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Original Article**Current status of interventional radiology practice in Saudi Arabia**

Ghazi A Alshumrani

Associate professor and consultant of interventional radiology, Department of Radiology, College of Medicine, King Khalid University, Abha, Saudi Arabia

Corresponding Author:

Ghazi A. Alshumrani, MD, FRCR

Associate professor and consultant of interventional radiology

Department of Radiology

College of Medicine, P.O. Box 641

King Khalid University

Abha 61421, Saudi Arabia

Mobile: +966 505782749

Fax: +966 172418194

Email: galshumrani@kku.edu.sa

ORCID ID - <https://orcid.org/0000-0002-2008-9327>

ABSTRACT

Objective: To study the current status of interventional radiology (IR) practice in Saudi Arabia.

Design: Cross-sectional study.

Setting: Multiple hospitals of different healthcare sectors in Saudi Arabia

Subjects: Interventional radiologists in Saudi Arabia.

Intervention: A cross-sectional survey targeting interventional radiologists in Saudi Arabia was conducted using an electronic questionnaire.

Main outcome measures: The questions aimed to gather information about the demographics of interventional radiologists, clinical and technical aspects of interventional radiology practice, and challenges facing this specialty.

Results: The response rate was 56% (54 respondents out of 97 interventional radiologists). Ninety-six percent of respondents were males, and 4% were females. Eighty percent were consultants, 41% were trained in North America, 22% in Saudi Arabia, and 19% in Europe. Fifty-two percent of respondents ran independent IR clinics, 81% did not have admission privileges, 54% did not do clinical rounds, and 80% did not have protected research time. Several challenges and obstacles were reported, including financial limitations (26%), competition and lack of cooperation from other specialties (24%), lack of patients and public awareness (17%), lack of administrative support (11%), and shortage of IR doctors and staff (11%).

Conclusion: The results of this survey provided background information about IR in Saudi Arabia. Variations in IR practice among interventional radiologists, in addition to several challenges and obstacles, were reported. Establishment of national practice guidelines and collaboration among multiple concerned parties to overcome the challenges are recommended.

KEY WORDS: Interventional radiology, practice, Saudi Arabia

INTRODUCTION

Interventional radiology (IR) is a relatively young specialty compared to most other medical and surgical specialties. It is expanding rapidly worldwide and is becoming a cornerstone in providing medical care to a diverse group of patients in many hospitals. A wide spectrum of vascular and non-vascular interventional procedures are performed daily by interventional radiologists (IRs) with a great valuation of this service by other specialties ^[1].

Saudi Arabia has a population of more than 31 millions with one of the top 20 economies in the world ^[2]. The healthcare system in Saudi Arabia is constituted of several sectors, including the ministry of health (MOH), university hospitals, private hospitals, national guard health affairs, ministry of defense hospitals, ministry of interior hospitals, and King Faisal specialist hospitals.

There are approximately one-hundred IRs practicing in several hospitals of different healthcare sectors in Saudi Arabia. Different training backgrounds of the IRs and lack of unified national practice guidelines may lead to variations among IRs in Saudi Arabia. Various challenges and obstacles, including lack of information related to its practice, face this specialty.

This study aimed to provide a reference point for and background information about the current status of IR practice in Saudi Arabia. A literature search was conducted and did not reveal any other studies that covered this topic previously.

SUBJECTS AND METHODS

This was a cross-sectional study that targeted IRs who practice in Saudi Arabia. The regional research ethics committee approved this study. An anonymous electronic survey consisting of 23 questions (appendix) was created on Google Forms (Google LLC, Mountain View, CA, USA). The participation link was sent electronically to the members of the Saudi Interventional Radiology Society (SIRS), who were 102 members at the time of the survey. The questionnaire was open for participation for a period of one month, from October 30 to November 30, 2017 with three reminders sent during that period. Statistical analysis was done by calculating the percentage of different responses to each question with multivariate analysis to link responses of different questions.

