Family medicine residents in central Saudi Arabia

How much do they know and how confident are they in performing minor surgical procedures?

Mohammed A. Andijany, *MBBS,* ***Mohammed A. AlAteeq,*** *MD.*

ABSTRACT

الأهداف: اكتشاف المعرفة الطبية والممارسة العملية في أداء العمليات الجراحية الصغرى لدى المتدربين في برامج طب الأسرة في مدينة الرياض بالمملكة العربية السعودية، ومدى ثقتهم بأنفسهم والعوائق المانعة والحلول المقترحة في نظرهم.

الطريقة: أجريت هذه الدراسة المقطعية عن طريق توزيع استبانات علمية محكمة على المتدربين في برامج طب الأسرة من جميع المستويات بمدينة الرياض وعددهم 267 متدرباً.

النتائج: بلغ معدل استجابة المتدربين في برامج طب الأسرة 71.9% (192) وبلغ متوسط معرفتهم بالعمليات الجراحية الصغرى 15.75% ومتوسط المهتمين بها 10.4 من أصل 12 كما بلغ متوسط ممارستهم لها 9.18 من أصل 23 عملية. كان متوسط ثقتهم بأنفسهم 26.6 من أصل 63 درجة وكان العائق الأكثر شيوعاً هو الافتقار إلى التدريب 115 (59.9%)، بينما كان العائق الأقل شيوعا هو الافتقار إلى الاهتمام 113 (58.9%). كانت الطريقة الأكثر فاعلية في تحسين الأداء في نظرهم هي تكثيف النشاط التعليمي بينما كانت الطريقة الأقل فاعلية هي زيادة مدة التدريب في التخصصات الجراحية بالبرنامج التدريبي.

الخاتمة: معظم متدربي طب الأسرة لهم اهتمام بالعمليات الجراحية الصغرى لكن يوجد قصور بالمعرفة الطبية والثقة الذاتية وقلة الممارسة العملية. تحتاج البرامج التدريبية إلى عمل تقييم ذاتي لمتدربيها في هذا المجال. يمكن تحسين أداء المتدربين وخبراتهم في العمليات الجراحية الصغرى بتوفير برامج تدريبة مستمرة تحت إشراف مدربين مؤهلين ومهتمين في العيادات التدريبية في طب الأسرة.

Objectives: To explore the knowledge, practice, barriers and reported self-confidence of family medicine (FM) residents in Riyadh, Kingdom of Saudi Arabia, in performing minor surgical procedures (MSP).

Methods: A cross-sectional study was conducted by distributing questionnaires to 267 family medicine residents in Riyadh, Kingdom of Saudi Arabia between May and July 2016. The questionnaire includes 7 categories with 71 questions about: knowledge, interest, experience and confidence in performing different MSPs, prior training in MSPs, perceived barriers to performing MSPs and ways to improve basic surgical skills.

Results: The response rate was 71.9%. Residents had a mean knowledge score of 15.75% and a mean interest score of 10.4 out of 12. Out of 23 MSPs surveyed, residents had performed a mean average of 9.18. The mean of residents' confidence scores was 26.6 out of 63. The most common barrier to performing MSPs was a lack of training (n=115; 59.9%), while the least common barrier was a lack of interest (n=113; 58.9%). Participants consider intensive education to be the the most effective way to improve their performance, while increasing the duration of some rotations found to be the least effective way for improvement.

Conclusion: A majority of FM residents were interested in MSP, but had low perceived knowledge, low reported confidence and infrequent practice. Family medicine programs should provide continuous standardized training by a qualified and interested trainer within the FM setting.

Saudi Med J 2019; Vol. 40 (2): 168-176
doi: 10.15537/smj.2019.2.23914

From the Department of Family Medicine, Ministry of National Guard-Health Affairs, King Abdullah International Medical Research Center, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Kingdom of Saudi Arabia.

Received 15th August 2018. Accepted 8th January 2019.

