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What can we learn from surveys? A systematic review of survey studies addressing femoroacetabular impingement syndrome

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ABSTRACT

The purpose of this study was to systematically review the methodology, response rate and quality of survey studies related to femoroacetabular impingement (FAI) syndrome. A search was conducted on three databases (PubMed, EMBASE, MEDLINE) for relevant studies from database inception to 27 January 2020. Data extracted included study and survey characteristics, as well as response rates. The quality of the included studies was also assessed using a previously published quality assessment tool. Data were analysed with means, ranges, standard deviations, 95% confidence intervals and bivariate analysis. Eleven studies (13 surveys) were included in this review out of a total of 1608 initial titles found. Surveys were most often administered via the Internet (72%) to orthopaedic surgeons (54%). The mean response rate was 70.4%. The mean quality score was moderate 13.3/24 (SD ±4.3). The criterion that most often scored high was 'clearly defined purpose and objectives' (11/11). The most common survey topic investigated surgeons' knowledge regarding FAI diagnosis and management (n = 7). In addition, bivariate analysis between quality score and response rate showed no significant correlation (Spearman's rho = −0.090, P = 0.85). Overall, survey studies related to FAI syndrome most often use Internet-based methods to administer surveys. The most common target audience is orthopaedic surgeons. The topics of the surveys most often revolve around orthopaedic surgeons' knowledge and opinions relating to the diagnosis and management of FAI syndrome. The response rate is high in patient surveys and lower in larger surgeon surveys. Overall, the studies are of moderate quality.

INTRODUCTION

Following the first description of femoroacetabular impingement (FAI) syndrome, a malformation of the femoral head–neck junction and/or the acetabular walls, causing chondrolabral injury and hip arthritis [1], there has been a growing interest in hip arthroscopy, with an increase in both performed procedures and published literature [2, 3]. To assess current practice patterns, physician attitudes and concerns, surveys have historically played an important role in health research in general, and in the fast-developing field of FAI management [4–6].

One of the most commonly discussed aspects of survey validity is the response rate, and several studies have suggested strategies to improve this response rate [4, 7]. Others have argued that the response rate per se is given too much credence, and that a survey can have high validity despite a low response rate, as long as the sample reflects the underlying population accurately [8]. Some argue that the focus, to minimize bias, should be on the methodological quality of a survey, paying attention to, e.g. the research question, pilot testing and sampling [9, 10].

However, despite the fact that several individual FAI survey studies have been performed, there has not been an analysis of these studies in the form of a systematic review on this topic analysing their methodology, response rate and quality [11]. This information would help to improve further FAI survey studies.

The purpose of this study was to systematically review the methodology, response rate and quality of survey studies on the general topic of FAI syndrome. The *a priori* hypothesis was that the response rate would improve over time and the overall methodological quality of the studies found in this review would be moderate.

MATERIALS AND METHODS
This systematic review was performed in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines [12].

Eligibility criteria
The research question and inclusion/exclusion criteria were established *a priori*. Only studies using a survey to elicit opinions about aspects of FAI syndrome were included. Studies with level of evidence I–IV and published in English were considered. Studies only reporting patient-reported outcomes as part of a routine follow-up were excluded, as well as conference papers, commentaries, systematic reviews and studies in which surveys were not the primary focus (e.g. patient-reported outcome measure questionnaires were used to assess the effectiveness of a treatment technique, but the questionnaires themselves were not being primarily studied).

Information sources and search
A systematic literature search was conducted in three online databases: EMBASE, MEDLINE and PubMed. The search was conducted on 27 January 2020, and retrieved articles from each database's inception, to search day. The key terms used in the search were variations of the terms 'survey' and 'femoroacetabular impingement syndrome'. The authors also performed a hand search of the references of all included articles. Detailed search strategies for the included databases are described in Table AI.

Study screening
Two reviewers (X.X., X.X.) screened all titles and abstracts independently and in duplicate. If the title or abstract did not provide enough data to make a decision regarding inclusion, the full text of the study was analysed. Reviewers were not blinded to author, year or journal. Disagreement between reviewers at the title and abstract stages were resolved by automatic inclusion. Discrepancies at full text stage were resolved by consensus between the reviewers, or by discussion with the senior reviewer (X.X.) if consensus was not met. Inter-observer agreement between reviewers was assessed.