RESULTS

Demographic results

The link of the survey reached 97 IRs who were eligible to participate. Out of them, 54 responses were received. Therefore, the response rate was 55.7%. Approximately, 80% (43/54) of the respondents were consultants, 13% (7/54) specialists, 7% (4/54) fellows, 96% (52/54) males, and only 4% (2/54) were females. The experience of 44% (24/54) of the respondents was less than 5 years, while 24% (13/54) had more than 10 years of experience, and 32% (17/54) had 5 to 10 years of experience. The highest number of respondents (22/54, 41%) were trained in North America, followed by Saudi Arabia (12/54, 22%) and Europe (10/54, 19%). The rest of the respondents completed their training in various other countries. The majority of the respondents (85%, 46/54) were vascular and interventional radiologists, followed by neuro-interventional radiologists (7%, 4/54), pediatric (4%, 2/54), and non-vascular ones (4%, 2/54). The ministry of health was the sector with the highest number of IRs (27/54, 50%) followed by the national guard for health affairs (11/54, 20%) as shown in Figure 1. Ninety-eight percent (53/54) of the respondents reported holding valid basic life support certificates, 37% (20/54) are certified for advanced life support, and 65% (35/54) carry conscious sedation certificates.

Clinical practice results

The majority of the respondents reported running an independent IR clinic (52%, 28/54; out of them, 54% (15/28) work in the MOH), not having admission privileges (81%, 44/54), not doing clinical rounds (54%, 29/54), not being trainers or trainees in IR fellowship programs (59%, 32/54), having no protected research time (80%, 43/54), practicing diagnostic radiology besides IR (56%, 30/54), and obtaining informed consent for minor procedures (78%, 42/54). Protected research time is granted to all respondents in university hospitals, 50% in King Faisal specialist hospitals, 40% in the Ministry of Defense hospitals, 20% in the National Guard hospitals, and to only 4% in the MOH hospitals.

Eighty-two percent of the respondents (44/54) reported performing trans-arterial chemoembolization procedures, 76% (41/54) perform radiofrequency ablation, 46% (25/54) perform trans-arterial radioembolization, 44% (24/54) perform microwave ablation, 4% (2/54) perform cryoablation, 2% (1/54) perform irreversible electroporation, and 19% (10/54) reported not performing any of these interventional oncology procedures.

The most frequently performed procedures are venous and dialysis procedures (46% of the respondents; 44% of them work in MOH), percutaneous biopsies and drainage (30%; 56% worked in MOH), peripheral arterial interventions (9%; 60% work in the ministry of defense), oncology interventions (4%, 50% of them work at King Faisal Specialist Hospital), gastrointestinal/genitourinary interventions (2%), and neuro-interventions (7%). All respondents reported using lead aprons in their practice, 96% (52/54) use thyroid shields, 85% (46/54) used radiation dosimeters, and only 48% (26/54) use lead eyeglasses. Other aspects related to clinical practice variations among IR practitioners were also surveyed (Figure 2).

Technical aspects results

Fifty-four percent of respondents (29/54) reported using local anesthesia for thyroid fine needle aspiration (FNA) procedures, 37% (20/54) do not (9% do not perform this type of procedure), and only 17% (9/54) reported that they request onsite cytology evaluation. Sixty-three percent (34/54) of the respondents use 22-23 gauge (G) needles for thyroid FNA, 28% (15/54) use 24-25G, and no one reported using 26-27G. Other technical variations among IR practitioners in some common procedures, such as uterine fibroid embolization and varicocele embolization, were also surveyed (Figure 3).

