Family Medicine Residents Knowledge and Confidence in Doing Minor Surgical Procedures in Tabuk City, Saudi Arabia

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Abstract

Background: Minor surgical procedures (MSPs) are essential components of family medicine practice and can be effectively performed in primary health care settings, offering patients timely, accessible, and cost-effective care. However, the level of training, knowledge, and confidence in MSPs among family medicine residents in Saudi Arabia remains underexplored.

Objective: To assess the knowledge, confidence, training experience, perceived barriers, and attitudes of family medicine residents in Tabuk toward performing minor surgical procedures.

Methods: This cross-sectional study was conducted among family medicine residents in Tabuk City, Saudi Arabia, during the period from May to December 2024. A validated, self-administered questionnaire adapted from a previous study was distributed to all eligible residents (N=75). The questionnaire included items on demographics, knowledge, training experience, procedural exposure, confidence, barriers, and suggestions for improvement. Data were analyzed using SPSS version 28. Knowledge was categorized as good or poor based on a 60% score threshold, while confidence was classified as low, moderate, or high based on composite mean scores.

Results: A total of 30 residents participated. Most reported adequate knowledge of sutures, suturing techniques, and surgical instruments, but fewer were familiar with surgical knots. Confidence was high for basic procedures like wound suturing and local anesthesia but low for specialized procedures such as biopsies and gynecological interventions. While the majority had performed common clinical procedures during training, exposure to advanced MSPs was limited. Key barriers included lack of facilities and practical experience. Residents showed strong interest in skill improvement and supported structured educational activities. No statistically significant associations were found between knowledge or confidence levels and gender or training level.

Conclusion: In spite of good exposure to basic MSPs, gaps remain in training and confidence, particularly for complex or specialty-specific procedures. Structured and mandatory skill development programs, including hands-on training and surgical rotations, are strongly recommended to enhance residents' competencies.

Keywords

Family medicine, minor surgical procedures, residency training, confidence, knowledge, Saudi Arabia.

Introduction

Health care systems worldwide are increasingly shifting from hospital-based services to primary health care [PHC]-centered models. Minor surgical procedures [MSPs] are a prime example of medical interventions that, while traditionally performed in hospital settings, can be safely and effectively carried out in PHC centers offering patients more accessible care, reduced waiting times, and significantly lower costs [1,2].

Minor surgical procedures are considered a fundamental component of family medicine practice. They are typically defined as procedures involving superficial tissues performed under local anesthesia, with minimal equipment and a low risk of complications. These procedures are commonly encountered in clinical practice and include tasks such as lesion excisions, superficial biopsies, abscess incision and drainage, ingrown toenail removal, wound suturing, foreign body removal, and musculoskeletal injections [3, 4].

The financial implications of performing these procedures in hospitals versus primary care settings have also been well-documented. A recent study found that the average cost of an MSP performed by a family medicine physician was $236, compared to $787 when done by a specialist resulting in an average savings of $551 per procedure, which translates to approximately 70% cost reduction [5].

Family medicine residents play a crucial role in delivering minor surgical procedures as part of comprehensive primary care. Their involvement not only enhances continuity of care but also contributes to early intervention, reduced referrals, and improved patient satisfaction. Training in these procedures during residency ensures that future family physicians are well-equipped to manage common surgical conditions independently within the primary care setting. Studies have emphasized

that hands-on experience during residency significantly improves both competency and confidence in performing minor procedures, such as wound suturing, skin excisions, and joint injections, which are essential in everyday family practice [6, 7].

To ensure safe and effective minor surgical care, it is essential for family physicians to be familiar with the surgical instruments used, understand their handling, and be trained in the application of local anesthesia. Knowledge of skin anatomy and awareness of high-risk areas are also crucial for preventing complications and ensuring procedural safety [3, 8].

Given the importance of MSPs in family practice and their potential benefits in primary care settings, assessing the current level of knowledge, confidence, and perceived barriers among family medicine residents is critical. This study was conducted to evaluate these elements and identify areas for improvement in surgical training within the residency program.