Data abstraction
Two reviewers collected data in duplicate and recorded them in a Microsoft Excel spreadsheet (Version 2007, Microsoft, Redmond, WA, USA). Study characteristics that were abstracted included author, year published, target audience, number of survey items, number of surveys sent out, response rate, delivery method and survey topic. If the original survey was not included in the study, a request was emailed to the corresponding author with a 1-week deadline to respond.

Quality assessment
The quality of the included studies was assessed using a previously published survey study quality assessment tool by Ekhtiari *et al.* [13, 14]. A list of the criteria is presented in Table AII. These criteria have not been formally validated, but they have been used for the same purpose previously [14]. In accordance with Ekhtiari *et al.*, each criterion was assigned 0 points if not addressed, 1 point if incompletely addressed and 2 points if fully addressed. Items were graded as incompletely addressed if the criteria had been addressed to a partial degree, but their remained uncertainties or unanswered questions from the point of view of the quality assessor. The maximum score was therefore 24 points [14]. Studies with a total score of 8 or less were considered low quality, studies with a total score between 9 and 16, inclusive, were considered moderate quality, and studies with a total score equal to or >17 were considered high quality. The quality of included surveys was assessed in duplicate and agreement between reviewers. Due to heterogeneity between surveys, no meta-analysis was performed.

Statistical analysis

Inter-observer agreement for the title, abstract and full text stages were calculated, respectively, using the Cohen kappa coefficient (κ). Inter-observer agreement for the survey quality was calculated using the interclass correlation coefficient (ICC). Agreement was categorized *a priori* as follows: κ/ICC of 0.61 or greater was considered substantial agreement; κ/ICC of 0.21–0.60, moderate agreement and κ/ICC of 0.20 or less, slight agreement [15]. Descriptive data are presented with means, ranges and measures of variance (SD and 95% confidence intervals [CI]). A Spearman's rank correlation was used to assess survey quality scores versus response rates, and number of survey items versus response rates. Univariate analyses were done to assess individual quality criterion versus response rates. An unpaired *t*-test was used to compare response rate with target audience. A linear regression analysis was conducted to compare number of survey items with response rate. A one-way ANOVA tests was conducted to assess the relationship between study publication date and survey response rate. One-way ANOVA was also used to compare study publication date with study quality score. Survey response rate was plotted by study publishing date on a scatterplot figure. Statistical significance was set at $P < 0.05$. Statistics were calculated using Microsoft Excel (version 16.16.13), Microsoft Corporation, Redmond, WA, USA.

RESULTS

Study characteristics

The initial search yielded 1608 studies, of which 11 met the inclusion and exclusion criteria for this review (Fig. 1). The inter-observer agreement between reviewers was substantial at the title (kappa = 0.79; 95% CI: 0.63–0.95), abstract (0.84, 0.77–0.91) and full-text (1.00, 1.00–1.00) screening stages. All included studies were published between 2014 and 2019 (Table I). Regarding country of publication, six studies were conducted in United States, two in Canada, one in the United Kingdom, one in Switzerland and one in Denmark.