Logistics, policies and challenges results

Forty-one percent of the respondents (22/54) reported that endovascular aortic aneurysm repair (EVAR) in their institutions are performed by IRs and other specialists working as one team, 41% (22/54) reported that it is performed by vascular surgeons, 7% (4/54) reported that it is performed by IRs and other specialists working as separate teams, and 11% of respondents (6/54) reported that this procedure is not done in their institution. No one reported that EVAR is done by IRs alone or by cardiologists/cardiovascular surgeons. Approximately 45% of the respondents (24/54) reported that peripheral arterial interventions in their institutions are performed by IRs alone, 35% (19/54) by IRs and other specialists as separate teams, 7% (4/54) by IRs and other specialists as one team, and 13% (7/54) reported that this type of procedures is not done in their institutions. Fifty-four percent of the respondents (29/54) reported that interventional neuroradiology procedures in their institutions are performed by interventional neuroradiologists, 11% (6/54) by interventional neuroradiologists and other specialists as one team, 7% (4/54) by interventional neuroradiologists and other specialists as separate teams, 4% (2/54) by neurosurgeons, 2% (1/54) by neurologists, and 22% (12/54) of the respondents reported that this type of procedures is not done in their institutions.

The most frequent challenges and obstacles facing the respondents' IR practices were financial/funding limitation (reported by 26% (14/54); 43% of them work in the MOH), competition and lack of cooperation by other specialties (24% (13/54); 46% work in the MOH), lack of patients and public awareness (17% (9/54); 44% work in the National Guard hospitals), lack of administrative support (11% (6/54), 83% work in the MOH), and shortage of IR doctors and staff (11% (6/54), 50% work in the MOH). Other challenges were reported by 11% (6/54) of respondents.

DISCUSSION

The results of this survey provide reference information about IR practice in Saudi Arabia. A literature search showed that this topic was not surveyed previously.

The majority of the respondents were consultants (80%), and yet, the most commonly reported duration of experience was less than 5 years, indicating a young generation of IRs in this rapidly growing specialty. A clear discrepancy in gender distribution is noted with only 4% females, which appears to be an international issue. In a recent joint survey from the European Society of Radiology (ESR) and the Cardiovascular and Interventional Radiological Society of Europe (CIRSE), remarkable gender discrepancy was reported with approximately 28% of the surveyed departments had no female IRs and 52% of the departments had only 1-25% females out of all IRs ^[3]. In the United States in 2005, there were only 4.7% females who did interventional fellowships ^[4]. The percentage of women members in the Society of Interventional Radiology was 6% in 2008 and increased to only 13% in 2017 ^[5]. A recent study based on a survey by the Pan Arab Interventional Radiology Society (PAIRS) concluded that women IRs face many challenges and are underrepresented in the Arab countries^[6]. The reported reasons for this gender discrepancy included concerns of radiation exposure, difficulties to balance the personal and work duties, and a claimed absence of role models female IRs ^[3,6].

Diversity of fellowship training was obvious in this survey with 60% trained in North America and Europe. Despite the relatively recent establishment of Saudi IR fellowship programs, 22% of respondents did their fellowships in Saudi Arabia.

Variations in clinical practice among the respondents were noticeable. Compared to a recent European survey, 52% of respondents in this survey ran IR clinics versus 42% in Europe, and only 19% reported having admission privilege versus 55% in Europe ^[7]. Certain practices were found not to be following the evidence. For example, pre-procedure antiplatelet therapy (Aspirin) is advisable in all cases of aortoiliac percutaneous endovascular interventions according to the guidelines of CIRSE (level B, class I evidence); however, only 30% of respondents reported practicing that ^[8]. The evidence is still unclear about the use of dual antiplatelets therapy post-stenting of peripheral arterial disease, and some guidelines recommend against its use; however, 70% of respondents still prescribe dual antiplatelets therapy ^[8,9].