Methodology

A cross-sectional study design and was conducted in Tabuk City, Saudi Arabia. The target population included all family medicine residents currently enrolled in training programs within the city. These residents were affiliated with two major training centers: the Ministry of Health [MOH] Family Medicine Program and the Military Hospital Family Medicine Program. The total number of eligible residents across all training levels [R1, R2, and R3] was 75, with 34 residents in the MOH program and 41 in the military program. All family medicine residents in Tabuk were invited to participate in the study, and no exclusion criteria were applied. The study was conducted over a planned period from May 2024 to December 2024, following

approval from both the Ethical and Research Committee of the Tabuk Region and the Ethical and Research Committee of the Family Medicine Program under the Ministry of Health. The minimum required sample size was calculated using the Raosoft online sample size calculator, based on a 95% confidence level and a 5% margin of error, yielding a minimum of 63 participants. A convenience sampling technique was utilized to recruit participants. Data were collected using a validated self-administered questionnaire adapted, with permission, from a previously published study conducted in Riyadh. The questionnaire consisted of two main sections. The first section gathered demographic information, while the second section comprised 71 items assessing various aspects of minor surgical procedures [MSPs]. These included knowledge of different MSPs [4 items], prior training in MSPs [4 items], interest in performing MSPs [3 items], experience with 21 specific MSPs [21 items], confidence in performing these procedures [21 items], and perceived barriers and suggestions for improving surgical skills [11 items].

Confidence levels in performing MSPs were measured on a three-point scale: 0 = not confident at all, 1 = confident with assistance, 2 = confident to perform the procedure independently and manage any associated complications.

Data Analysis

Data analysis was performed using IBM SPSS Statistics version 28 [IBM Corp., Armonk, NY, USA]. Descriptive statistics were used to summarize the demographic characteristics, knowledge levels, confidence ratings, and procedural experiences of the participants. The overall knowledge of minor surgical skills was assessed by awarding one point for each correct response. Residents who scored 60% or higher were categorized as having good knowledge, while those scoring below this threshold

were considered to have poor knowledge. Confidence levels in performing surgical procedures were measured using a composite mean score derived from individual item responses. Participants with a mean score less than 1 were classified as having low confidence, those with a score from 1 to 1.5 were considered moderately confident, and those with a score from 1.6 to 2 were regarded as having high confidence. Associations between knowledge and confidence levels with gender and training level were tested using the Exact Probability test. P-value less than 0.05 was considered for statistical significance.

Results

Table 1 presents the demographic characteristics of the 30 family medicine residents who participated in the study in Tabuk, Saudi Arabia. The majority of the residents were male, accounting for 23 individuals [76.7%], while females represented a smaller portion with 7 residents [23.3%]. Regarding the current level of training, most residents were in their third year [R3], making up 20 residents [66.7%]. First-year residents [R1] comprised 6 individuals [20.0%], and second-year residents [R2] were the least represented, with 4 residents [13.3%].

Table 2 illustrates the knowledge and training experience in basic surgical skills among the 30 family medicine residents in Tabuk, Saudi Arabia. A high proportion of participants reported knowing the common types of surgical sutures [26; 86.7%] and suturing techniques [23; 76.7%]. Similarly, 23 residents [76.7%] indicated they were familiar with common surgical instruments. However, knowledge about surgical knots was relatively lower, with only 16 residents [53.3%] reporting they knew the different types. Regarding formal training, 19 residents [63.3%] reported attending a surgical skills course or workshop. Training received during residency varied: while

17 residents [56.7%] were trained on suturing techniques and 15 [50.0%] on using surgical instruments, only 14 [46.7%] received training on knot-tying techniques. Figure 1 illustrates the overall knowledge and training experience in basic surgical skills among the family medicine residents in Tabuk, Saudi Arabia. Out of the 30 participants, more than half [16 residents; 53.3%] were categorized as having a poor level of knowledge and practice in surgical skills, while only 14 residents [46.7%] demonstrated a good level.