Survey characteristics

In total, there were 11 studies included in this systematic review, which yielded a total of 13 surveys. One study used three different surveys, and the other studies used one survey each [16]. Surveys were mainly targeted towards orthopaedic surgeons (7 surveys), followed by patients (5 surveys) and orthopaedic trainees (1 survey). Eight surveys were distributed solely via Internet-based systems (email and/or survey clients), 1 survey both via email and mail, 1 survey was distributed via an interview (both in person and
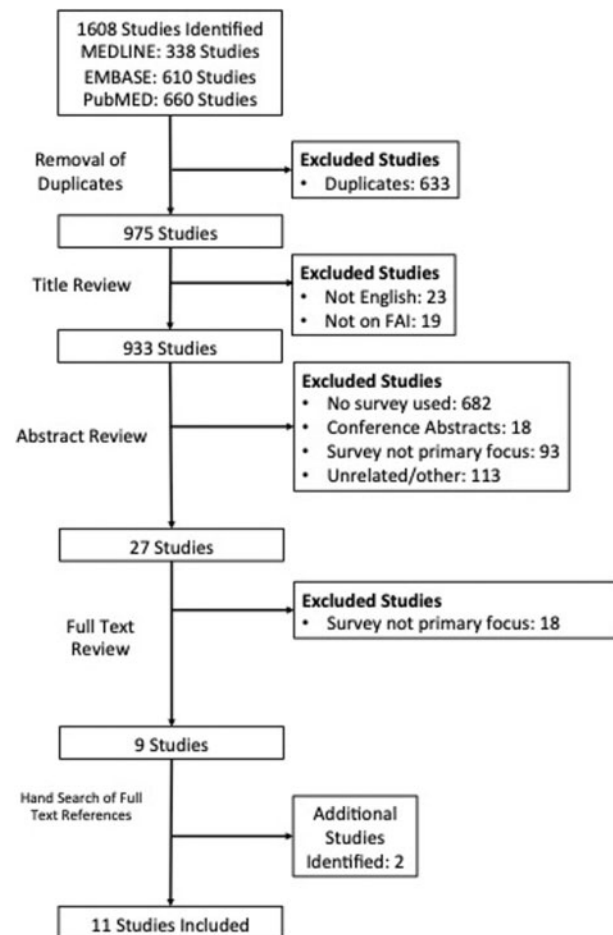

Fig. 1. PRISMA flow diagram demonstrating the systematic review of the literature for survey studies on the topic of FAI syndrome.

via telephone), 1 was in person, and 2 studies did not report how the survey was distributed. The number of items on the surveys ranged from 3 to 99 (SD 25.7), mean 25.3 questions. The number of surveys that were distributed was reported for 5 surveys and ranged from 10 to 1035 (SD 375.2), with a mean of 273 surveys. In total, 7 studies, including a total of 700 respondents from a total of 1911 invited participants, reported the response rate, which ranged from 20% to 100% (SD 35.9), mean 70.4%. The mean response rate by patients was 88.7%, whereas the mean response rate by physicians was 56.8%. However, an unpaired *t*-test showed no statistically significant difference in response rate between the two groups ($P = 0.28$). In addition, it was noted that the response rate for survey studies with an orthopaedic surgeon audience size of >100 ($n = 2$) had a mean response rate of 20.5% [6, 17]. Whereas, the response rate for survey studies with an orthopaedic surgeon audience size of <100 ($n = 2$) had a

Table I. Characteristics of included studies

First author	Year	Country of publication	Target audience	Number of items	Number of surveys sent out	Number of survey respondents (with percentage response rate)	Delivery method	Survey topic	Quality score
Ayeni	2014	Canada	Orthopaedic surgeons	37	1035	202 (20%)	Internet and mail	Current state of knowledge among orthopaedic surgeons regarding FAI treatment	18
Bockhorn	2019	United States	Orthopaedic surgeons	15	NR	8	Internet	The utility of 3D-printed hip models in the evaluation and management of patients with hip pain undergoing hip preservation surgery	10
			trainees	7	NR	11			
			patients	10	NR	10			
Bramming	2019	Denmark	Patients	12	50	34 (68%)	Internet	Patient's awareness and ability to forget about their symptomatic joint in everyday life	14
Childs	2018	United States	Patients	18	31	31 (100%)	NR	Patients' perceived understanding of functional anatomy and FAI pathomorphology.	13
Herickhoff	2018	United States	Orthopaedic surgeons	36	35	30 (86%)	Internet	Surgical decision making for acetabular labral tears (indications for repair or debridement)	7
Impellizzeri	2015	Switzerland	Patients	3	NR	162	In person	Identifying the optimal patient-reported outcome measure	13
Khan	2016	Canada	Orthopaedic surgeons	46	NR	900	Internet	Perceptions of orthopaedic surgeons regarding the diagnosis and management of FAI, and demographic characteristics of surgeons performing FAI surgery	18
Mancuso	2019	United States	Patients	21	307	302 (98%)	Interview, in person or via telephone	Patients' preoperative expectations and expectations in terms of demographic and clinical characteristics	19
Radha	2019	United Kingdom	Orthopaedic surgeons	99	NR	165	Internet	Developing global consensus-based guidelines for arthroscopic intervention for FAI syndrome	17

