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Teaching procedural skills to family medicine residents: Preliminary report of the Bori experience.

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Abstract

Introduction: Proficiency in procedural skills is a prerequisite for graduating residents in Family Medicine. The acquisition of these skills required for clinical practice remains an ongoing challenge. In order to overcome the challenge of resident doctors in Family Medicine in acquiring competence in procedural skills, rural posting was added in their curriculum.

Aim: The aim of this study was to evaluate the effect of dedicated teaching of procedural skills on the residents' performance at the end of their rural posting.

Method: A hospital based cross-sectional study in which respondents were recruited by convenient sample of all consenting residents (n = 29) from two training institutions who reported to the Bori Zonal Hospital for rural posting from 2018-2020. A questionnaire was administered to the respondents. A two sample t-test was used to compare the means and P-value of <0.05 was considered statistically significant.

Result: A total of 728 procedures were performed during the period. The most common procedure performed was caesarean section and the least was repair of vesicovaginal fistula. The mean procedural rating score at the beginning and the end of the rural posting were 1.68±0.70 and 3.94±0.64 respectively. There was a significant difference between the procedure mean scores at the beginning and end of the rural posting (t=11.91, p< 0.0001, 95% confidence interval: -2.6414 to -1.8786).

Conclusion: Given the right training in an enabling environment, the Family Medicine resident graduates proficient in the right mix of skills needed to run district Hospitals and other health institutions.

Keywords: Training; Skills; Hospital rural; Residency

1. Introduction

The versatility of doctors in procedural skills depend a lot on their undergraduate training, residency training program and a passion for excellent practice.¹ Unfortunately, interaction with young medical graduates reveal that their exposure to procedural skills is inadequate. During undergraduate training, more time is spent taking medical histories and performing clinical examinations and only observing their teachers perform the procedures. As a result, new residents commence postgraduate training without a good foundation for performing procedural skills [2, 3].

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Deficiencies in procedural training have been described in most residency trainings [4, 5, 6] and family medicine appears to be the worst hit. This is because most residency training is hospital based and professionally regulated. The task force recognized that family physicians in practice may perform a wide range of procedures, and that there is significant variance among physicians-in-training for procedural skills. This variance may lead to confusion among employers, credentialing bodies, and patients about what services a trained family physician should be able to provide [3,4] also, exposure of family medicine residents in these hospitals to procedural skills is inadequate since the hospitals are dominated by centralized specialist services, vertical disease-oriented approaches and time limitations during the rotations [7,8] Also, the departments where the family medicine residents rotate through may have large number of residents with whom to compete for few patients who may be very sick and not suitable for training. Acquisition of these skills is essential for the provision of high-quality services to clients [1] especially in rural practice. Competences in these skills also give doctors higher job satisfaction; increase their earning potential [9] and truncate the increasing reports of medical malpractice and negligence [10].

The main objective of the family medicine residency training in Nigeria is to produce specialists competent enough to manage patients in the three core areas: primary medical care (especially home based care), family care dynamics and facility based care either in clinics or in secondary/tertiary care hospitals [11]. Expertise in these core areas make family physicians very suitable in running District Hospitals, University health services, industrial clinics and outpatient departments in Tertiary Hospitals. Management of district hospitals requires expertise in procedural skills to reduce morbidity, mortality and the number of referrals to larger hospitals which many rural dwellers detest [12]. Generally, graduates are more likely to perform procedures in practice when they receive appropriate training and gain confidence during residency training [13] especially if the training program incorporates component of rural medical training [14]. In pursuance of excellence in training, and the desire to meet curriculum requirements especially in the Teaching/Specialist Hospitals, the Faculties of Family Medicine in the National Postgraduate Medical College of Nigeria and the West African College of Physicians incorporated the rural posting in their curriculum. The family medicine residencies in Port Harcourt, therefore adopted the Bori Zonal Hospital as a rural training centre. This study was designed to evaluate the effect of dedicated teaching of procedural skills on the residents' performance at the end of their rural posting in Bori Zonal Hospital.