Address correspondence and reprint request to: Dr. Mohammed A. AlAteeq, Department of Family Medicine and Primary Health Care, King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, Kingdom of Saudi Arabia. E-mail: ateeqm@ngha.med.sa
ORCID ID: orcid.org/0000-0001-6747-6765

Minor surgical procedures are an essential part of FM practice. Minor surgery includes any procedure that is performed relatively simply, usually under local anesthesia, has a short duration, involves a relatively accessible part of the body, and is rarely associated with intraoperative or postoperative complications.[1] Performing MSPs in primary health care clinics (PHCCs) rather than hospitals is thought to be beneficial in terms of patients' waiting time and their satisfaction, and the patient-doctor relationship. It has also been proven to be cost-effective, cheaper than performing the same procedure in hospital, and shortens the waiting time for MSPs conducted in hospitals.[2,3]Nevertheless, most practicing FM physicians, whether certified or in residency training, do not perform MSPs in the normal course of their daily practice, or if they do, only undertake a limited list of MSP types. This may be attributed to several factors including lack of training, lack of setting, and lack of time.[2,4,5] Internationally, a cross-sectional study of Canadian family physicians found that a significant number do not usually perform 4 types of MSP: skin excision, shoulder or knee joint injections, and endometrial biopsy. Instead, they refer patients to other specialties. The most common reasons given for doing this were lack of skills and lack of time. Likewise, a newly graduated physician may not feel confident enough to practice certain MSPs in the PHCC setting because they have had insufficient exposure to that procedure during their medical school training or residency program.[2] In Kingdom of Saudi Arabia, one study of primary health care (PHC) physicians conducted in Al-Qatif city explored physicians' perceptions, attitudes and readiness to undertake MSPs. Most (86.9%) were interested in conducting MSPs in the PHCC setting, but they were not confident in doing so. Reported barriers to performing MSPs were inadequate facilities (90.2%), staff shortages (55.8%), fear of complications (73.7%), medicolegal considerations (72.2%), lack of time (70.4%), and ease of referral to other specialties (57.3%). A significant number of physicians also reported lacking the necessary training (80%) and experience (65.4%) to perform MSPs.[4] Provision of hands-on MSP training for family physicians, even years after board certification, has been found to be beneficial and enhances MSP practice in the FM setting. This was evident in a Canadian study by Nasmith et al,[6] in which 25 family physicians underwent a series of workshops to train them on 7 MSPs. Six months later, the researcher noted an increase in the number of MSPs reported. They concluded that MSP workshops were important for upgrading residents' skills and recommended that they should be an essential part of the FM residency training program curriculum.[6] In another study of FM residents in Oakwood Annapolis, United States of America, a wound care service training program was developed and assessed in terms of its usefulness and effectiveness by testing FM residents before and after the training. A significant improvement was noted in residents' knowledge and confidence in taking care of wounds.[7] In FM residency training programs in Kingdom of Saudi Arabia, all residents must be trained and assessed on a certain MSP, which are listed as a learning objective of specific rotations and could be practiced in different clinical settings.

This study aimed to explore the perceived knowledge, practice, barriers and self-confidence of FM residents in performing MSPs during their residency training program.

Methods. Prior to research conduction, manual search of English-language journals for similar articles about MSPs in FM, PHC and general practice was conducted in Medline and Google Scholar.

This was a cross-sectional study of physicians enrolled in FM residency training programs in Riyadh, Kingdom of Saudi Arabia, between May and July 2016. There are 6 such programs in Riyadh, Kingdom of Saudi Arabia: King Abdulaziz Medical City at National Guard (KAMC), King Faisal Specialist Hospital and Research Center (KFSHRC), Security Forces Hospital (SFH), King Saud University (KSU), Prince Sultan Military Medical City (PSMMC), and Ministry of Health (MOH).

In Kingdom of Saudi Arabia, FM residency training programs are 4 years in duration (full time), and designed to provide learning opportunities in multiple settings (namely, hospital, ambulatory care, emergency settings, and in-home and long-term care facilities). In relevant rotations, there is the opportunity to learn and practice various MSPs.

The study population included the entire cohort of 267 FM residency trainees enrolled in R1-R4 in one of the 6 programs. There was not exclusion criteria.

