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**IMPACT OF CLINICAL OFFICER ANAESTHETIST TRAINING PROGRAMME AT THE KENYA MEDICAL TRAINING COLLEGE, NAKURU, ON TRAINEE SATISFACTION, QUALITY OF PRACTICE, AND CADRE SHORTFALL ALLEVIATION**

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**IMPACT OF CLINICAL OFFICER ANAESTHETIST TRAINING PROGRAMME AT THE KENYA MEDICAL TRAINING COLLEGE, NAKURU, ON TRAINEE SATISFACTION, QUALITY OF PRACTICE, AND CADRE SHORTFALL ALLEVIATION**

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**ABSTRACT**

**Objective:** To determine the impact of Clinical Officer (C.O) Anaesthetist Training programme at Kenya Medical Training College (KMTC) Nakuru, on Trainee satisfaction, quality of practice and cadre shortfall alleviation.

**Design:** Cross-sectional descriptive study

**Setting:** Kenya Medical Training College, Nakuru.

**Subjects:** All thirty one Clinical Officer Anaesthetist graduates from KMTC Nakuru, since the training programme started 8 years ago.

**Results:** Twenty nine of the 31 C.O Anaesthetist graduates responded. Twenty six of the 29 respondents (89.7%) passed in the final qualifying examination in the first sitting. Twenty one (72.4%) are working in Public health facilities. All graduates are distributed in 16 out of the 47 counties in Kenya. Twenty six (89.7%) are satisfied with the training. Their average working week is 54 hours, with a median of 45 working hours a week. They recommend an improvement in peripheral nerve blocks and epidural training in the 2005 curriculum.

**Conclusion:** C.O Anaesthetist training in KMTC Nakuru over the last eight years has produced self reported satisfied, adequately trained graduates and has had an impact in alleviating shortage of this cadre in Kenya. Improvement in peripheral nerve blocks and epidural training is needed.

**INTRODUCTION**

Anaesthesia, a unique, fast evolving and expanding field of medicine is very demanding. Top-notch professional competence ensuring safe patient and comfortable surgeon are needed.

Physician anaesthetists are few worldwide. In Europe, the anaesthesia workforce is facing increased demand and expansion of the labour market, which may likely exceed supply (1). A demographic survey of French Anaesthesiologists showed falling numbers of new anaesthesiologists, increase in retirements and changes in working practices, such as the European Working Time Directive (2). African continent, a survey in Ghana showed shortage of anaesthesia providers (3). Regionally, a study in Rwanda (4) and Uganda (5) shows shortage of anaesthesia providers. In Kenya, there are only 127 Physician anaesthetists to date.

Many countries use Task Shifting in health care (6), with most anaesthesia care delivered by non-physician anaesthetists. Different countries train and use different cadres. The United States uses Certified Registered Nurse Anaesthetists (CRNA) (7, 8) and Anaesthesiologist Assistants (AA) (9). Quebec

uses Anaesthesia Technicians (10), while India uses Diploma Anaesthetists. Kenya uses Clinical Officer (C.O) Anaesthetists. To date, a total of 880 C.O Anaesthetists have been trained.

Kenya started training Clinical Officer Anaesthetists in 1965 at Medical Training Center Nairobi. In 2005, the Government of Kenya realised there still was a big shortage in this cadre, reviewed the curriculum and four new training centers were inaugurated. These were KMTC Nakuru, Kisumu, Eldoret and Mombasa in addition to Nairobi. The aim was to comprehensively train more C.O Anaesthetists, who are competent and are able to provide anaesthetic, resuscitation and disaster management services throughout the country. KMTC Nakuru has been offering this training programme for the last eight years.

**MATERIALS AND METHODS**

A descriptive cross-sectional study was designed. Data was collected using a 21 question semi-structured questionnaire.