Table 3 highlights the self-reported confidence levels of family medicine residents in performing a range of common clinical procedures. Procedures such as minor wound suturing and applying local anesthesia had the highest levels of independent confidence, reported by 63.3% and 56.7% of residents respectively. Similarly, 43.3% felt confident performing Cryotherapy and fluorescent dye eye examinations independently. On the other hand, a substantial proportion of residents expressed low confidence in more specialized procedures. For instance, only 3.3% felt confident performing skin biopsies or endometrial biopsies independently, and none felt confident inserting or removing intrauterine devices [IUDs] without assistance. Notably, over half of the participants lacked confidence in taking pap smears [56.7%], performing endometrial biopsies [70.0%], and joint aspiration [60.0%].

Figure 2 presents the overall confidence level of family medicine residents in performing common clinical procedures. Among the 30 participants, 13 residents [43.3%] reported a high level of confidence, while 11 residents [36.7%] indicated a moderate level, and only 6 residents [20.0%] expressed low confidence. These findings are encouraging, as the majority of residents [80.0%] felt at least moderately confident in their procedural skills.

Figure 3 offers the clinical procedures performed by family medicine residents during their residency in Tabuk. The data show that residents had strong exposure to basic and essential procedures. Performing ECGs [70.0%], urine dipstick and microscopy [70.0%], suturing and laceration repair [70.0%], intramuscular and other types of injections [66.7%], and wound debridement and management [63.3%] were among the most commonly performed tasks, reflecting adequate training in general practice competencies. Similarly, more than half of the residents had experience with procedures such as peak flow measurement and inhaler techniques [56.7%], cauterization and cryosurgery [53.3%], and performing swabs from various body sites [53.3%]. On the other hand, exposure to moderately complex procedures was more limited. Only 40.0% had performed nasogastric tube insertion, 36.7% had done nasal packing for epistaxis, and 30.0% had experience with splinting or closed joint reduction. Skills like simple excision of superficial masses [43.3%], ear wax removal [46.7%], and removal of foreign bodies from the nose or ear [46.7%] were practiced by less than half of the residents, indicating partial procedural involvement. More advanced or specialty-specific procedures showed limited exposure. For instance, only 20.0% had inserted thoracic tubes or performed skin biopsies, and just 16.7% had experience with intrauterine device insertion or joint injections. Gynecological and emergency procedures, such as obtaining cervical cytology [13.3%], performing proctoscopy [13.3%], and episiotomy with repair [3.3%], were rarely performed.

Table 4 summarizes the perceived barriers that hinder family medicine residents from performing minor procedures, as well as their suggested strategies to improve basic surgical skills. Among the barriers, the most significant was the lack of facilities, with the lowest mean score [2.2 ± 1.5], indicating it was perceived as the top obstacle [ranked 1]. This was followed by lack of up-to-date skills or practical experience

[mean 3.1 ± 1.6], and lack of time [mean 3.3 ± 1.8], reflecting the importance of hands-on training and time allocation in residents' schedules. Other less pressing barriers included the perception that it is easier to refer patients [mean 3.8 ± 1.8] and a lack of interest in performing such procedures [mean 4.1 ± 2.1], which was the least concerning barrier [ranked 6]. Regarding solutions, residents strongly favored structured educational interventions. The most recommended strategies were continuous educational and practical sessions during the Half Day Released Course [HDRC] and mandatory attendance of basic surgical skills courses, both receiving the lowest mean scores [1.6], reflecting high perceived importance. Additionally, taking surgical clinics during family medicine rotations [mean 1.9 ± 1.1] and extending rotation duration for minor procedures [mean 2.1 ± 1.1] were also valued.

Figure 4 illustrates the attitudes of family medicine residents toward enhancing their proficiency in basic surgical skills during their residency training in Tabuk. The results show a strong positive inclination toward skill development. Nearly all participants [96.7%] expressed interest in improving their surgical skills during their rotations. Additionally, the vast majority [93.3%] supported the idea of incorporating courses or workshops on basic surgical skills within the residency program, and 90.0% favored continuous education and hands-on sessions through the Half Day Released Course [HDRC].