Data was collected using a structured questionnaire that was pre-designed by the investigators based on the study objectives, and after a literature review of similar studies. The questionnaire was reviewed and validated by 2 research experts and a biostatician.

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

The questionnaire was divided into 2 main sections: the first section was for demographic data (gender, current level of training, and current training center), and the second section included 7 categories with a total of 71 questions. The 7 categories included questions about: knowledge of different MSPs (4 questions), prior training in MSPs (4 questions), interest in performing MSPs (3 questions), experience of 21 MSPs during different clinical rotations (21 questions), confidence in performing these 21 MSPs (21 questions), and perceived barriers to performing MSPs and ways to improve basic surgical skills (11 questions). Questions were analyzed separately.

The questions concerning residents' self-confidence in performing MSPs were developed after reviewing the current literature, and were reviewed and validated by a biostatician. Each procedure was scored on a 4-point scale: 0=not confident at all; 1=confident with assistance; 2=confident to carry out the procedure alone but not to deal with the complications; and 3=confident to carry out the procedure alone and to deal with the complications.

The questionnaire was pre-tested in a pilot study on a sample of 20 residents; feedback was taken into consideration and changes were made accordingly. The results of the pilot study are not included in the analysis.

The investigator distributed a hard copy of the questionnaire to all FM residents, explained the study's objectives, and obtained verbal consent from all those who completed it.

All data were coded, entered and analyzed using Statistical Package for Social Sciences software, Version 23 (IBM Corp., Armonk, NY, USA). Continuous variables were reported in terms of means and standard deviation, while categorical variables were described using frequencies and percentages. Analytic statistics were carried out using the Chi-square (x^2) test for associations or the difference between 2 categorical variables. A $p \leq 0.05$ was considered significant.

Ethical consideration. Scientific and ethical approval was obtained from King Abdullah International Medical Research Center (KAIMRC). Participants were guaranteed privacy, confidentiality and anonymity. Participation in the study was voluntary. Data collection sheets were coded using 3-digit serial numbers, maintained by the co-investigator. Participants could not be traced after collecting the data sheets. Information obtained from data sheets was used for research purposes only. The study was carried out according to the principles of Helsinki Declaration.

Results. A total of targeted 267 residents were approached to complete the questionnaire, with the response rate being 71.91% (192 residents). Males constituted 52.1% of participants. Thirty-five point four percent of residents were in R1 of their 4-year training program; 28.1% in R2, 19.3% in R3, and 17.2% in R4 levels. In regard to the training programs, 29.2% from Prince Sultan Military Medical City, 21.4% were from King Abdulaziz Medical City at National Guard, 19.3% from Ministry of Health, 15.1% from King Saud University, 8.9% from Security Forces Hospital and 6.3% form King Faisal Specialist Hospital & Research Center.

Ninety-one residents (47.4%) had previously undertaken MSP training courses. **Table 1** presents the detailed extracurricular education of the residents in MSPs.

Table 2 presents residents' scores regarding their perceived knowledge of surgical skills.

In regrad to the participants interest in earning MSP, more than 85% of participants either strongly agree or agree with the statements: "I am interested in upgrading my surgical skills during my residency training, "I support the idea of taking courses/workshops in MSPs during educational leave" and "I support the idea of taking practical sessions in MSPs during the academic day". Residents' scores of interest in learning MSP was 12, calculated by multiplying 3 (concepts) by 4 (score for 'strongly agree'). The mean of total scores was 10.4 out of 12.

Table 3 summarizes residents' previous experience of 21 different MSPs. The 3 procedures that residents had most often performed alone were suture removal (n=102; 53.1%); intramuscular, subcutaneous or

Table 1 - Residents' background in minor surgical procedures.