2. Methodology

2.1. Setting

This study was conducted in Bori Zonal Hospital, in Rivers State of Nigeria. It is one of the hospitals managed by the Rivers State Hospitals Management Board. It was adopted for training of residents in Family Medicine in rural practice by the University of Port Harcourt Teaching Hospital (UPTH) and Braithwaite Memorial Specialist Hospital (BMSH) Port Harcourt because of its large catchment area spanning across six local government areas with a resultant large patient population. This adoption was after a memorandum of understanding was signed between the Rivers State Hospitals Management Board (the managers of the Bori Zonal Hospital) and the University of Port Harcourt Teaching Hospital (UPTH) and Braithwaite Memorial Specialist Hospital (BMSH).

2.2. Study Population

This consisted of all consenting residents (n = 29) from the University of Port Harcourt Teaching Hospital (UPTH) and Braithwaite Memorial Specialist Hospital (BMSH) Port Harcourt who reported to the Bori Zonal Hospital for rural posting within a period of three years. (2018, 2019 and 2020). The criteria for inclusion were that the residents were in active training in any of the two training centres or from other nearby hospitals outside Rivers State as required by the training program.

2.3. Sampling Method

Convenient sample of all consenting residents from the University of Port Harcourt Teaching Hospital (UPTH) and Braithwaite Memorial Specialist Hospital (BMSH) Port Harcourt who reported to the Bori Zonal Hospital for rural posting.

2.4. Procedure

Prior to the commencement of the program, accreditation teams from the Faculties of Family Medicine of the National Postgraduate Medical College of Nigeria and the West African College of Physicians were invited by the University of Port Harcourt Teaching Hospital (UPTH) and Braithwaite Memorial Specialist Hospital (BMSH) Port Harcourt to inspect the Bori Zonal Hospital and ascertain the suitability of its use for training. Furthermore, an orientation session for the

hospital staff on the use of the facility by Family Medicine Residents was done. The Chief Residents in the training hospitals were requested to incorporate two months and six months posting to Bori Zonal Hospital into the rotation roster of junior and senior residents respectively based on the curriculum of the two Postgraduate Medical Colleges. In the rotation of junior residents, three months was spent in each of the departments of surgery and obstetrics and gynaecology in the training hospitals. During the rural posting, they were given tutorials on procedural skills with demonstrations and allowed to perform them under the supervision of the teachers in preparation for their part one examinations.

The scope of skills required during this posting was adopted from the resident's log books of the Faculties of Family Medicine of the National Postgraduate Medical College of Nigeria and the West African College of Physicians which include the in-patient management of a wide range of conditions, many of which are life-threatening and severe. The definition of "procedure" was applied to include anything that involved physical interaction with patients which was invasive, or required use of a tool or piece of equipment (e.g. urethral catheterisation, caesarean sections, salpingectomy for ectopic gestation, herniorrhaphies, appendectomies, toe nail avulsion). Interpretive skills such as "interpreting electrocardiogram" or "fetal heart monitoring" and management skills, such as management of acute anaphylaxis were not included. Where the procedure listed was stated in a general manner, such as "excision of lipoma and breast lumps," it was tallied as "excisions." Laceration repair was assumed to include infiltration with local anesthetic as described by van der Goes et al [13]. To further expand their scope and overcome the existing controversy over which procedures should be taught in family medicine residency, [15] the skills required were grouped into two:

- Core skills: Skills that are mandatory and should be performed independently at the end of the training based on the resident's log books of the Faculties of Family Medicine, National Postgraduate Medical College of Nigeria/ West African College of Physicians.
- Elective skills: Skills that are not mandatory but can be learnt as part of training.

Procedures performed were recorded in the operations register and a questionnaire specially designed for this study.

2.5. Procedural skills Trainees

These consisted of junior and senior Family Medicine Residents from the University of Port Harcourt Teaching Hospital (UPTH) and Braithwaite Memorial Specialist Hospital (BMSH) Port Harcourt. The junior Residents were employed after passing the primary fellowship examinations of any of the two Postgraduate Medical Colleges. They undergo a minimum of 24-months rotation in the medical and surgical specialties before writing the part one fellowship examinations. Success in this examination qualifies them to commence the senior residency (part two) training which also lasts for a minimum of 24 months before the part two examinations which qualifies them to be appointed as consultants. They are expected to be abreast with the procedural skills at the end of the postings.

2.6. Procedural skills teachers

These are Consultant Family Physicians with considerable experience in performing procedural skills in surgery, obstetrics and gynaecology and emergency medicine.

