (5.0%) | 5 (11.1%) | 0.432 |
| No | 19 (95.0%) | 40 (88.9%) | |

DDH: Developmental dysplasia of the hip

countries (60% vs. 6%, $P < 0.001$) that it is important to ask about risk factors of DDH in all children <1-year-old (90.6% vs. 69.7%, $P < 0.001$), and that DDH screening protocol should be implanted in all primary care centers (93.8% vs. 90.9%). There were no significant differences in the attitude towards DDH as to years of experience, the country where they had their education, and whether they had DDH training or not ($P > 0.05$, $P > 0.05$ and $P > 0.05$, respectively).

### Practice

The majority of the respondents would refer a DDH case to an orthopedic surgeon when there is a positive finding by a radiograph or ultrasound. Less than 10% of the respondents always examine the hip for DDH, whereas the majority never examines the hip for DDH. Almost half of the respondents ($n = 30$, 46.2%) never referred a DDH case. Despite the presence of a pediatrician in the same center of 57 respondents, only 17 (26.2%) always refer their DDH cases to a pediatrician and 16 (23.6%) never did a referral to a pediatrician, they referred directly to pediatric orthopedic clinics. There were no significant differences in the practice regarding DDH as to gender ($P > 0.05$), years of experience ($P > 0.05$), and the country where they had their training and education about DDH ($P > 0.05$). Relatively, the GPs see more DDH cases than consultants (65.6% vs. 42.4%, $P = 0.060$) [Table 4].

**Table 3:** Frequency distribution of responses to the nine questions on attitude toward DDH.

| Questions | Strongly agree/ agree | Neutral | Disagree/ strongly disagree |
|---|---|---|---|
| DDH in Saudi Arabia is more common than in the Western countries. | 21 (33.3%) | 34 (52.3%) | 10 (15.4%) |
| It is important to ask about risk factors of DDH in all children<1-year. | 52 (80.0%) | 8 (12.3%) | 5 (7.7%) |
| DDH screening protocol should be implanted in all primary care centers. | 60 (92.3%) | 4 (6.2%) | 1 (1.5%) |
| The community needs more awareness about DDH and its risk factors. | 63 (96.9%) | 1 (1.5%) | 1 (1.5%) |
| No need for further research about DDH. | 11 (17.0%) | 11 (16.9%) | 43 (66.1%) |
| Family physicians should not treat or follow-up DDH cases. | 18 (17.7%) | 14 (21.5%) | 33 (50.8%) |
| Primary care physicians need further training about DDH. | 58 (89.2%) | 5 (7.7%) | 2 (3.0%) |
| It is highly recommended to establish a national register for DDH cases. | 56 (86.2%) | 8 (12.3%) | 1 (1.5%) |
| It is important to review a DDH topic once a year at least. | 53 (81.5%) | 10 (15.4%) | 2 (3.0%) |

DDH: Developmental dysplasia of the hip

## DISCUSSION

The prevalence of DDH may not be that high, occurring in <1% of live births.[2,3] However, despite the several screening guidelines that have been developed, there seems to be a deficiency in the knowledge, attitude, and practice of PCPs in the diagnosis, referral, and management of DDH patients. DDH is primarily a pediatric orthopedic problem, but early diagnosis and prevention are based on a multidisciplinary approach involving pediatric orthopedic surgeons, neonatologists, obstetricians, pediatricians, and PCPs.[18] The problem of complex diagnosis, prevention, and treatment of DDH has been a center for discussion for many practitioners.