Training background	n (%)
Have you undertaken any extracurricular training in minor surgical procedures? (n=192)	
Yes	91 (47.4)
No	101 (52.6)
How many times have you taken an extracurricular training course in minor surgical procedures? (n=91)	
One time	55 (60.4)
2 times	23 (25.3)
3 times	13 (14.3)
Duration of training course? (n=91)	
3 days or less	79 (86.8)
>3 days	12 (13.2)
When did the training course take place? (n=91)	
During medical school	43 (47.3)
During internship	56 (61.5)
During first year of residency	24 (26.7)
During second year of residency	22 (24.4)
During third year of residency	4 (4.4)
During fourth year of residency	1 (1.1)

intradermal injection (n=84; 43.8%), and wound closure and dressing (n=83; 43.2%). The 3 procedures most often not performed were thoracic tube insertion (n=171; 89.1%); corneal foreign body removal (n=164; 85.4%); and intrauterine contraceptive device (IUCD) insertion and removal (n=155; 80.7%).

Table 4 presents the score the residents' perceived confidence level in performing 21 different MSPs. The mean confidence score was 26.6 out of 63. The 3 procedures that residents were most confident about were suture removal (n=119; 62%), wound closure and dressing (n=82; 42.7%), and injection intramuscular, subcutaneous or dermal (n=81; 42.2%). The 3 procedures that residents were least confident about performing were thoracic tube insertion (n=110; 57.3%), intubation of airways (n=94; 49%), and lumbar puncture (n=91; 47.4%).

The barriers to performing MSPs, as reported by residents, are presented in **Table 5**. The most 3 commonly reported barriers were lack of training (n=115; 59.9%), lack of trainers (n=95; 49.5%), and lack of skills/ experience/confidence (n=82; 42.7%). The 3 barriers least often reported were lack of interest (n=113; 58.9%), not being allowed to perform the procedure by a consultant or supervisor (n=101; 52.6%), and patient refusal (n=93; 48.4%). The most effective ways to

Table 2 - Residents' knowledge of surgical skills (n=192).

Knowledge area	Yes	Partially yes	No
Resident knows the common types of sutures	40 (20.8)	118 (61.5)	34 (17.7)
Resident knows the common suturing techniques	29 (15.1)	114 (59.4)	49 (25.5)
Resident knows the common types of knots	22 (11.5)	93 (48.4)	77 (40.1)
Resident knows the names of common surgical instruments used for minor surgery	30 (15.6)	115 (59.9)	47 (24.5)

Values are presented as number and percentage (%)

Table 3 - Residents practicing minor surgical procedures (n=192).

Minor surgical procedures	Yes, I have performed this procedure alone	Yes, I have performed this procedure with assistance	No, I have not performed this procedure
Injections: intramuscular or subcutaneous or intradermal	84 (43.8)	48 (25.0)	60 (31.3)
Lumbar puncture	13 (6.8)	46 (24.0)	133 (69.3)
Nasogastric tube insertion and lavage	51 (26.6)	61 (31.8)	80 (41.7)
Insertion and removal of Foley's catheter	59 (30.7)	55 (28.6)	78 (40.6)
Intubation of airways	11 (5.7)	40 (20.8)	141 (73.4)
Thoracic tube insertion	6 (3.1)	15 (7.8)	171 (89.1)
Aspiration and injections of joints, namely, knee joints	9 (4.7)	30 (15.6)	153 (79.7)
Proctoscopy	11 (5.7)	40 (20.8)	141 (73.4)
Wound closure and dressings	83 (43.2)	69 (35.9)	40 (20.8)
Suture removal	102 (53.1)	42 (21.9)	48 (25.0)
Cast removal	35 (18.2)	46 (24.0)	111 (57.8)
Ascetic taping	15 (7.8)	41 (21.4)	136 (70.8)
Incision and drainage of superficial abscesses	34 (17.7)	43 (22.4)	115 (59.9)
Excision of ingrowing nails	12 (6.3)	31 (16.1)	149 (77.6)
Ear wax aspiration	19 (9.9)	35 (18.2)	138 (71.9)
Nasal packing or cautery for control of epistaxis	22 (11.5)	30 (15.6)	140 (72.9)
Cauterization and cryosurgery with liquid nitrogen	30 (15.6)	39 (20.3)	123 (64.1)
Skin biopsy and excision of skin lesions	17 (8.9)	27 (14.1)	148 (77.1)
Corneal foreign body removal	6 (3.1)	22 (11.5)	164 (85.4)
Obtaining vaginal and cervical cytology	35 (18.2)	34 (17.7)	123 (64.1)
Intrauterine contraceptive device insertion and removal	3 (1.6)	34 (17.7)	155 (80.7)

Values are presented as number and percentage (%).