Wide variations in the techniques of procedures among respondents were present. As an example, thyroid FNA is one of the most commonly performed IR procedures, and yet, there were clear variations of the technical aspects related to this procedure. The majority of respondents (54%) used local anesthesia in thyroid FNA although several studies did not recommend its routine use, and even some studies found higher pain score when using local anesthesia in a single needle puncture ^[10,11]. Only 17% of respondents requested onsite cytology evaluation of thyroid FNA although the importance of rapid onsite evaluation has been confirmed in several studies and can significantly reduce inadequate reports ^[12,13]. The needle size used for thyroid FNA was mostly the large sizes, 22-23G. Multiple studies have not shown differences in sample adequacy of FNA between small and large needle sizes even when comparing very large needle sizes (21G) to very small ones (27G) ^[14,15]. Technical variations among respondents were also present in other commonly performed procedures, such as uterine fibroid embolization (UFE) and varicocele embolization. However, such variations have been reported in different parts of the world, including Europe ^[16]. Some of those

variations can affect the outcome of the procedures, such as the type of embolizing material in UFE and varicocele) [17,18].

EVAR is a procedure that can be performed by different specialists. In the United States, the percentage of EVAR procedures completed by vascular surgeons ranges from 66% to 88% [19,20]. In this survey, only 41% of respondents stated that in their institutions these procedures are performed solely by vascular surgeons, while 50% of the respondents stated that EVAR is done by IRs either independently or as members of a multidisciplinary team. This suggests higher involvement of IRs in this type of procedure in Saudi Arabia when compared to the United States although the comparison depends on the percentage of respondents rather than the percentage of procedures as the latter parameter is not available for analysis in this study. However, it was not reported in this survey that there are institutions in which EVAR is done exclusively by IRs. On the other hand, a much higher involvement (87%) of IRs has been reported in peripheral arterial disease interventions, out of which 44% are done exclusively by IRs. This higher involvement of IRs in peripheral vascular interventions is also reported in Europe, with a vast majority (81%) of IRs perform peripheral arterial interventions followed by vascular surgeons (58%), cardiologists (19%), and angiologists (13%) [7]. A recent study from the United States showed that the greatest proportional increase (by about 107%) in infra-popliteal claims for the period of 2011 to 2017 occurred among IRs [21].

There are several challenges facing the IR specialists, including financial limitations, lack of cooperation by other specialists, lack of public awareness, deficiency in administrative support, and staff shortages. These challenges seem to vary among different healthcare sectors. In the MOH sector, the most commonly reported challenges were financial limitations, lack of cooperation by other specialties, and lack of administrative support. In the National Guard health affairs sector, the most commonly reported challenge was the lack of public and patient awareness of IR. Similar and other challenges were also reported in different parts of the world, including the United States, Europe, and Canada [3,22,23].

A response rate of only 56% is a limitation in this study, although it is still higher than the rate reported in several similar international studies [22,23].

CONCLUSION

This study presents an overview of the current status of IR practice in Saudi Arabia. Variations in clinical practice and technical aspects among IRs were observed. Several challenges and obstacles were reported.

Bringing attention to these findings and conducting similar studies to investigate the IR status in other countries is one of the messages of this study. Recommendations can be made to the different societies of interventional radiology, including the Saudi Interventional Radiology Society (SIRS), to come up with practice guidelines to unify certain aspects of IR practice. Collaboration among all stakeholders at multiple levels in all healthcare sectors is also recommended to overcome several reported challenges related to IR practice in Saudi Arabia and worldwide.