This study showed that 2 of 3 of our respondents have sufficient knowledge of DDH regardless of gender, age, job level, years of experience, or whether they had received their training locally or abroad. However, despite their knowledge of what DDH is about, there seemed to be a wide gap in translating knowledge of DDH to physicians' practice of DDH management. One example is that 89.2% of the respondents believed that they needed to go for further training about DDH. This implies a

**Table 4:** Responses to questions on practice regarding DDH cases among the 65 respondents.

| Questions on practice | *n* (%) |
|---|---|
| Refer a DDH case to an orthopedic surgeon when they see | |
| Hip click or clunk | 23 (35.4%) |
| Presence of a risk factor | 7 (10.8%) |
| Family request | 6 (9.2%) |
| Positive radiograph or ultrasound | 59 (90.8%) |
| Frequency of examining the hip for DDH | |
| Always | 6 (9.2%) |
| Sometimes | 13 (20.0%) |
| Rarely | 4 (6.2%) |
| Never | 42 (64.6%) |
| Number of DDH cases referred per month | |
| None | 30 (46.2%) |
| 1 or more | 35 (53.48%) |
| Presence of a pediatrician in the center | |
| Yes | 57 (87.7%) |
| No | 8 (12.3%) |
| Refer DDH cases to a pediatrician first | |
| Always | 17 (26.2%) |
| Sometimes | 17 (26.2%) |
| Rarely | 15 (23.1%) |
| Never | 16 (23.6%) |

DDH: Developmental dysplasia of the hip

need to translate their theoretical knowledge into practice that may be evidenced by persistent confusion on diagnosis, decision-making and management of DDH cases.[19] One study showed that around 18.6% of physicians fail to recognize DDH as a treatable disease.[13] In this study, we noticed that majority (at least >70%) of our respondents answered the knowledge questions correctly with regards to risk factors, particularly the presence of a family history of DDH, absence of total dislocation of the hip, presence of oligohydramnios, breech presentation, and the presence of hip clunk, abnormal skin fold, limping and limb-length discrepancy. Furthermore, many respondents fell short on the knowledge of the diagnostic imaging procedure that is ideal for diagnosing DDH at a varying age of the patients, such as the use of ultrasonography for younger aged patients and radiographs of the pelvis for older patients. Although there is insufficient evidence in using ultrasonography for younger patients aged 6–8-weeks-old, the presence of risk factors would warrant a dedicated screening to institute proper management, particularly among breech-delivered babies.[19]

Another highlight of this study is the way the respondents refer cases of DDH. Nine of ten respondents refer a DDH case to a pediatric orthopedic surgeon when a radiograph or ultrasound is positive. However, only one in ten of these respondents will always examine the hip for DDH. This is because of the lack of universally agreed guidelines on what must be examined and at what age will constitute a developmental disease or an actual disease.[20] One particular example is the Ortolani maneuver, which is one important clinical test for detecting hip dysplasia in newborns. In this study, 64.6% of the respondents reported the performance of Ortolani test at 3 months, whereas 35.4% said it is best to perform it beyond the age of 3 months to a year. It is known that in most of DDH cases, Barlow and Ortolani tests will not be positive after the age of 3 months in patients with DDH.[21,22] In other instances, some of the Barlow-positive hips, resolve spontaneously and the mild DDH that occurs with this in newborns also resolve spontaneously.[21,22]

Several clinical practice guidelines, including the American Academy of Pediatrics, the American Academy of Orthopedic Surgeons, the Pediatric Orthopedic Society of North America, recommended screening of all newborns by physical examination for DDH. However, there were controversial oppositions from the US Preventive Services Task Force (USPSTF) that routine screening for DDH may potentially cause avascular necrosis with frequent manipulation of the hip joint.[23,24] However, several studies have reputed the USPSTF claim and advocated the early screening and diagnosis of DDH.[25,26] Consequently, undiagnosed and uncorrected DDH during infancy were reported to be the main cause for the need of total hip arthroplasty when they grow up.[27]

The wide variation in the responses pertaining to the practice, approachn and management of DDH in this study reflects discrepancies in the diagnostic opinions of our respondents.[28] In turn, these differing opinions may be brought about by the absence of a standard care pathway for the management of DDH. About 68% of surgeons surveyed in North America do not endorse a standard care pathway for DDH.[29] In India, even though only 30% of institutions follow an international standard care pathway, most physicians support their own implemented care pathway that is multidisciplinary, involving orthopedic surgeons and enhancing the skills of their local practitioners.[30]

The present study had several limitations. Firstly, our results are limited to a small convenience sample of PCPs from a single institution primary care health centers in Riyadh and cannot be generalized to reflect the greater population of physicians involved in the screening and management of DDH. Another limitation is that this study included all PCPs, which made a major defect in the results. It could have been devoted to pediatric PCPs as adult PCPs do not see infants or children to look for DDH. The knowledge of DDH from other segments of the population may reflect a different scenario. However, we were able to deduce some important information regarding our respondents' knowledge, attitudes, and practices that may give a bird's eye view of the current situation. The small sample size also limited us to generate more concrete results.