Table 4 - Residents' confidence in performing 21 minor surgical procedures.

Minor surgical procedures	Confidence level*				Mean total confidence level score (out of 63)*
	0	1	2	3	
Injections: intramuscular or subcutaneous or intradermal	15 (7.8)	48 (25.0)	48 (25.0)	81 (42.2)	
Lumbar puncture	91 (47.0)	66 (34.4)	28 (14.6)	7 (3.6)	
Nasogastric tube insertion and lavage	38 (20.0)	47 (24.5)	54 (28.1)	53 (27.6)	
Insertion and removal of Foley's catheter	25 (13.0)	47 (24.5)	61 (31.8)	59 (30.7)	
Intubation of airways	94 (49.0)	64 (33.3)	28 (14.6)	6 (3.1)	
Thoracic tube insertion	110 (57.0)	60 (31.3)	14 (7.3)	8 (4.2)	
Aspiration and injections of joints, namely, knee joints	71 (37.0)	83 (43.2)	29 (15.1)	9 (4.7)	
Proctoscopy	74 (39.0)	66 (34.4)	32 (16.7)	20 (10.4)	
Wound closure and dressings	18 (9.4)	44 (22.9)	48 (25.0)	82 (42.7)	
Suture removal	15 (7.8)	25 (13.0)	33 (17.2)	119 (62.0)	
Cast removal	32 (17.0)	62 (32.3)	39 (20.3)	59 (30.7)	26.6
Ascetic taping	72 (38.0)	64 (33.3)	38 (19.8)	18 (9.4)	
Incision and drainage of superficial abscesses	32 (17.0)	77 (40.1)	43 (22.4)	40 (20.8)	
Excision of ingrowing nails	66 (34.0)	73 (38.0)	31 (16.1)	22 (11.5)	
Ear wax aspiration	49 (26.0)	65 (33.9)	43 (22.4)	35 (18.2)	
Nasal packing or cautery for control of epistaxis	64 (33.0)	66 (34.4)	33 (17.2)	29 (15.1)	
Cauterization and cryosurgery with liquid nitrogen	61 (32.0)	50 (26.0)	43 (22.4)	38 (19.8)	
Skin biopsy and excision of skin lesions	67 (35.0)	75 (39.1)	27 (14.1)	23 (12.0)	
Corneal foreign body removal	84 (44.0)	71 (37.0)	26 (13.5)	11 (5.7)	
Obtaining vaginal and cervical cytology	64 (33.0)	57 (29.7)	33 (17.2)	38 (19.8)	
Intrauterine contraceptive device insertion and removal	77 (40.0)	69 (35.9)	35 (18.2)	11 (5.7)	

Values are presented as number and percentage (%). Confidence level scores: 0= not at all confident; 1= confident but only with assistance; 2= confident to carry out the procedure alone but not to deal with complications; 3= confident to carry out the procedure alone and to deal with complications.

improve residents' performance of MSP were intensify educational activities during the residency training program (namely, workshops, skills labs and lectures), as reported by 55.2% of resident being the most effective way, followed by taking extra activities outside the program (namely, workshops, symposia and courses) (34.4%) and to make modifications to the curriculum to enhance this issue (27.1). Increasing the duration of some rotations that teach MSPs was reported by 40% of resisndts as the least effective way to enhance MSP performance follwed by taking some clinics in surgery during the FM clinical rotation (27.6%).

Table 6 shows the correlations applied by way of bivariate analysis between perceived knowledge, resident interest, performed procedures, and confidence in performing MSPs, and training level, training courses undertaken, duration and MSP time of training.