Table 6 explores the association between gender and current training level with overall surgical skills knowledge and confidence levels among family medicine residents in Tabuk. In terms of surgical skills knowledge, a slightly higher proportion of female residents [57.1%] reported poor knowledge compared to males [52.2%], while 55.0% of R3 residents had good knowledge compared to only 33.3% of R1 and

25.0% of R2 residents, though the difference was not statistically significant [p = 0.419]. Regarding confidence in performing surgical procedures, a larger proportion of females [57.1%] reported high confidence compared to males [39.1%], while low confidence was more frequently reported by R1 [33.3%] and R2 residents [50.0%] compared to R3 residents [10.0%]. Again, although these trends suggest that confidence improves with training, the associations were not statistically significant [p = 0.378 for training level; p = 0.700 for gender].

Discussion

The findings of this study assessed the current level of knowledge and confidence among family medicine residents in Tabuk, Saudi Arabia, regarding minor surgical procedures [MSPs]. A significant proportion of residents in Tabuk showed familiarity with common surgical sutures and suturing techniques, which is encouraging given the importance of these skills in primary care settings. However, only one-half were well-informed about surgical knots, and formal training in knot-tying was reported by just less than half of participants. This suggests that while foundational skills are being addressed, more complex aspects of surgical procedures may require additional emphasis in residency curricula. These findings matches with a similar study conducted by Andijany in Riyadh [2016], where knowledge levels were notably lower, with only 15.75% of residents correctly answering questions about sutures, knots, and instruments [9]. The contrast between the two studies may reflect regional differences in training quality or curricular emphasis. The higher knowledge levels in Tabuk could indicate improvements in surgical skills training over time or variations in program structure.

Internationally, studies have shown that family medicine residents often feel underprepared for surgical procedures due to inconsistent exposure. A Canadian study by Chan et al. [2018] found that only 40% of family medicine graduates felt competent in performing basic suturing, with even lower confidence in more complex procedures [10]. Similarly, a South African study by Mash et al. [2013] reported that inadequate hands-on training was a major limitation in developing surgical skills among primary care physicians [11].

Considering confidence, a majority of residents reported moderate to high overall confidence [80%], but there were prominent variations depending on the complexity and specialization of the procedure. Residents demonstrated the highest confidence in fundamental procedures such as minor wound suturing and applying local anesthesia, which aligns with their reported knowledge of suturing techniques and familiarity with surgical instruments. This indicates that foundational skills taught during medical school and reinforced in residency such as wound closure are well retained. Similarly, 43.3% expressed confidence in Cryotherapy and fluorescent dye eye examinations, likely due to structured exposure during dermatology and ophthalmology rotations. These findings are consistent with a study by AlGhamdi et al. [2019] in Jeddah, where family medicine residents reported the highest comfort levels in suturing and local anesthesia administration, likely due to their frequent use in primary care settings [12].

In contrast, confidence dropped significantly in more specialized procedures. Only 3.3% felt competent performing skin or endometrial biopsies independently, and none reported confidence in IUD insertion/removal. This is concerning, given that these skills are essential for comprehensive women's health and dermatological care in

primary practice. The lack of confidence in Pap smears [56.7% lacking confidence], endometrial biopsies [70%], and joint aspirations [60%] means a critical defect in hands-on training for these high-yield procedures.

These findings reflect those of Andijany's [2016] Riyadh study, where residents had very low confidence in specialized MSPs, particularly gynecological procedures [9]. A possible explanation is the limited procedural exposure during residency, as many programs prioritize outpatient management over hands-on skills. A similar trend was observed in a US study by Tenore et al. [2001], where only 22% of family medicine graduates felt prepared to perform colposcopies and IUD placements, citing insufficient supervised practice during training [10].