The salaries of the trainees and teachers were paid by the University of Port Harcourt Teaching Hospital (UPTH) and the Rivers State Government who employed the Residents from Braithwaite Memorial Specialist Hospital (BMSH) Port Harcourt. The procedure instrument set, consumables were provided by the Rivers State Hospitals Management Board. The patients paid their hospital bills which were subsidized by the government.

2.7. Teaching Method

The cognitive components of the training were delivered using the following headings in tutorials during the training:

- a) Introduction
- b) Indications
- c) Contraindications
- d) Equipment needed
- e) Steps of the procedure
- f) Complications and management
- g) Documentation
- h) Post procedural care

The procedure component was commenced with the use of teaching aids which included recorded procedures on DVD, CD ROMs and you tube demonstrations. Improvising with non-human materials were made frequently in the demonstrations. Questions were entertained and explanations made. The hands-on procedures took place at bedside in the ward, labour room, accident and emergency department and the theatre.

2.8. Procedure status definitions

- Observer status: The teacher demonstrates with a running commentary while resident observes without any active involvement in the procedure.
- Assistant status: The teacher demonstrates the procedure with a running commentary step by step making it as simple as possible while the resident assists.
- Performance under supervision: The resident performs the procedure with a running commentary under the supervision of the teacher. Mistakes are corrected immediately.
- Independent performance: The resident performs the procedure on his own if found satisfactory in a previous performance assisted by another resident or a theatre nurse. The teacher stays in the theatre reception room within the hospital.

2.9. Pre-post self-efficacy ratings and questionnaire evaluation of training by trainees

Self-efficacy ratings were performed by the residents before and after the rural posting skills training. This was done using a two-part questionnaire. The first part contained the personal characteristics of the residents and the second part was the self-rating of the participants based on six items a) knowledge of anatomical structures required for the core procedures, b) knowledge of the equipment required to perform the procedures, c) knowledge of the steps involved in performing the procedures, d) previous experience in performing the procedures, e) competence in performing the procedures, and f) consultant's teaching method and supervision. These items were rated on a five-point Global Competency Rating Scale (1=Poor, 2=Fair, 3=Average, 4=Good, 5=Excellent) [16] Each participant filled the questionnaire at the beginning of the posting and submitted it to the teacher for safe keeping and prevention of reference to it at the end of the posting when the questionnaire was administered again.

2.10. Statistical analysis

Data was collated, coded and analysed using the Statistical Package for Social Sciences (SPSS) version 20 software. Absolute numbers and simple percentages was used to describe categorical variables such as sex, occupation etc. Similarly, quantitative variables were described using measures of central tendency(mean) and measures of dispersion (range, standard deviation) as appropriate. Similarly, two sample t-test was used to compare the means. A P-value of <0.05 was considered statistically significant.

3. Results

Twenty-nine residents at their different stages of their training with mean age 32.6 ± 2.5 years participated in the training rotated through the hospital within a period of three years. They were all married. They had spent 1.5 – 6 years in residency training with a mean of 3.3 ± 1.2 years. All of the residents had their undergraduate training in Nigeria. Two female and one male resident had spent one month of their junior residency training in Obio Cottage Hospital, Port Harcourt where they were exposed to obstetrics and gynaecological procedures.

3.1. Procedures performed within the study period.

A total of 728 procedures were performed during the period. The most common procedure performed was caesarean section followed by suturing of lacerations, appendectomy, myomectomy, herniorrhaphy and salpingectomy for ectopic gestation. The least performed procedure was repair of vesicovaginal fistula which was among the elective skills.

Table 1 Procedures performed within the study period.

Core Skills	Number performed (%)
Caesarean sections	363(49.9)
Salpingectomy for ectopic gestation	32(4.4)
Bartholin cyst marsupialisation	5(0.69)
Evacuation of uterus for inevitable abortion	32(4.4)
Repair of cervical tear	3(0.41))
Ingrown toe nail	7(0.96)
Appendicectomy	41(5.6)
Inguinal herniorrhaphy	35(4.8)
Hydrocelectomy	12(1.6)
Wound debridement	7(0.96)
Suprapubic cystostomy	11(1.5)
Epigastric Herniorrhaphy	9(1.2)
Anal warts	3(0.41)
Excisions	34(4.7)
Suturing of laceration	63(8.7)
Incision and drainage	15(2.1)
Venous cut down	3(0.41)
Elective Skills	
Vesico- vaginal fistula repair	1(0.14)
Subtotal abdominal hysterectomy	6(0.82)
Vaginal hysterectomy	3(0.41)
Myomectomy	35(4.8)
Oophorectomy	3(0.41)
Bowel resection and anastomosis	5(0.69)
Total	728