The study targeted all the 31 graduate Clinical Officer Anaesthetists trained in KMTC Nakuru under

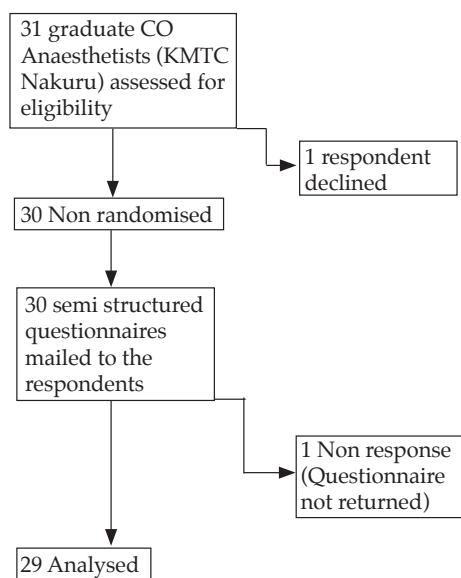
the new programme for the past eight years. Ethical Committee approval was sought from the Rift Valley Provincial General Hospital before commencement of the study. Respondents voluntarily signed a consent form and returned it to the principal investigator before participating in study. One graduate declined to consent.

key thematic areas was performed.

The questionnaire was mailed to the 30 targeted respondents who consented. Where the questionnaire was not returned in four weeks, a reminder was sent to the respondent.

Data were analysed using quantitative and qualitative techniques. Qualitative analysis, involving summarising, categorising and interpreting data into

*Flow diagram of study methodology*



## RESULTS

Twenty nine out of the 31 targeted respondents returned answered questionnaire. This was a 93.55% return rate. One participant did not return questionnaire and one declined to participate.

Socio-demographic characteristics of C.O Anaesthetists trained at KMTC Nakuru (Table 1) showed a majority 51.7% (15 out of 29) being age 31-40 years. 12 (41.4%) were aged 21-30 years and 2 (6.9%) were aged 41-50 years. None was above 50 years.

**Table 1**  
*Social demographic characteristics of C. O anaesthetists trained at KMTC Nakuru*

| Attribute                       | Frequency | Percentage (%) |
|---------------------------------|-----------|----------------|
| 1. Age                          |           |                |
| 21-30 years                     | 12        | 41.4           |
| 31-40 years                     | 15        | 51.7           |
| 41-50 years                     | 2         | 6.9            |
| Above 50 years                  | 0         | 0              |
| 2. Gender                       |           |                |
| Male                            | 23        | 79.3           |
| Female                          | 6         | 20.9           |
| 3. Funding source               |           |                |
| GOK                             | 17        | 58             |
| FBO                             | 1         | 3.4            |
| Private                         | 11        | 37.9           |
| 4. Current anaesthesia practice |           |                |
| Yes                             | 27        | 93.1           |
| No                              | 2         | 6.9            |
| 5. Full time employer           |           |                |
| GOK                             | 21        | 72.4           |
| Private                         | 5         | 17.2           |
| FBO                             | 3         | 13.3           |

Majority, 23 out of 29 (79.3%) were males compared to only six females (20.9%). Over half, 17 (58.6%) were Government funded, while 11 (37.9%) were privately sponsored with only one (3.4%) sponsored by Faith Based Organization (FBO). Almost all, 27 out of 29

(93.1%) of the respondents are practicing anaesthesia. 21 (72.4%) are currently working in various Public health facilities across the country, five (17.2%) in privately owned health facilities and three (10.3%) are employed full time by FBO.

**Figure 1**  
*The work station distribution by county*



The C.O Anaesthetists level of satisfaction with the training at KMTC Nakuru (Table 2) showed that most, 26 out of 29 (89.7%) were satisfied with the depth of content covered during the training. 19 (65.5%) felt

that theory lectures were well taken by tutors, seven (24.1%) felt these were averagely taken, with three (10.3%) reporting inadequacy in the way these were delivered.