The challenges observed among family medicine residents in Tabuk reflect broader global and national trends in minor surgical procedure [MSP] training and practice. In Canada, a significant proportion of family physicians avoid performing key MSPs such as skin excisions, joint injections, and endometrial biopsies preferring instead to refer patients to specialists due to lack of skills and time constraints [8]. This parallels our findings in Tabuk, where residents reported particularly low confidence in specialized procedures like joint aspirations [60% lacking confidence] and endometrial biopsies [70%]. Similarly, newly graduated physicians often hesitate to perform MSPs in primary care due to insufficient exposure during training, a phenomenon observed in both Saudi and international contexts. Within Saudi Arabia, a study in Al-Qatif revealed that while 86.9% of PHC physicians expressed interest in performing MSPs, most lacked confidence due to multiple barriers, including inadequate facilities [90.2%], staff shortages [55.8%], fear of complications [73.7%], and medicolegal concerns [72.2%] [14]. Exactly 80% had insufficient

training, mirroring the 63.3% of Tabuk residents who had attended surgical workshops but still struggled with complex procedures. These findings suggest that systemic issues such as under-resourced PHC centers and inconsistent MSP training are widespread across Saudi Arabia, contributing to low procedural confidence among family physicians.

However, international studies demonstrate that structured, hands-on training can significantly improve MSP competency. A Canadian study by Nasmith et al. [15] showed that after a series of workshops, family physicians performed more MSPs in clinical practice, reinforcing the value of targeted skill-building sessions. Similarly, a US-based wound care training program for FM residents led to marked improvements in knowledge and confidence [16]. These findings support our recommendation for mandatory simulation-based workshops and enhanced procedural rotations in Saudi residency programs.

Besides, the study revealed that family medicine residents in Tabuk face several systemic barriers in performing minor surgical procedures, with inadequate clinical facilities emerging as the most significant challenge. This logistical limitation is compounded by deficits in practical surgical skills training and time constraints within residency schedules. Notably, while referral tendencies exist, lack of interest appears to play a minimal role, signifying residents are willing but constrained by structural factors. In response to these challenges, residents strongly advocate for structured educational interventions, particularly emphasizing the integration of hands-on surgical training into existing curricular frameworks like the Half Day Released Course. Mandatory skills workshops and enhanced clinical exposure during rotations were identified as key solutions, with extended rotation duration being viewed as

somewhat less critical. These findings matches' international experiences where resource limitations and training gaps similarly hinder procedural competency, while highlighting the particular need for formalized skill-building opportunities within Saudi Arabia's family medicine training system. The residents' clear preference for practical, curriculum-integrated training over simply extending rotation lengths provides valuable guidance for program directors seeking to improve surgical skills acquisition. This alliance between identified barriers and resident-proposed solutions underscores the importance of addressing both infrastructural limitations and educational gaps to enhance minor procedure competency in primary care settings.

Conclusions and Recommendations

This study showed an average level of knowledge and confidence of family medicine residents in Tabuk, Saudi Arabia, regarding minor surgical procedures. While residents had adequate familiarity with common surgical tools and techniques, a considerable proportion reported limited training and exposure to key procedural skills, especially in knot-tying and specialized interventions such as gynecological procedures, joint injections, and skin biopsies. Although the majority of residents had experience with basic tasks like wound suturing, ECG performance, and administering injections, their exposure to more complex or less frequently encountered procedures remained limited. Confidence levels varied significantly depending on the type of procedure, with higher confidence in simpler tasks and lower confidence in specialized or invasive techniques.

The most prominent barriers identified were lack of facilities, insufficient hands-on training, and limited time. Nevertheless, residents expressed a strong interest in enhancing their surgical skills and overwhelmingly supported the inclusion of

structured educational interventions. These included mandatory workshops, continuous hands-on sessions during academic days, and expanded clinical rotations with a surgical focus. Based on these findings, it is recommended that family medicine residency programs implement formal and mandatory basic surgical skills training early in residency.