## CONCLUSION

Knowledge of DDH among our PCPs who are directly involved in the screening and management of DDH is sufficient. There is discordance between knowledge, attitude and practice. Despite their knowledge, our respondents fall short in the translation of their knowledge into practice.

## RECOMMENDATIONS

The results of this study suggest and recommend a revisit on the knowledge, attitudes and practice of our PCPs, particularly those pediatric PCPs who are involved in the screening, diagnosis and management of patients with DDH. There is a need for continuing education on DDH, particularly on screening, management and referral. In addition, the formulation of a standard general protocol for screening and managing patients with DDH would be helpful to minimize confusion and discordance in the practices.

### Acknowledgments

We would like to thank the department of family medicine in our institution for their support and facilitation of this project.

## AUTHORS' CONTRIBUTIONS

TNA, AAA, and AHJ have contributed with concepts, design, the definition of intellectual content, manuscript preparation, and editing. SAL has contributed with literature search, data acquisition, manuscript preparation, and editing. ALA has contributed with design, and data acquisition. All authors have critically reviewed, approved the final draft and are responsible for the content and similarity index of the manuscript.

## ETHICAL APPROVAL

This study was approved by the Institutional Review Board of King Abdullah International Medical Research Center, National Guard Health Affairs, Riyadh, Saudi Arabia, with Memorandum Reference No. RYD-18-419812-79989, dated May 7, 2018.

### Declaration of participants' consent

All participants consented for participation and for the publication of the results.