Discussion. This study explored the perceived knowledge and confidence of FM residents, their experience of practice, and reported barriers to performing MSPs. The response rate of 71.9% (192 out of 267) may be considered reasonable, and constitutes almost 25% of the total number of FM residents in Kingdom of Saudi Arabia. Although the questionnaire was anonymous and residents were reassured that all data would be confidential, some may have been hesitant to report their perceived knowledge and confidence in medical practice, hence may not have wanted to participate in such a study. This study had an unequal distribution of residents across the 4 levels of training, with more residents at junior levels (R1 and R2). This may be explained by the fact that the yearly intake of FM residents in training is steadily increasing in Kingdom of Saudi Arabia, with more residents enrolled each year. Almost half of residents reported that they had previously taken an extracurricular course in MSPs, either during medical school, during their internship, or during the FM residency training program. Most of those who had undertaken such a course said they had only had one course, and that it lasted for 3 days or fewer.

When deciding whether or not to undertake an extracurricular course, there are many factors that might

Table 5 - Barriers of performing minor surgical procedures reported by residents.

Barriers	Most common barrier	Common barrier	Least common barrier	Total
Lack of facilities, namely, instruments, specialist clinics	66 (34.4)	67 (34.9)	59 (30.7)	
Lack of time	51 (26.6)	67 (34.9)	74 (38.5)	
Lack of skills/experience/confidence	82 (42.7)	86 (44.8)	24 (12.5)	
Lack of training	115 (59.9)	70 (36.5)	7 (3.6)	
Lack of trainers	95 (49.5)	73 (38.0)	24 (12.5)	
Patients' attitude/refusal to undergo the procedure	20 (10.4)	79 (41.1)	93 (48.4)	192 (100)
Not allowed by consultant/supervisor	22 (11.5)	69 (35.9)	101 (52.6)	
Competition with other residents/specialists	47 (24.5)	68 (35.4)	77 (40.1)	
Lack of interest	25 (13.0)	54 (28.1)	113 (58.9)	
No indication in practice	43 (22.4)	73 (38.0)	76 (39.6)	
Easy to refer procedures to other specialties	48 (25.0)	88 (45.8)	56 (29.2)	

Values are presented as number and percentage (%).

Table 6 - Bivariate analysis (*p*-value).

Variables	Perceived knowledge	Interest	Performed procedure	Confidence score
Training level	0.028	0.574	0	0.001
Resident received training	0	0.155	0.01	0.176
Duration				
3 days or fewer	0.001	0.082	0.589	0.455
More than 3 days	0.005	0.045	0.502	0.419
Time during medical training at which extracurricular training was taken	0.24	0.964	0.035	0.276
Time during internship at which extracurricular training was taken	0.019	0.955	0.725	0.004
Perceived knowledge		0.036	0	0
Interest	0.036		0.24	0.005
Performed procedure	0	0.24		0
Confidence score	0	0.005	0	

A *p*-value ≤0.05 was considered significant.

influence medical students and residents. One is self-awareness and recognition of the importance of being knowledgeable and skillful in such a medical practice. Another factor is interest; if medical interns are not interested in certain surgical specialties, they may make an early decision to specialize in fields that have a low requirement to perform MSPs. A third important factor is real-life practice: medical students and most FM medical residents on rotation do not have the opportunity to perform MSPs because they are carried out by the consultant or specialist. Hence, students/residents do not recognize the need to improve their knowledge and skills in MSPs. Our results showed that few residents undertook MSP training during their residency training, despite the fact that residents have greater responsibility for, and direct contact with patients compared to medical interns, therefore, their need for better knowledge and skills is greater. This finding might be explained by the fact that, unfortunately, MSPs are not part of the daily practice of most certified or non-certified family physicians in Kingdom of Saudi Arabia, either because of privilege and regulation issues, or because of a lack of resources and poor clinical settings. During residency training, most residents need monitoring and guidance to fill their knowledge and skill gaps by taking extracurricular courses. Minor surgical procedure is one important aspect of medical practice that requires such extra training. To evaluate residents' knowledge of MSPs, we asked them 4 questions: to name the types of sutures, suturing techniques, surgical knots, and common instruments. The mean number of residents who knew the answers to all 4 questions was 30.25 (15.75%). The mean number of residents who did not know any of the listed items was 51.75 (26.95%). These figures are worrying and may reflect residents' poor knowledge of MSP, despite the fact that almost half of participants reported taking at least one MSP training course. This finding may be attributed to residents' poor experience of MSP in their daily medical practice. Level of perceived knowledge correlates positively with level of residency, formal training in MSP, confidence score and level of interest. In an American study, FM residents had a mean knowledge score about wound care of 42.5%.[7] Although the American study only looked at one surgical skill, the finding is similar to that in the present study. A clear majority of residents reported having an