3.2 Self-rating of procedural skills acquired

Self-rating of procedural skills acquired by the residents were performed (table 2). The mean procedural rating score at the beginning of the rural posting was 1.68 ± 0.70 and the mean procedural rating score at the end of the posting was 3.94 ± 0.64 . There was a significant difference between the procedure mean scores at the beginning and end of the rural posting ($t=11.91$, $p < 0.0001$, 95% confidence interval: -2.6414 to -1.8786). Although the pre- posting score of the knowledge of anatomical structures required for the core procedures and the knowledge of the equipment required to perform the procedures were high as compared to the other scored items the difference between them and the post posting scores were significant ($p < 0.0001$). The score of their previous experience in performing the procedures was low (1.3 ± 0.73). All of the participants accepted to recommend the posting for all residents in other training centres.

Table 2 Mean Residents' Self-rating scores.

The Scored Items	Pre- posting	Post- posting	t-test	p-value
Knowledge of anatomical structures required for the core procedures.	2.08±0.64	4.04±0.55	11.61	<0.0001
Knowledge of equipment required to perform the procedures.	2.16±0.62	3.96±0.73	9.40	<0.0001
Knowledge of steps involved in performing the procedures.	1.24±0.44	3.84±0.62	17.10	<0.0001
Competence in performing the procedures.	1.20±0.41	3.92±0.65	17.89	<0.0001
Previous experience in performing the procedures.	1.3±0.41			
I recommend the posting for all residents		100%		

The residents were unanimous in their report that the time was well spent. Each learned at least one new procedure and reported that the exposure increased their likelihood of including skills in their future practice.

3.3 Evaluation of procedural skills training sessions

Procedural skills training sessions were evaluated by residents at the end of the rural posting to assess their competence using the teaching method on a six-point Likert scale (1 = "I completely agree" to 6 = "I completely disagree"). Items are shown in Table 3.

Table 3 Acceptance ratings of procedural skills training session by trainees (n = 29).

Item	Rating
I have learnt a lot during the training sessions	3.3±0.5
I was continuously alert during the trainings	2.5±0.6
Repeated observation of the procedures were helpful	3.1±0.3
Independent performance of the procedures were helpful	2.7±0.4
Observations of repeat procedure were too few	4.2±1.1
There were too few independent performance	4.7±1.3
Running commentary during the procedures were helpful	4.1±0.6
At the end of the posting, I feel confident in attempting the procedure	2.3±0.7
I am more confident with perioperative management	3.5±0.6

4. Discussion

The purpose of this study was to evaluate the effect of dedicated teaching of procedural skills on the residents' performance at the end of their rural posting. The Zonal Hospital Bori offered a good volume of patients with a variety of needed procedures. Data regarding the number of procedures performed and effectiveness of training was encouraging.

The high prevalence of the emergency procedures in hospital was similar to the findings by Yakassai et al in Northern Nigeria [17]. The most common procedure performed was caesarean section followed by suturing of lacerations, appendectomy, myomectomy, herniorrhaphy and salpingectomy for ectopic gestation. This finding mirrors the findings by Ameh in Northern Nigeria [18] and Umunna in South Eastern Nigeria [19]. The prevalence of caesarean section among the procedures studied could be attributed to the location of many health centres in the rural areas with good antenatal care services from where the mothers were referred. This is advantageous for the residents and the nation in general since this skill is imperative for the reduction of maternal and perinatal mortality in the area [20]. Some optional procedures such as intestinal resection and anastomosis and subtotal abdominal hysterectomy are very important procedures that should be learned by residents since they can be confronted with obstructed hernia with gangrenous bowel which will require resection and anastomosis and ruptured uterus requiring subtotal abdominal hysterectomy to prevent mortality. It is therefore necessary to make them core procedures and taught as such. The intestines of cows were used in the demonstration of bowel resection and anastomosis in this study in the absence of clinical skills laboratory and non-availability of suitable patients during their posting.