**Table 2**  
*C. O anaesthetists level of satisfaction with training*

| Attribute                         | Frequency | Percentage (%) |
|-----------------------------------|-----------|----------------|
| 1. Depth of content               |           |                |
| Satisfactory                      | 26        | 89.7           |
| Inadequate                        | 2         | 6.9            |
| Varied                            | 1         | 3.4            |
| 2. Theory lectures                |           |                |
| Well taken                        | 19        | 65.5           |
| Averagely taken                   | 7         | 24.1           |
| Inadequately taken                | 3         | 10.3           |
| 3. Clinical attachment experience |           |                |
| Good                              | 12        | 41.4           |
| Adequate                          | 12        | 41.4           |
| Inadequate                        | 5         | 17.2           |
| 4. Trainees perception of tutors  |           |                |
| A. Mastery of content             |           |                |
| Good                              | 17        | 58.6           |
| Average                           | 10        | 34.5           |
| Inadequate                        | 2         | 6.9            |
| B. Experience in content delivery |           |                |
| Good                              | 7         | 24.1           |
| Average                           | 5         | 17.2           |
| Inadequate                        | 17        | 58.6           |
| C. Motivation                     |           |                |
| Good                              | 8         | 27.6           |
| Average                           | 12        | 41.4           |
| Low                               | 9         | 31.0           |
| D. Tutor numbers                  |           |                |
| Adequate                          | 5         | 17.2           |
| Satisfactory                      | 10        | 34.5           |
| Inadequate                        | 14        | 46.7           |
| E. Tutor professionalism          |           |                |
| High                              | 20        | 69.0           |
| Average                           | 9         | 31.0           |
| Low                               | 0         | 0              |
| 5. Training process               |           |                |
| A. Pace                           |           |                |
| Good                              | 10        | 34.5           |
| Average                           | 10        | 34.5           |
| Fast                              | 9         | 31.0           |

The clinical attachment experience was rated as good by 12 (41.4%), as adequate by a similar number and as inadequate by five (17.2%) respondents. Over half, 17 (58.6%) of the respondents felt that the KMTC Nakuru tutors had good mastery of content in their respective areas. Ten (34.5%) felt that their tutors mastery of content was average, with only two (6.9%) feeling it was inadequate.

Seventeen (58.6%) of the respondents felt that the tutors lacked the necessary experience to deliver the content in their respective units well. The motivation of the KMTC Nakuru tutors was rated as average by 12 (41.4%) respondents, and as low by nine (31.0%) respondents. Fourteen (46.7%) of the respondents felt

that the number of tutors was inadequate, while only ten felt that the current staffing was satisfactory.

The training process was rated as good paced by ten (34.5%) respondents, average by ten (34.5%) and as fast by nine (31.0%). The training schedule was rated as good by 15 (51.7%) of the respondents, average by ten (34.5%) and as congested by four (13.8%). Coaching was rated as good by 15 (51.7%) respondents and as satisfactory by 14 (48.3%).

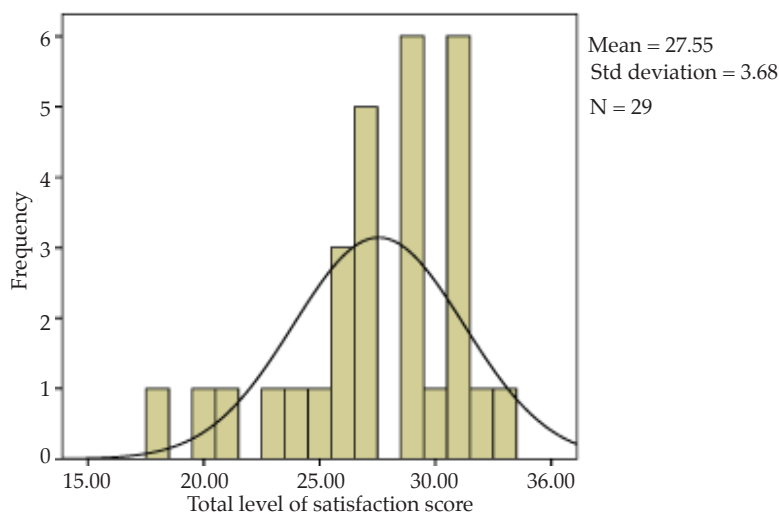
The larger proportion, 26 out of 29 (89.7%) of the C.O. Anaesthesia trainees from KMTC Nakuru passed final examinations at first sitting. The remaining three passed after re-sit in six months time.

A total level of satisfaction score was computed

based on the trainees' perceptions on the depth and content of training, clinical attachment experience, knowledge and experience of the tutors and the general training process. The total maximum score was 33[11 items × 3(highest score per item)]. The