interest in upgrading their knowledge and experience of MSPs, either by taking extracurricular courses or arranging practical sessions during the academic day. This may reflect a genuine need and readiness to take upgrade and refresher courses in MSPs. The directors of FM training programs should consider making MSP courses an essential part of the academic day at all levels, and to help residents to take these courses by freeing their time (namely, through educational leave), or by supporting them financially and logistically. Level of residents' interest correlated negatively with level of training, with more senior residents being less interested. This may be explained by that fact that senior residents may perceive that they have had enough MSP training. Also, residents with greater perceived knowledge and confidence were found to be more interested. Alfaraj et al,[4] reported similar high interest in performing MSP among practicing primary doctors in AlQatif, Kingdom of Saudi Arabia. Residents were asked if they had experience of performing any of a list of 21 MSPs on the FM training curriculum. The 3 procedures most often performed by residents alone were suture removal (53.1%); intramuscular, subcutaneous or intradermal injection (43.8%), and wound closure and dressing (43.2%). This was expected since these 3 MSPs are simple and commonly performed in FM clinics. The 3 procedures reported least often were thoracic tube insertion (89.1%), corneal foreign body removal (85.4%), and IUCD insertion and removal (80.7%). It was expected that the first 2 of these 3 procedures would be performed relatively infrequently since they are relatively advanced interventional procedures, only performed in rare cases and requiring a specialist setting. However, we did not expect so few IUCD insertions and removals. We think the reason for this is the way in which FM is arranged in Kingdom of Saudi Arabia, where by most IUCD insertions and removals are referred to a gynecology clinic that has the appropriate setting and equipment. Throughout their 4-year training, FM residents only spend 2 months on a gynecology rotation. In addition, male doctors are commonly not allowed to perform the procedure. A worrying finding of this study is that the mean number of MSPs performed by residents was only 8.4 out of 21, and there were even few residents who reported that they had never performed any procedures at all (2.6%). Bearing in mind that many of the MSPs listed in this study are simple with little requirement for advanced training, we think that residents' poor experience is mostly related to the way in which FM clinics are arranged. This study found that, compared to other groups, senior residents and those who had received formal MSP training had a greater level of self-reported knowledge and greater confidence in practicing MSPs. A similar local study also found that male primary care physicians living in remote areas performed more MSPs than other groups of physician, and as doctors gained confidence in certain skills such as resuscitation, venous cut-down, and handling trauma and fractures, they performed more MSPs than those who were not confident.[8] Comparing these findings with a similar Canadian study of practicing family physicians, most participants in that study reported that they do not routinely perform 4 listed procedures, namely, dermatological excision, endometrial biopsy, shoulder injection, and knee injection.[2] The residents in our study reported varying levels of confidence in performing MSPs. The mean confidence score was 26.6/63. The 3 procedures that residents were most confident about were suture removal (62%), wound closure and dressing (42.7%), and injection intramuscular, subcutaneous or dermal (42.2%). This finding was expected because these procedures are simple and frequently practiced in the clinic. The 3 procedures about which residents felt least confident were thoracic tube insertion (57.3%), intubation of airways (49%), and lumbar puncture (47.4%). In fact, almost half of the participants in our study reported having no confidence at all in performing lumbar punctures or airway intubation; this is a significant finding that should be remarked for improvement by training program coordinators. This study identified that residents' confidence levels appear to linearly decrease with decreasing frequency of practice, and clearly show the procedures with which residents report having deficient experience; therefore, these data would be very useful for program directors to plan training activities. We also found that confidence level is positively correlated with level of training; senior levels of resident were more confident, had greater self-reported knowledge and interest, and more frequently practice MSPs. A similar self-reported level of competency was found among primary care physicians in AlQatif, Kingdom of Saudi Arabia.[4] Little et al,[7] found the self-reported confidence levels of American FM residents in performing surgical wound care to be 1.9-3.2 on a scale of 1-5 (where 1=most confident and 5=least confident). In Canada, Friedlich et al,[9] and Goertzen,[10] found higher confidence levels among FM residents; this was expected because surgical procedures form an essential part of FM clinical practice in Canada.