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Table 1. The Demographic Characteristics of the Study Family Medicine Residents, Tabuk, Saudi Arabia (N=30)

Demographics	No	%
Gender		
Male	23	76.7%
Female	7	23.3%
Current training level		
R1	6	20.0%
R2	4	13.3%
R3	20	66.7%

Table 2. Knowledge and Training Experience in Basic Surgical Skills Among Family Medicine Residents in Tabuk, Saudi Arabia (N=30)

Knowledge items	Yes		No	
	No	%	No	%
I know the common types of surgical sutures:	26	86.7%	4	13.3%
I know the common types of suturing techniques:	23	76.7%	7	23.3%
I know the common types of knots:	16	53.3%	14	46.7%
Do you know names of common surgical instruments?	23	76.7%	7	23.3%
I have attended a surgical skills training course/workshop:	19	63.3%	11	36.7%
During my residency I was trained on how to use common surgical instruments:	15	50.0%	15	50.0%
During my residency I was trained on common suturing techniques:	17	56.7%	13	43.3%
During my residency I received training on how to do the common types of knots (one hand, two hand and instrumental tie)?	14	46.7%	16	53.3%

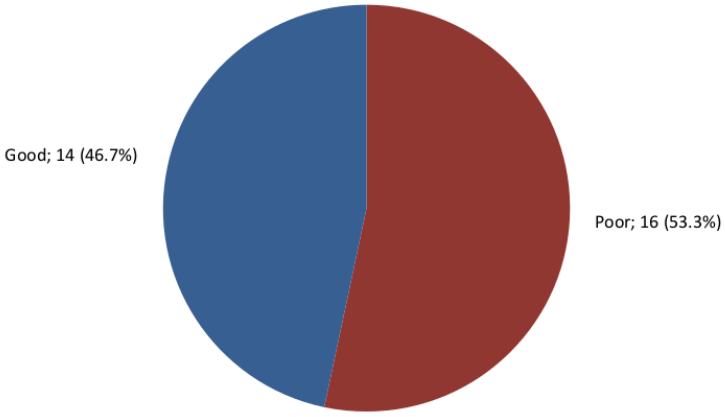

Figure 1. The Overall Knowledge and Training Experience in Basic Surgical Skills among Family Medicine Residents in Tabuk, Saudi Arabia (N=30)

Table 3. Confidence Level in Performing Common Clinical Procedures among Family Medicine Residents in Tabuk, Saudi Arabia (N=30)

	Feel unconfident		Confident with assistance		Confident independently	
	No	%	No	%	No	%
Abscess incision and drainage	2	6.7%	17	56.7%	11	36.7%
Cryotherapy	7	23.3%	10	33.3%	13	43.3%
Taking skin biopsy (punch/excisional/incisional)	15	50.0%	14	46.7%	1	3.3%
Minor wound suturing	1	3.3%	10	33.3%	19	63.3%
Ingrown toenail repair	10	33.3%	14	46.7%	6	20.0%
Skin tag removal	6	20.0%	18	60.0%	6	20.0%
Taking pap smear	17	56.7%	9	30.0%	4	13.3%
Taking endometrial biopsy	21	70.0%	8	26.7%	1	3.3%
Insertion/removal of intrauterine device (IUD)	18	60.0%	12	40.0%	0	0.0%
Basic Prenatal ultrasound	7	23.3%	15	50.0%	8	26.7%
Injection/aspiration of large joints	18	60.0%	10	33.3%	2	6.7%
Splint for upper or lower extremities fracture	14	46.7%	13	43.3%	3	10.0%
Measuring intraocular pressure	10	33.3%	17	56.7%	3	10.0%
Fluorescent dye examination of eye	6	20.0%	11	36.7%	13	43.3%
Foreign body removal from ear/nose	7	23.3%	12	40.0%	11	36.7%
Anterior nasal packing for epistaxis	5	16.7%	15	50.0%	10	33.3%
Bladder catheterization	8	26.7%	9	30.0%	13	43.3%
Apply local anesthesia	3	10.0%	10	33.3%	17	56.7%