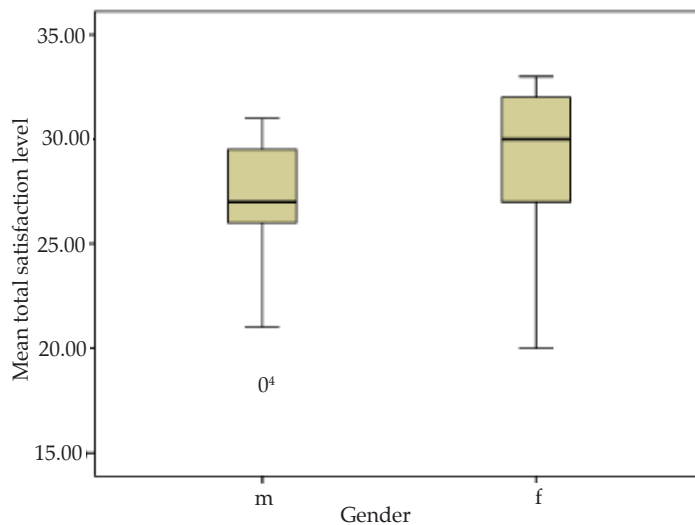
mean score on level of satisfaction was 27.6 (standard deviation of 3.68). The highest score was 33 while the lowest was 15. From the histogram (Figure 2), the total scores on the level of satisfaction with the training at KMTc Nakuru were normally distributed.

**Figure 2**  
*Total level of satisfaction with the CO anaesthetist training at KMTc Nakuru*



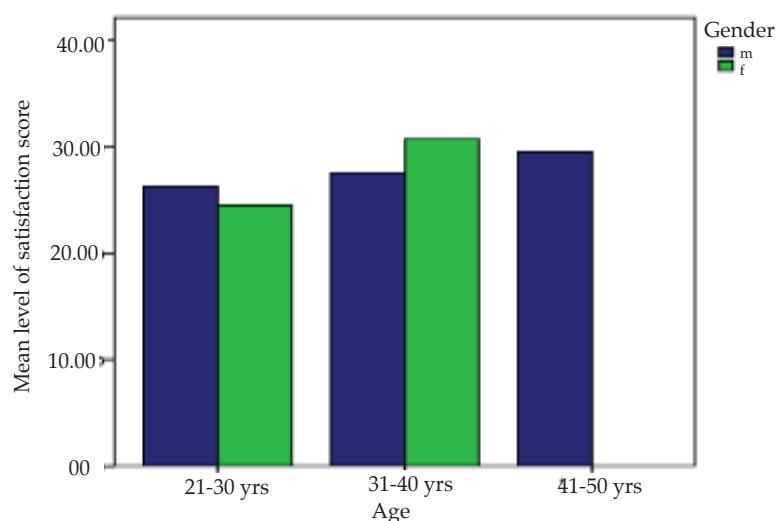
The mean and median total satisfaction scores in the males were lower at 27.3 and 27.0 respectively compared to those of the females 28.0 (mean) and 30.0 (median).

**Figure 3**  
*Level of satisfaction score by gender*



The mean score on satisfaction level was higher in the 31-41 and 41-50 years age groups compared to the 21-30 years age group. The differences in the mean scores on satisfaction level did not appear to be very different between the male and female CO Anaesthetist trainees.

**Figure 4**  
Level of satisfaction score by age groups and gender



Most of the trainees felt that the programme equipped them with key desirable attributes of an anaesthetist, Table 3. These were, Professionalism learnt by 27 out of the 29 (93.1%), on time response by 26 (89.7%), effective communication by 25 (86.2%) and sensitivity to colleagues learnt by 25 (82%).

**Table 3**  
Effectiveness of C. O anaesthetists training at KMTC Nakuru

| Attribute   | Frequency | Percentage (%) |
|---|-----------|----------------|
| 1. Key desirable attribute talent   |           |                |
| A. Professionalism  | 27        | 93.1           |
| B. On time response   | 26        | 89.7           |
| C. Effective communication  | 25        | 86.2           |
| D. Sensitivity to colleagues  | 25        | 82             |
| 2. Important learning experiences   |           |                |
| A. Informal teaching  | 25        | 86.2           |
| B. Formal lectures  | 21        | 72.4           |
| C. Discussion groups  | 16        | 55.2           |
| D. Senior students interaction  | 16        | 55.2           |
| E. Mortality and morbidity sessions                                       | 15        | 52.4           |
| F. Surgeons interaction   | 2         | 6.9            |
| 3. Desirable tutor behaviour  |           |                |
| A. Calmness   | 18        | 62.1           |
| B. Non-threatening information  | 18        | 62.1           |
| C. Clear communication  | 17        | 58.1           |
| 4. Unprofessional treatment   |           |                |
| A. Yes  | 8         | 27.6           |
| B. No   | 21        | 72.4           |
| 5. Pre-operative anaesthetic visit  |           |                |
| A. Always   | 14        | 48.3           |
| B. Most times   | 12        | 41.4           |
| C. Only when consulted  | 3         | 10.3           |
| 6. Completion of operation list   |           |                |
| A. Always   | 13        | 44.8           |
| B. Most times   | 14        | 48.3           |
| C. Missing system   | 2         | 6.9            |
| 7. Rating of the quality of management of physically poor status patients |           |                |
| A. Very adequate  | 5         | 17.2           |
| B. Adequate   | 20        | 69             |
| C. Neutral  | 4         | 13.8           |