Table I. (continued)

| First author	Year	Country of publication	Target audience	Number of items	Number of surveys sent out	Number of survey respondents (with percentage response rate)	Delivery method	Survey topic	Quality score
Ross	2016	United States	Orthopaedic surgeons	6	10	10 (100%)	NR	Surgeon willingness to participate in large, multicentre randomized controlled trials (RCTs) to address common treatment decisions for the management of FAI	9
Saroki	2016	United States	Orthopaedic surgeons	19	443	91 (21%)	Internet	Radiograph imaging use in perioperative care for FAI and surgeon knowledge and perspective on radiation safety when treating FAI	8

NR, not reported.
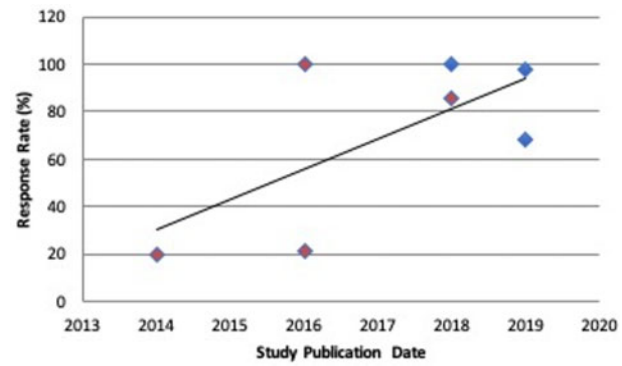
Fig. 2. Scatterplot comparing study publication date and survey response rate (Red, orthopaedic surgeon audience; Blue, patient audience).

mean response rate of 93% [18, 19]. A linear regression analysis comparing number of survey items with response rate showed a statistically non-significant negative relationship ($b = -0.396$, $P = 0.379$). The most common survey topic investigated surgeons' knowledge regarding FAI diagnosis and management ($n = 7$), followed by patients' knowledge, expectations, perceptions and outcomes surrounding FAI and its treatment ($n = 5$), and finally surgeons' willingness to participate in randomized control trials on FAI ($n = 1$). One-way ANOVA revealed no statistically significant relationship between study publication date and survey response rate, although a scatterplot suggests a trend towards increasing response rate over time (Fig. 2).

Survey quality

A complete version of the survey used was not included in two of the studies [5, 6].

After a request was sent to the corresponding author of each study, a complete version of the survey used was obtained for all studies. The mean quality score was 13.3 (SD ±4.3) out of a possible score of 24. Inter-observer agreement was substantial with an ICC of 0.77 (95% CI, 0.71–0.83). The highest quality study received a global score of 19. The criterion which most often scored highest (i.e. 2) was 'clearly defined purpose and objectives' (11/11), followed by 'appropriate, accurate title', 'make the survey as brief and simple as possible', 'questions short, simple, unambiguous, unidirectional', 'avoid questions and techniques that influence answers', 'decide how data will be compiled and analysed *a priori*', (8/11 each). The criterion that most often scored 0 was 'thank the respondents', (11/11), followed by 'allow space for additional voluntary comments', (8/9). In addition, bivariate analysis between quality score and response rate as well as number of survey

items and response rate showed no significant correlation (Spearman's rho $= -0.090$, $P = 0.85$; -0.577, $P = 0.175$, respectively). Univariate analysis comparing each individual quality criterion with response rate showed no statistically significant variables (Table AIII). A one-way ANOVA showed no statistically significant relationship between study publication dates and study quality scores.

DISCUSSION

The key finding in this systematic review was that there is an overall high response rate for surveys used in the field of FAI syndrome, and the surveys and their respective studies are of moderate quality. In addition, with respect to methodology, the surveys most often use Internet-based methods to administer surveys to samples of orthopaedic surgeons. Finally, the most common survey topic investigated surgeons' knowledge regarding FAI diagnosis and management.