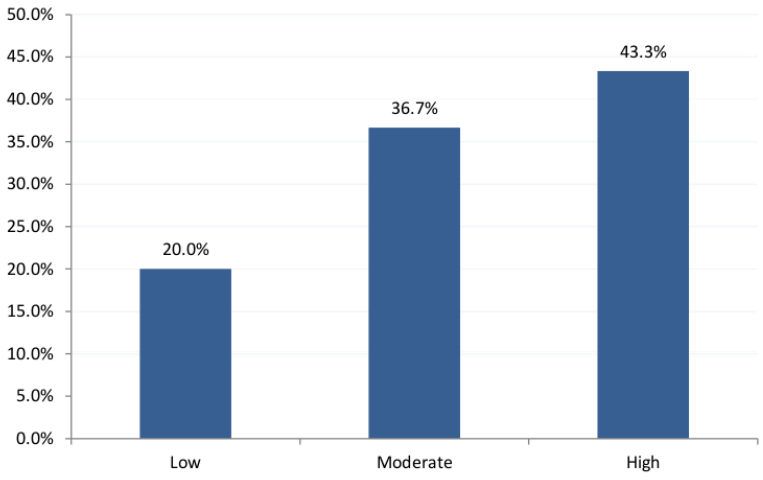

Figure 2. The Overall Confidence Level in Performing Common Clinical Procedures among Family Medicine Residents in Tabuk, Saudi Arabia (N=30)

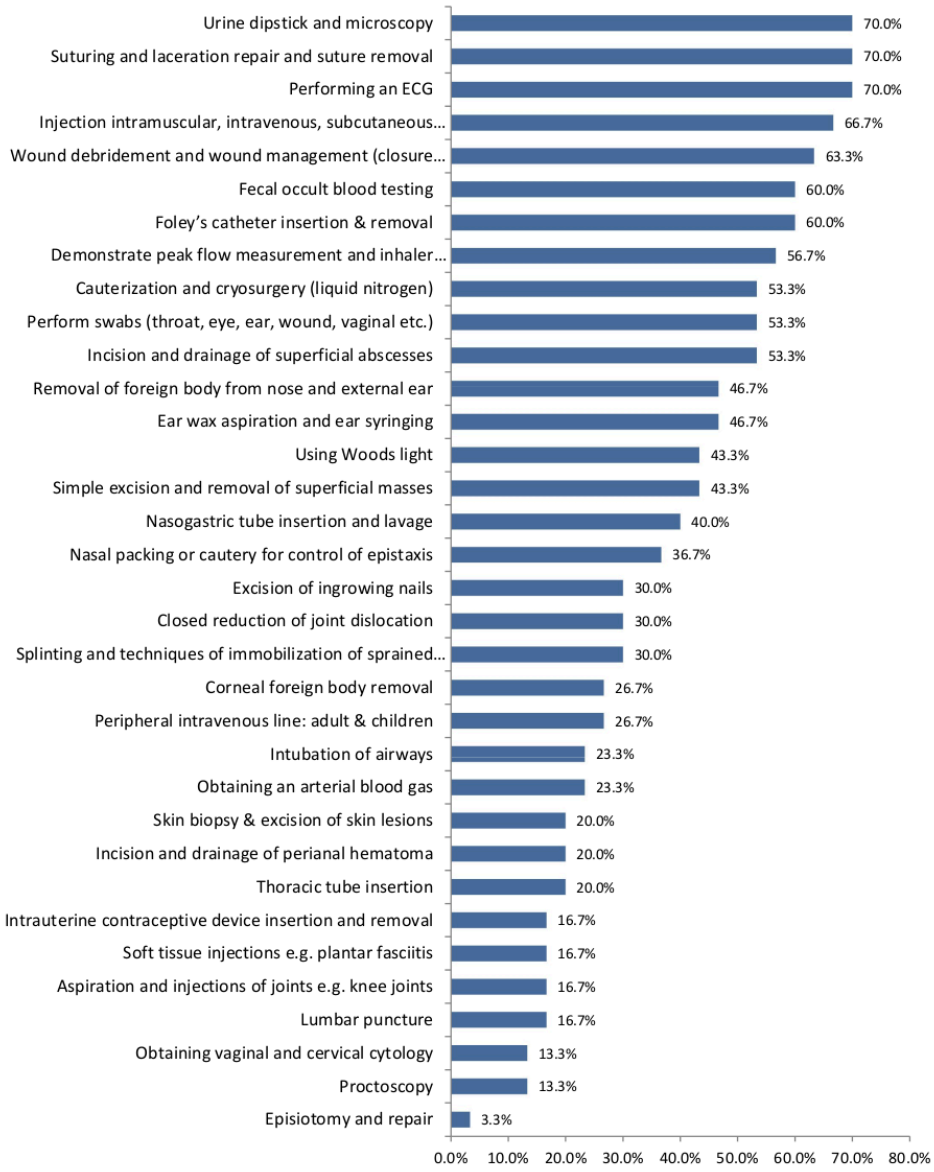

Figure 3. Procedures Done By the Residents during Family Medicine Residency Training Program in Tabuk