### Financial support and sponsorship

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Wright J, James K. Developmental dysplasia of the hip. In: Paediatric Orthopaedics in Clinical Practice. London: Springer; 2016. p. 69-90.
2. Aronsson DD, Goldberg MJ, Kling TF Jr., Roy DR. Developmental dysplasia of the hip. Pediatrics 1994;94:201-8.
3. Mirdad T. Incidence and pattern of congenital dislocation of the hip in Aseer region of Saudi Arabia. West Afr J Med 2002;21:218-22.
4. Moosa NK, Kumar PT, Mahmoodi SM. Incidence of developmental dysplasia of the hip in Dubai. Saudi Med J 2009;30:952-5.
5. Ortiz-Neira CL, Paolucci EO, Donnon T. A meta-analysis of common risk factors associated with the diagnosis of developmental dysplasia of the hip in newborns. Eur J Radiol 2012;81:344-51.
6. Agarwal A, Gupta N. Risk factors and diagnosis of developmental dysplasia of hip in children. J Clin Orthop Trauma 2012;3:10-4.
7. Karmazyn BK, Gunderman RB, Coley BD, Blatt ER, Bulas D, Fordham L, *et al*. ACR Appropriateness Criteria on developmental dysplasia of the hip-child. J Am Coll Radiol 2009;6:551-7.
8. Committee on Quality Improvement, American Academy of Pediatrics. Clinical practice guidelines: Early detection of developmental dysplasia of the hip. Pediatrics 2000;105:896-905.
9. Zdravkovic N, Stojanovic S. Early diagnosis of developmental hip dysplasia in the district of Pirot, Serbia. Med Biol 2004;1:26-30.
10. Paton RW. Screening in developmental dysplasia of the hip (DDH). Surgeon 2017;15:290-6.
11. Shorter D, Hong T, Osborn DA. Cochrane review: Screening programmes for developmental dysplasia of the hip in newborn infants. Evid Based Child Health 2013;8:11-54.
12. Kotlarsky P, Haber R, Bialik V, Eidelman M. Developmental dysplasia of the hip: What has changed in the last 20 years? World J Orthop 2015;6:886-901.
13. Uzel M, Ergun GU, Ekerbicer HC. The knowledge and attitudes of the primary care physicians on developmental dysplasia of the hip. Saudi Med J 2007;28:1430-4.
14. Melo TE, Resende TM, Silva RC, Cruz SA, Oliveira VM. Developmental dysplasia of the hip: Do the responsible for screening know what to do? Acta Ortop Bras 2016;24:312-7.
15. Külcü NU, Orak MM, Gerenli N, Sari E, Say A. The knowledge of pediatricians about developmental hip dysplasia in a training hospital. J Curr Pediatr 2015;13:89-96.
16. Alshahrani KM, Alsiddiky A, Alamro SM, Alqarni AA. Assessing the level of DDH knowledge among parents in Riyadh city in Saudi Arabia. Int Arch Integr Med 2018;5:141-9.
17. Kremli MK, Alshahid AH, Khoshhal KI, Zamzam MM. The pattern of developmental dysplasia of the hip. Saudi Med J 2003;24:1118-20.
18. Dziewulski M, Dziewulski W, Barcińska-Wierzejska I. The importance of early diagnosis and treatment of developmental dysplasia of the hips. Ortop Traumatol Rehabil 2001;3:412-7.
19. Schaeffer EK, Mulpuri K. Developmental dysplasia of the hip: Addressing evidence gaps with a multicentre prospective international study. Med J Aust 2018;208:359-64.
20. Shaw BA, Segal LS. Evaluation and referral for developmental dysplasia of the hip in infants. Pediatrics 2016;138:e20163107.
21. Brurås KR, Aukland SM, Markestad T, Sera F, Dezateux C, Rosendahl K. Newborns with sonographically dysplastic and potentially unstable hips: 6-year follow-up of an RCT. Pediatrics 2011;127:661-6.
22. Clarke NM, Reading IC, Corbin C, Taylor CC, Bochmann T. Twenty years experience of selective secondary ultrasound screening for congenital dislocation of the hip. Arch Dis Child 2012;97:423-9.
23. Shipman SA, Helfand M, Moyer VA, Yawn BP. Screening for developmental dysplasia of the hip: A systematic literature review for the US preventive services task force. Pediatrics 2006;117:557-76.
24. Patel H, Canadian Task Force on Preventive Health Care. Preventive health care, 2001 update: Screening and management of developmental dysplasia of the hip in newborns. CMAJ 2001;164:1669-77.
25. Laborie LB, Engesæter IØ, Lehmann TG, Eastwood DM, Engesæter LB, Rosendahl K. Screening strategies for hip dysplasia: Long-term outcome of a randomized controlled trial. Pediatrics 2013;132:492-501.

26. Gardner F, Dezateaux C, Elbourne D, Gray A, King A, Quinn A, *et al*. The hip trial: Psychological consequences for mothers of using ultrasound to manage infants with developmental hip dysplasia. Arch Dis Child Fetal Neonatal Ed 2005;90:F17-24.
27. Sakellariou VI, Christodoulou M, Sasalos G, Babis GC. Reconstruction of the acetabulum in developmental dysplasia of the hip in total hip replacement. Arch Bone Jt Surg 2014;2:130-6.
28. Roposch A, Liu LQ, Protopapa E. Variations in the use of diagnostic criteria for developmental dysplasia of the hip. Clin Orthop Relat Res 2013;471:1946-54.
29. Taylor IK, Burlile JF, Schaeffer EK, Geng X, Habib E, Mulpuri K, *et al*. Developmental dysplasia of the hip: An examination of care practices of pediatric orthopaedic surgeons in North America. J Pediatr Orthop 2020;40:248-55.
30. Hooper N, Aroojis A, Narasimhan R, Schaeffer EK, Habib E, Wu JK, *et al*. Developmental dysplasia of the hip: An examination of care practices of orthopaedic surgeons in India. Indian J Orthop 2021;55:158-68.