One trend noted in this study was that the response rate improved over time. Specifically, the earliest published paper by Ayeni et al. in 2014 had a response rate of 20% [6]. Ayeni et al. attributed this lower response rate to the fact that FAI syndrome was still a relatively novel topic at that time and as a result, a smaller proportion of the audience was familiar with the topic [6]. One recently published study surveying orthopaedic surgeons had a response rate of 86% [18]. As knowledge of FAI syndrome becomes more widespread, we expect that the target audience is better equipped and more inclined to respond to surveys on the topic.

Furthermore, our review demonstrated a trend towards higher response rate amongst patients compared with physicians. One possible reason for the lower response rate amongst physicians may be due to the relatively busy nature of their profession. A 2015 study exploring physician specialist response rates to web-based surveys found that response rates varied by specialty, with internal medicine physicians responding 42.9% of the time, while general surgeons responded only 29.6% of the time. In addition, the main reason for not responding to surveys was lack of time/survey burden [20]. Although not statistically significant, this systematic review found a trend towards decreased response rate with increasing number of survey items, suggesting that survey length is a factor to be considered when designing a survey, particularly for healthcare providers who likely have other demands on their time. Furthermore, another study investigating the cause for declining response rates in clinician surveys found that 36.3% of physicians had a blanket office policy not to participate in any surveys [21]. This further predicts a lower response rate among physicians in survey studies. As such,

efforts need to be made to optimize physician response rates. Simple measures such as cash incentives of $2 to each physician participant may improve the response rate, compared with lottery style rewards as demonstrated in one study, which showed a higher response rate in the cash incentive group compared with the $250 lottery group (56.0% versus 44.0%) [22].

In addition, this systematic review identified that survey studies administering surveys to a large cohort of surgeons had a lower response rate than studies that administered surveys to smaller cohorts of orthopaedic surgeons. This may be due to the fact that the studies that invited a larger audience had broader questions such as diagnosis and management of FAI, whereas the studies that invited a smaller audience had more specific questions such as willingness to participate in FAI randomized control trials. Therefore, if a survey topic is more focused and administered to an audience to whom it's relevant, the target audience is more motivated to participate [20].

This systematic review also found that the majority of surveys was administered electronically, with only one study utilizing standard mail methods and one study incorporating in-person delivery [6, 23]. In an age where technology use is widespread, even amongst ageing populations, such a finding is expected as online surveys offer immediate delivery and data acquisition, are cost-effective, and maintain anonymity compared with in-person or telephone interviews [24, 25]. However, previous studies have shown greater response rates with surveys that were delivered by regular mail compared with electronically administered surveys [14]. In fact, the single study in this review that administered surveys in-person had one of the highest response rates (i.e. 98%) [23]. This may be due to increased participant willingness to respond when approached in-person, the general decline in response rates of surveys, and/or because the target audience can now more easily be reached by other survey administers, overwhelming the intended group of respondents, and consequently reducing the response rate [26]. In addition, one caveat of the widespread use of Internet-based survey methods is that it limits recruitment to participants who have access to computer networks, consequently limiting the generalizability of such studies.

Furthermore, this study emphasized the shortcomings of current survey studies on the topic of FAI syndrome. Specifically, only four studies reported pretesting their survey prior to administering to the target audience. Although pretesting a survey does not guarantee a successful final study, it serves as a predictor and can be helpful in study design. Piloting a survey can estimate a potential response rate, provide feedback regarding ambiguities or difficult

questions, estimate the length of time needed for participants to complete the survey to ensure it is practical, and assess whether each question has a full range of possible responses [27]. Furthermore, this study found that the target audience of the surveys was orthopaedic surgeons, orthopaedic trainees or patients. Future studies should also target other FAI treatment providers such as physiotherapists and occupational therapists to gain further insights into the condition.

Limitations

The main limitation of this study is the lack of a validated survey quality assessment tool. The quality assessment tool used in this study is based on a 12-point list of criteria recommended for survey design to minimize bias and covers the aspects of study aim, survey format and distribution [13] These criteria have been used previously in the evaluation of survey quality in the field of anterior cruciate ligament (ACL) reconstruction [14]. In addition, the exclusion of non-English studies is another limitation because of possible publication bias. Moreover, there were only 11 studies eligible for inclusion out of a total of 1608 studies, which is a relatively small sample of studies to derive conclusions from. Nevertheless, this is reflective of the available literature on the topic. A systematic review of survey studies in ACL reconstruction included 53 studies out of a total of 1276 initially screened studies [14]. This may be explained due to the fact that there is a greater abundance of research in the ACL field. Furthermore, our initial search yielded 1608 articles due to the use of broad search terms. Finally, lack of clear reporting of study data prevented us from performing sub-analyses, such as correlating response rate by method of survey delivery.