The significant difference in the self-rating scores of the residents before and after the training is an indication of the success of the teaching sessions. Self-rating of a procedural skill reflects residents' views of their ability to perform and confidence in performing the procedure. A strong sense of efficacy has been opined by Bandura to enhance human accomplishment and personal well-being in many ways. Individuals with high assurance in their capabilities approach difficult tasks as challenges to be mastered rather than as threats to be avoided. They set themselves challenging goals and maintain strong commitment to them. They heighten and sustain their efforts in the face of failure. They quickly recover their sense of efficacy after failures or setbacks [21].

The ratings of procedural skills training session by trainees revealed above average scores and may be a pointer to the efficacy of the teaching method. The high level of confidence expressed in attempting the procedures and peri-operative management may imply that development of competence is related to actual experience in a procedure as reported by authors such as Fincher et al [22] who demonstrated a relationship between frequency of performing procedures and self-assessed competence, [23] who demonstrated an association between frequency and perceived proficiency, and Hicks et al [24] who noted an association between frequency of performing procedures and comfort level.

4.1. Limitations of this study

The fact that it was conducted in a single institution may introduce institutional bias.

Convenience sampling was used to select 29 student participants, which does not rule out sampling error and selection bias.

The self-assessment ratings were scored generally and not based on single procedure hence uniform competence in all the procedures cannot assured.

The number of procedures performed in the hospital is quite low considering the number of residents, hence proficiency cannot be assured.

Most of the procedures fall under Obstetrics and Gynaecology. The surgical cases are very few.

Only ketamine anaesthesia was used in the hospital when spinal anaesthesia could have been employed in most of the cases. This was due to lack of appropriate facilities.

Residents were unlikely to see patients for long follow-up due to their short duration of stay at the Zonal Hospital.

Some patients refuse referral for financial reasons hence putting the staff under undue pressure in their management with minimal resources.

The belief in traditional medical practices and faith healers is rife among the patients hence late presentation to the hospital in some cases and conversion of cold cases to emergencies.

5. Strengths of this study

Residents were:

- Able to integrate the knowledge and skills acquired in the various specialties, bearing in mind the family and social dynamics for patient management at primary and secondary levels of health care as prevails in the rural setting.
- Able to identify which problems should be managed at the different levels of medical care so as to optimize resource utilization and patient outcomes within the rural areas.
- Able to identify the family models and how these impact on health seeking behaviour, medical presentation and adherence to medical management plan.
- Able to handle common surgical conditions that present in general health care settings independently with occasional supervision.
- Able to undertake perioperative care of patients effectively.
- Considering the timely intervention in emergencies by residents who were always on ground, no mortalities were recorded among the operated patients.
- This posting has reduced the number of referrals from the Bori Zonal Hospital to tertiary centres such as University of Port Harcourt Teaching Hospital and Braithwaite Memorial Specialist Hospital. This has created more room for research and teaching in these centres.
- This posting has also reduced the socio-economic burden that comes with referral on the rural people and reduced mortality.

5.1. Recommendation

- It is envisaged that with adequate exposure, health facilities that cannot benefit from the appointment of specialists (obstetricians, surgeons, physicians or paediatricians) due to low population of patients and few beds will benefit from the services of well-trained family physicians especially in rural areas, industrial clinics etc. The implication is that this posting has to be commenced early enough during the training.
- The low rating of competency before the rural posting improved after the posting and the consultant's teaching methods and supervision was given a good rating. It is recommended that, to improve the quality of family medicine consultants trained in the Port Harcourt residencies, the rural posting should be encouraged. There should also be regular assessment of activities during the rural posting to ensure that standards are maintained.
- It is recommended that an additional centre for rural posting be created so that the residents may be more exposed to surgical procedures and become proficient. This will in no small measure improve the health indices in the state.

6. Conclusion

Rural postings should be introduced early in the training of resident doctors in family medicine. This will ensure that the resident doctors acquire a good mixed of the skills needed to practice as Family Physicians especially in resource limited countries.

7. Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

We have no conflict of interest.

Statement of ethical approval

Ethical approval was obtained from the medical research ethics committee of the Zonal Hospital.

Statement of informed consent

The details of the study was explained to all the resident doctors during their rural posting at the Bori General hospital. An informed written consent was gotten from the respondents before involving them in the study.

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