The C.O Anaesthetist trainees in KMTC Nakuru identified both formal and informal learning as some of their most important learning experiences. Discussion group and interaction with senior students were also cited as being important sources of learning by 16 (55.2%). Mortality and morbidity sessions were cited as vital by 15 respondents (52.4%), while interactions with surgeons were cited as contributing the least to the learning experience in the college (6.9%).

Clear communication, by 17 respondents (58.6%) and calmness, by 18 (62.1%) were cited as the two most important behavioural attributes displayed by the tutors that were of most significance to the CO Anaesthetist trainees. Use of non threatening language was also identified as important by 18 respondents (62.1%).

Only eight out of the 29 respondents (27.6%) reported any form of unprofessional treatment. Among the unprofessional treatment cited was lack of empathy and courtesy as well as the use of unprofessional language. Being denied time out to deal with personal problems was also cited.

The CO Anaesthetists on average work for 54 hour per week at their current facilities. The median

hours of duty were 45 hours. The median anaesthesia hours were longer in Laikipia, Kiambu and Elgeyo Markwet Counties.

Fourteen of the respondents (48.3%) reported conducting a pre-operative anaesthetic visit always to plan mode of anaesthesia. 12 (41.4%) made the visit most times while 3 (10.3%) made the visit only when called to do so.

Thirteen (44.8%) of the respondents reported being able to complete their operating list always. Fourteen (48.3%) reported being able to complete their operating list most of the times.

Fifteen respondents (51.7%) reported encountering one ASA III, IV, and V patient in a fortnight. Ten (34.5%) encountered these patients once weekly and three (10.3%) one monthly. Most CO Anaesthetists (69.0%) felt that the anaesthetist care they provided for the physically poor status patient was adequate. 17.2% felt it was very adequate and only 13.8% were neutral.

Twenty Five (86.2%) Respondents felt there was need to have the current curriculum improved. The remaining four (13.8%) felt there was no need to improve it. The suggested recommendations are tabulated in Table 4.

**Table 4**  
*Respondents' recommendations for improvement of the curriculum*

| Recommendation  | Frequency | Percentage |
|---|-----------|------------|
| 1. Improve teaching and practice of peripheral nerve block and epidural anaesthesia | 6         | 24         |
| 2. Employ adequate tutors   | 5         | 20         |
| 3. Motivate tutors adequately   | 4         | 16         |
| 4. Modernise hospital anaesthetic equipment and drugs                               | 3         | 12         |
| 5. Equip library with more anaesthesia literature                                   | 3         | 12         |
| 6. Accomodate trainees within hospital premises                                     | 2         | 8          |
| 7. Improve on visual teaching aids  | 2         | 8          |
| 8. Start a paediatric anaesthesia refresher course                                  | 1         | 4          |

## DISCUSSION

The population of Kenya is 38,610,097 (11). This population gets anaesthesia services from 127 Physician Anaesthetists and 880 C.O Anaesthetists. In effect, 2.61 anaesthesia providers for every 100,000 persons. CO Anaesthetists constitute about 87% of all anaesthesia providers in Kenya. Most of the anaesthesia providers are located in urban centres in private practice, with only 31 Physician Anaesthetists and 198 Clinical Officer Anaesthetists in Public Service\*. Out of the 880 C.O Anaesthetists trained, some are not practising anaesthesia due to retirement, natural attrition and other reasons. No register exists of exact number currently providing anaesthesia.

Health care systems in Kenya have devolved to rural areas. More surgical experts are being trained and posted to Kenyan rural areas. This is in keeping

with ongoing government devolution.