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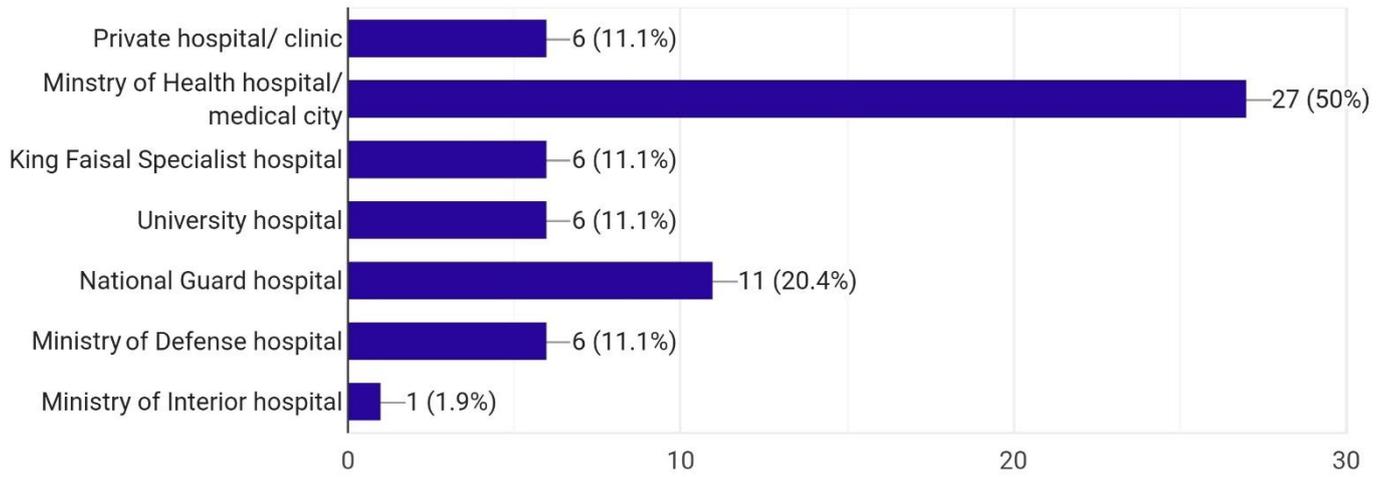


Fig 1: Distribution of respondents by sector of practice. Note: Some respondents work in more than one sector, which is why the total number/percentage exceeded 54/100%.

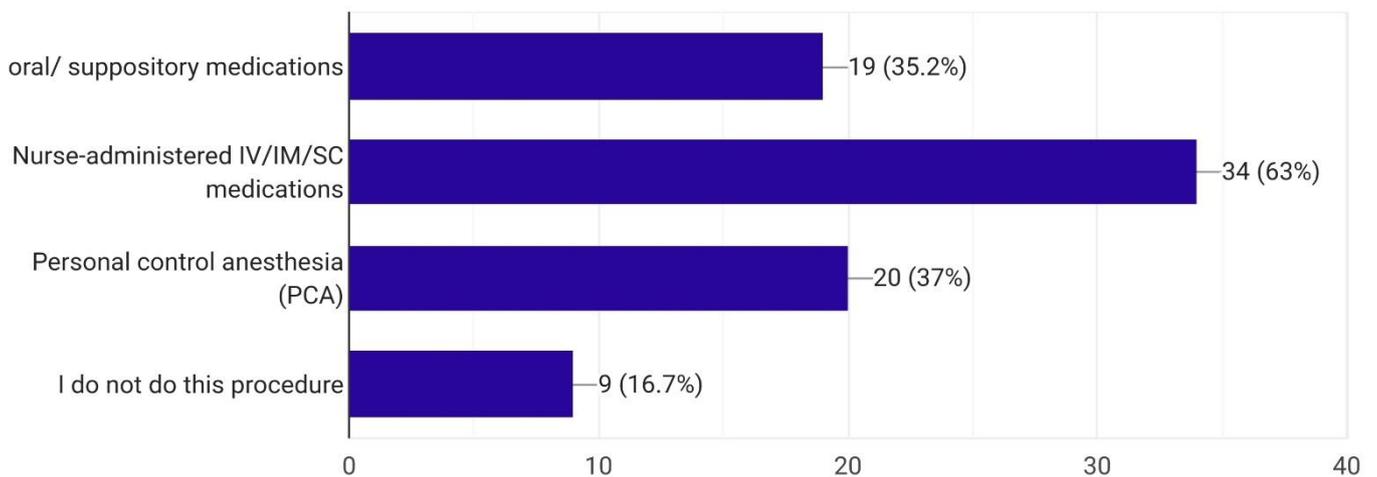


Fig 2: Responses regarding pain control medication during the post-procedure hospital stay for uterine fibroid embolization (UFE).