In our study, residents clearly pinpointed the barriers that they perceive prevent them from acquiring sufficient knowledge of and skills in MSPs. Most residents reported that their superior consultant allows them to carry out the MSP, that they have no problem in obtaining patient permission, and they are interested in such procedures. The remaining barrier then, is training by qualified and interested trainers; indeed this was the reason most often cited by residents to explain their lack of competence in MSPs. Sempowski et al,[2] reported a similar barrier "lack of up-to-date skills" among Canadian family physicians.

Inadequate training can be caused by several factors: lack of time during clinical practice, lack of interested and qualified trainers, especially in FM clinics, and lack of an appropriate setting in FM clinics. All of these issues are manageable and could be fixed easily. When we asked residents how their performance in MSPs might be improved, interestingly, they least often reported that the duration of their surgical specialty rotation should increase. This may indicate 2 things: first, that rotating in surgical specialties is not very effective for MSP training, and second, that FM residents are more interested in training within the FM program and FM clinics, where they spend most of their training time and are familiar with the staff and settings. Several studies,[6,7,11,12] found that MSP performance improved by incorporating more survival procedures within FM clinics. Importantly, the residents surveyed in this study revealed that they have low confidence in performing MSPs, and perceive several barriers that lead to poor practice. Residents themselves have made some clear suggestions as to how residency training programs may be improved; program directors should review these suggestions to develop a well-organized improvement plan for this essential competency. It would be a good idea to establish a special one-year program after the board to enhance family physicians' surgical skills, especially for those who plan to practice in rural areas, similar to the enhanced surgical skills program in Canada.[10,13-15]

Study limitations. Data on residents' knowledge was self-reported as perceived by the residents themselves, not through formal knowledge assessment. Recall bias cannot be excluded. Since the study was only conducted in Riyadh, Kingdom of Saudi Arabia, the results may not be generalizable to all family medicine residents in Kingdom of Saudi Arabia.

More similar studies with a larger scale and for other programs outside Riyadh, kingdom of Saudi Arabia, are needed to explore this issue more. For the situation to be improved, several factors need to be considered. Minor procedures need to be part of the family physicians duties at PHC services. For this to succeed, the centers need to be equipped well with the necessary setting, with enhancement and refreshment of knowledge and skills of trainers and practicing physicians through continuous professional development activities. This will create good environment for the teaching and training of FM residents. In addition, and at the level of Saudi Commission for Health Specialties, review of training curriculum is warranted to develop and improve the content related to MSPs in term of objectives and competencies, process of training and tools of assessment.

In conclusion, a majority of FM residents in this study were interested in MSP, but had low perceived knowledge, low reported confidence, and infrequent practice. This requires further internal assessment by each program, but generally, we recommend that programs might be improved by providing continuous standardized training by qualified and interested trainers in minor procedure clinics within the FM setting.

Acknowledgment. *The authors gratefully acknowledge Dr. Saeed Ulrahman, Dr. Emad Yasin and Muneera Baraja, from the Department of Family Medicine and Primary Health Care, King Abdulaziz Medical City, Riyadh, Kingdom of Saudi Arabia, who were consulted in preparation of the data collection, for thier help and guidance. We would like also to thank eScienta (www.eScienta.com) for the English language editing.*

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