The 2005 new curriculum aims and philosophy is to train a competent C.O in Anaesthesia who will provide anaesthetic, resuscitation and disaster management services throughout the country. One who adheres to professional ethics continuously and develops self. During training the student must develop and maintain a sufficient level of technical competence and theoretical knowledge to enable them discharge all the professional duties efficiently and safely.

The course is offered to Clinical Officers, holding a Diploma in Clinical Medicine and Surgery (three year training in middle level college), be registered and licensed by the Clinical Officers' Council of Kenya to practice in Kenya. One must have worked for at least three years as a Clinical Officer and below 40 years at admission. Must satisfy an interview panel.

The course duration is 18 months, comprises Theory classes 493 hours (Health Service Management 240 hours and Anaesthesia 253 hours), Clinical attachment 58 weeks, Research two weeks and Final Examinations two weeks at the end of the course duration. 15 months are spent in KMTC Nakuru and last three months and final national qualifying Examination offered centrally at KMTC Nairobi.

A student will have passed the final qualifying examination if they attain 50% in both the theory and the practical examination. They shall be awarded a Higher Diploma in Clinical Medicine and Surgery (Anaesthesia). A grade of 49% and below will require the student to re-sit the examination after six months having rotated again in clinical areas and attended theory classes. A student must pass the final examination in one year following first sitting.

The qualified C.O Anaesthetist is registered in Kenya to provide anaesthesia services without supervision, but should know when to consult and refer difficult cases to the physician anaesthetists\*\*. This differs worldwide when task shifting in anaesthesia is undertaken. Out of 50 States in the United States, in 17 states, CRNAs work without supervision of Physician Anaesthesiologist. On roles and working under supervision or no supervision, articles have been published (10, 12, 13, 14, 15, 16). Retirement from public service is at 60 years of age. Majority of our graduates are in the age group 31-40 years, indicating the possibility of a good number of productive years as C.O Anaesthetists.

Only 20.9% of the graduates were females. This finding is similar to findings in other countries (17, 18) and may be an indication of the demanding nature on social and family life that anaesthesia work is.

The governments' commitment to increase access to anaesthesia services in public health facilities in the country is supported by fact that it funded 58.6% of the C.O Anaesthetists trained at KMTC Nakuru. This study also established that 72.4% of all C.O Anaesthetists trained at KMTC Nakuru are currently employed by the government. These are distributed in 16 out of the 47 counties in the country. However, the majority are concentrated in high resource counties, with only one in a far flung county, Wajir. The intension of the programme is to have equitable distribution of anaesthesia providers throughout all counties in the country.

The C.O. Anaesthetists on average work for 54 hours a week at their current facilities. The median hours of duty being 45 hours. Government office hours in Kenya are stated as 40 hours a week (19). This compares with The European Working Time Directive (EWTD) that the average weekly working time shall not exceed 48 hours (20). Overwork is explained by shortage in anaesthesia providers in Kenya.

To achieve a high standard of professional

competence and strict adherence to professional ethics in a trainee, the tutor must mentor, teach and model professional behavior. In any educational curriculum, there is the formal curriculum, the informal curriculum and the hidden curriculum (21, 22, 23, 24).

The formal curriculum, based on facts is taught in lectures, Problem Based Learning Discussion, mortality and morbidity meetings and is tested. The informal curriculum, offered on day-to-day interactions between tutors and trainees is personal and less structured. It offers opportunities for exchange of ideas, opinions and experiences, and professional values are more likely taught during this setup. The hidden curriculum is the organisational culture and values passed on in a subtle way.

The results show that we have been able to effectively implement the 2005 curriculum. This is depicted by a first pass rate of 89.7%, with theory and clinical experience adequately covered. Poor physical status patients when encountered by our graduates are adequately managed as reported by them. Graduates rate tutors as good mentors, motivating and highly professional. Important values of an anaesthetist are taught, including on time response, sensitivity to colleagues, effective communication, preoperative visit to plan anaesthesia and list completion.

Areas to improve curriculum shall be addressed, with lectures already being given by power point presentation.

In conclusion, C.O Anaesthetist training in KMTC Nakuru over the last eight years has produced self reported satisfied, adequately trained graduates and has had an impact in alleviating shortage of this cadre in Kenya. Improvement in peripheral nerve blocks and epidural training is needed.

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