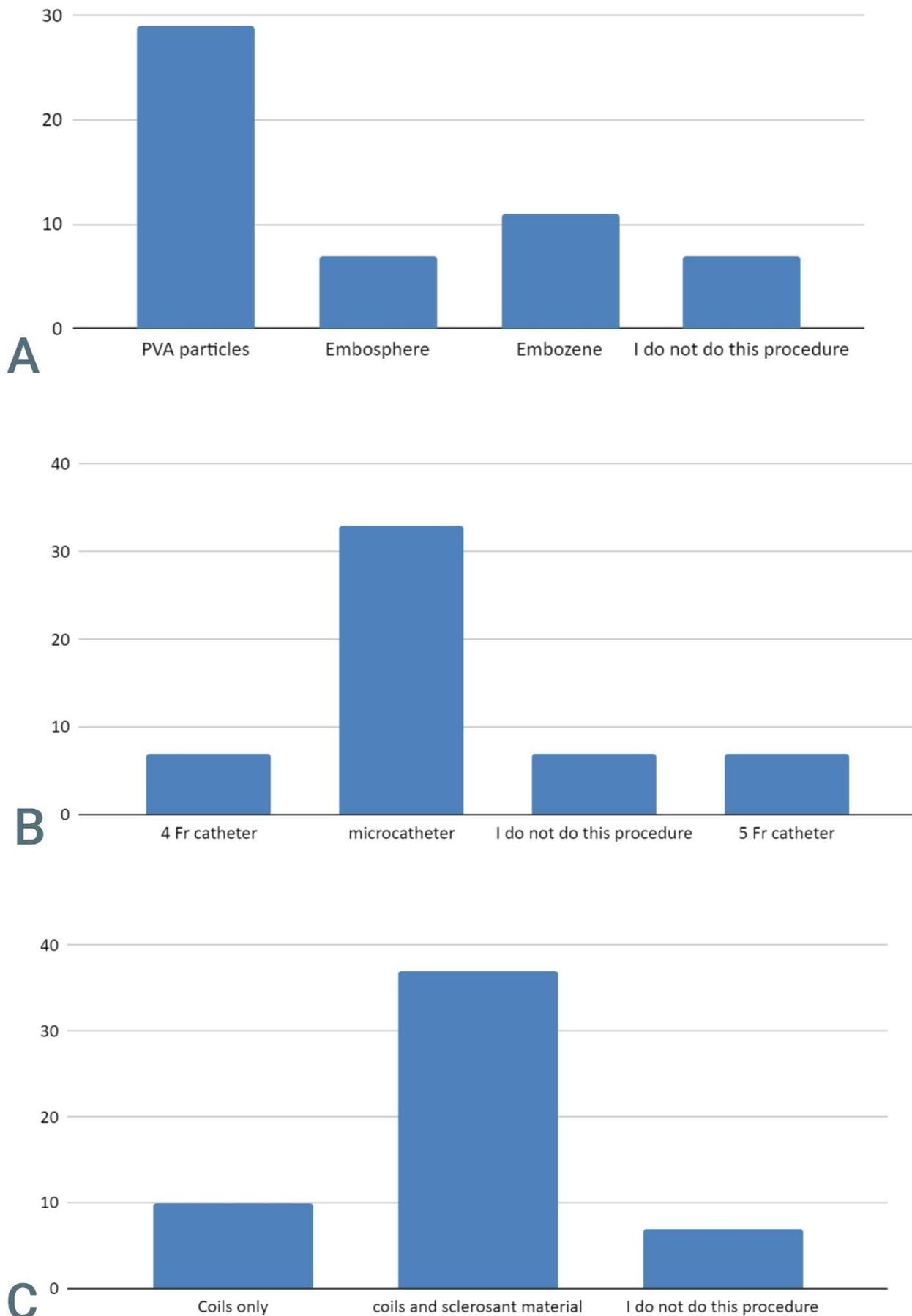


Fig 3: Variations in technical aspects among respondents. A: embolization agents used in UFE. B: type of catheter used in UFE. C: material used in varicocele embolization.