Table 4. Perceived Barriers to Performing Minor Procedures and Suggested Ways to Improve Basic Surgical Skills Among Family Medicine Residents in Tabuk, Saudi Arabia

Items	Mean	SD	Rank of importance
Barriers to perform minor procedures			
Lack of facilities	2.2	1.5	1
Lack of time	3.3	1.8	3
Lack of up-to-date skills / practical experience	3.1	1.6	2
Lack of interest	4.1	2.1	6
Do not see patients with indications	3.6	1.7	4
Easier to refer	3.8	1.8	5
Ways to improve basic skills for residents			
Mandatory attendance to the basic surgical skill courses	1.6	1.0	2
Continuous taking educational and practical sessions about basic surgical skill in Half Day Released Course (HDRC)	1.6	0.9	1
Increase the duration of some rotations teaching minor procedures during board training years.	2.1	1.1	4
Taking some clinics in surgery during rotation in Family Medicine clinic	1.9	1.1	3

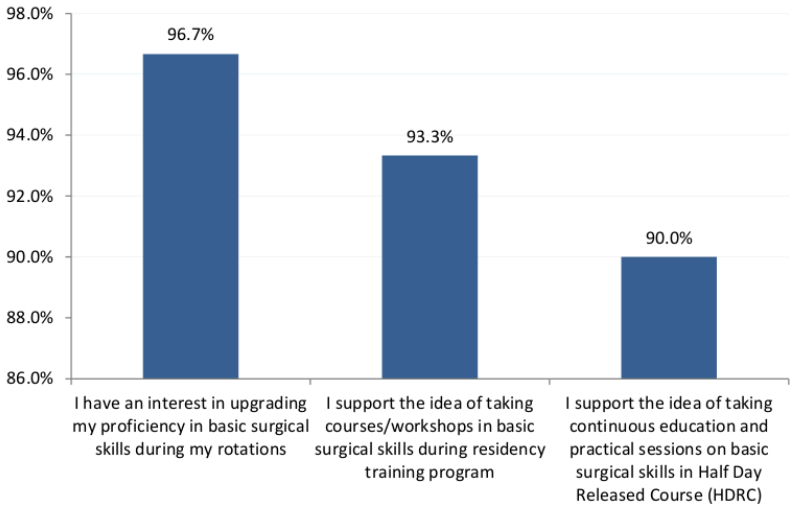

Figure 4. Residents' Attitudes toward Enhancing Proficiency in Basic Surgical Skills during Family Medicine Residency Training in Tabuk, Saudi Arabia (N=30)

Table 6. Association between Gender and Training Level with Overall Surgical Skills Knowledge and Confidence Level among Family Medicine Residents in Tabuk, Saudi Arabia (N=30)

Items	Gender				Current training level					
	Male		Female		R1		R2		R3	
	No	%	No	%	No	%	No	%	No	%
Overall surgical skills knowledge / practice level										
Poor	12	52.2%	4	57.1%	4	66.7%	3	75.0%	9	45.0%
Good	11	47.8%	3	42.9%	2	33.3%	1	25.0%	11	55.0%
p-value	.818				.419					
Confidence level of performing surgical procedures										
Low	5	21.7%	1	14.3%	2	33.3%	2	50.0%	2	10.0%
Moderate	9	39.1%	2	28.6%	2	33.3%	1	25.0%	8	40.0%
High	9	39.1%	4	57.1%	2	33.3%	1	25.0%	10	50.0%
p-value	.700				.378					

P: Exact Probability test

Family Medicine Residents Knowledge and Confidence in Doing Minor Surgical Procedures in Tabuk City, Saudi Arabia

ORIGINALITY REPORT

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