CONCLUSION

Overall, survey studies related to FAI syndrome most often use Internet-based methods to administer surveys. The most common target audience is orthopaedic surgeons. The topics of the surveys most often revolve around orthopaedic surgeons' knowledge and opinions relating to the diagnosis and management of FAI syndrome. The response rate is high in patient surveys and low in larger surgeon surveys. Overall, the studies are of moderate quality.

CONFLICT OF INTEREST STATEMENT
None declared.

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Table AI. Search strategy

EMBASE: 610 studies		MEDLINE: 338 studies		PubMed: 660 studies	
Strategy	Studies	Strategy	Studies	Strategy	Studies
1. survey.mp.	1 315 872	1. survey.mp. or 'Surveys and questionnaires'/	840 860	1. survey	1 331 194
2. questionnaire/or questionnaire.mp.	872 781	2. questionnaire.mp.	392 904	2. questionnaire	1 185 272
3. poll.mp.	2363	3. poll.mp.	1819	3. poll	3721
4. opinion.mp.	109 157	4. opinion.mp.	86 925	4. opinion	657 215
5. sample/or sample.mp.	1 094 234	5. sample.mp.	796 895	5. sample	796 307
6. 1 OR 2 OR 3 OR 4 OR 5	2 964 648	6. 1 OR 2 OR 3 OR 4 OR 5	1 721 945	6. 1 OR 2 OR 3 OR 4 OR 5	2 507 849
7. Femoroacetabular impingement/or FAI.mp.	5017	7. Femoroacetabular impingement/or FAI.mp.	3099	7. Femoroacetabular impingement	2673
8. Femoroacetabular impingement.mp.	210	8. Femoroacetabular impingement.mp.	1522	8. FAI	2586
9. 7 OR 8	5098	9. 7 OR 8	3106	9. 7 OR 8	4038
10. 6 AND 9	610	10. 6 AND 9	338	10. 6 AND 9	660

Table AII. Criteria for assessment of survey quality

	Not addressed = 0	*Incompletely addressed = 1*	*Fully addressed = 2*
1. Clearly defined purpose and objectives			
2. Appropriate, accurate title			
3. Make the survey as brief and simple as possible			
4. Questions short, simple, unambiguous, unidirectional			
5. Avoid questions and techniques that influence answers			
6. Decide how data will be compiled and analysed *a priori*			
7. Quantify response rate and compare respondents versus nonrespondents			
8. Pretest survey			
9. Revise survey based on pretest			
10. Distribute questionnaire to broad sample			
11. Allow space for additional voluntary comments			
12. Thank the respondents			

Table AIII. Univariate analysis assessing response rate versus individual criteria

Criterion	*Spearman's rho*	*P-value*	*Interpretation*
1. Clearly defined purpose and objectives	NA	NA	No significant correlation
2. Appropriate, accurate title	0.319	0.485	No significant correlation
3. Make the survey as brief and simple as possible	−0.201	0.666	No significant correlation
4. Questions short, simple, unambiguous, unidirectional	−0.201	0.666	No significant correlation
5. Avoid questions and techniques that influence answers	−0.073	0.877	No significant correlation
6. Decide how data will be compiled and analysed *a priori*	−0.08	0.865	No significant correlation
7. Quantify response rate and compare respondents versus nonrespondents	0.364	0.422	No significant correlation
8. Pretest survey	−0.319	0.485	No significant correlation
9. Revise survey based on pretest	−0.319	0.485	No significant correlation
10. Distribute questionnaire to broad sample	−0.583	0.17	No significant correlation
11. Allow space for additional voluntary comments	0.515	0.237	No significant correlation
12. Thank the respondents	NA	NA	NA