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RESEARCH ARTICLE

SETTING A MODEL BY MODELLING THE SETTING TO COMMISSION CRITICAL CARE SERVICE IN LOW RESOURCE AREA; THE CASE OF SUDAN

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ABSTRACT

Background: Intensive Care Unit (ICU) has greatly advanced over the last six decades, but there is a delay by more than a decade between the developed and low-income countries. In low-income countries, 77% of ICUs lack trained staff. Sudan as a low-resource country is severely suffering from lack of skilled healthcare providers in critical care and other specialized services. Eldaman hospital, Kordofan state, Sudan was an example of this problem. The hospital has a well-equipped ICU, but was not able to deliver critical care service for more than 2 year due to lack of trained staff. **Objective:** The objective of this intervention is to enable service commissioning in low resource area and capacity building of local staff. **Method & Result:** To solve the problem the hospital imported commissioning team of experienced ICU staff (doctors and nurses) who are also critical care educators. This helped to createa continuous capacity building program for local staff and trained 37 and 15 critical care nurses and doctors respectively. The imported team in collaboration of locally trained staff helped to create 10 ICU beds to serve 229 patients. **Conclusion:** Importing Commissioning team and establishing a continuous capacity building program, look like an attractive solution to enable critical care service in low-income countries.

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INTRODUCTION

Critical care started as a new speciality in the 1950s and 1960s, with primary focus to help an imminently dying patient(1). It is predicted that, virtually all of the current generation will have an ICU encounter during life time (1). ICUs has greatly advanced over the last six decades to provide the highest level of safe medical care and improve outcomes. There was a delay by more than a decade between the development of intensive care medicine in developed and low-income countries (2).While there is a need and will to develop and improve critical care, there is a dire need of experts specifically trained in intensive care in the form of doctors and nurses. A convenience sampling of 13 low-middle income country ICUs showed that 77% lacked trained staff and identified this as the most important barrier to the development of intensive care (3). Critical shortage of highly skilled health professionals was seen mostly in sub-Saharan Africa, (4).

In Sudan, most of the intensive care units & emergency rooms are staffed by medical officers, medical and anesthesia registrar. Most of them received scanty training in the field of emergency medicine and critical care. The same is applied to the nursing staff (5).

Service commission & staff capacity building: Eldaman hospital was established in 2017 in Al-Obeid city in North Kordofan state, Sudan.Kordofan population is 2.9 million and Al-Obeid is 350 Kilometres from the capital. The hospital is 200 beds with most general medical and surgical departments; and fully equipped intensive care unit (ICU). The hospital was struggling for two years to commission ICU service due to lack of qualified providers.During this process the hospital was lucky to hire a young cardiologist, with excellent experience in critical care and he is a certified professional trainer in many resuscitation courses (like, Advance Life Support (ALS);

Fundamentals of Critical Care Support (FCCS); Mechanical ventilation). He and the senior author of this article were requested to help in commissioning ICU service with long term sustainability. This goal was transformed into an operation plan by having a commissioning team to start the service, and by creating sustainable capacity building program for the local staff. Commissioning team was led by this cardiologist, and an experienced IU resident and a qualified ICU nurse. The leading ICU resident and nurse were professional trainer and educator at the Continuous Professional Development center at the Federal ministry of health (CPD-FMOH). They were supported by 2 experienced ICU resident who are professional trainer at CPD – FMOH and five experienced ICU nurses from Khartoum. When the team arrived at Eldaman hospital in February 2020, there were 15 nurses and 8 doctors assigned for the ICU without any critical care experience. The nurses and doctors were subjected to didactic and professional training covering relevant areas for each of them. Table-1 shows the capacity building activities for both doctors and nurses. They were subjected to progressive training in soft and hard skills needed in ICU. These capacity building activities were conducted over 60 days. Education started by emphasizing the theoretical bases and principles followed by practical and simulation stations. This was coupled by practical supervision at the critical care area led by the skilled staff. Assessment of trainee was conducted by work place-based assessment and written and oral exam.

To commission the service, the skilled ICU providers from the capital were assembled into three teams, each was composed of an ICU resident and 2 ICU nurses. Assigned to each team 2-3 doctors and 5 nurses from the local staff. The goal was to couple didactic activities with professional training. The local staff took clinical responsibility gradually. Full delegation was given when they mastered the skills. Initially the service was started by two beds that expanded to five ICU beds by the end of training. Then the administration decided to increase bed capacity to 10 beds. This was achieved by hiring 14 experienced nurses from the capital. To be ready for anticipated future losses in human resources a second cycle of training of local staff was started in Jan 2021. It followed the same path and ended by training 22 new critical care nurses and 7 doctors. By April 1st the hospital trained 37 nurses and 15 doctors from the local staff. Total number of experience nurses hired from Khartoum were 20. The combination of commissioning team and capacity building program avail 10 ICU beds in 10 months. This served 229 patients with an estimated mortality of 28.8% (66 cases). The hospital lost 18 (18/57=31.6%) critical care nurses in 10months. Interestingly 12 (12/20=60%) of them were from Khartoum staff and 6 (6/37= 16.2%) were from local staff.

Table 1. Indicates the capacity building activities conducted to both doctors and nurses

No	Item	Nurses' activity	Doctors' activity
1.	Basic Life support.	✓	✓
2.	Immediate life support.	✓	✓
3.	Advance Life Support	✓	✓
4.	Infection prevention & control.	✓	✓
5.	Basics nursing skills.	✓	
6.	Patient safety.	✓	✓
7.	Medication safety	✓	✓
8.	Air way management.	✓	✓
9.	Code blue & rapid response team.	✓	✓
10.	Basics of mechanical ventilation	✓	✓
11.	ABGs analysis & interpretation	✓	✓
12.	Safe transfer.	✓	✓
13.	Care of arrested patient.	✓	✓
14.	Documentation	✓	✓
15.	Communication skills	✓	✓
16.	ECG interpretation	✓	✓
17.	Mechanical Ventilation	✓	✓
18.	Use of inotrope	✓	✓
19.	Assessment of deteriorating patient	✓	✓
20.	Nursing ethics	✓	
21.	Medical ethics		✓
22.	Equipment care & preparations	✓	
23.	Oxygenation & suction	✓	✓
24.	setting crash cart	✓	
25.	ICU protocols	✓	✓
26.	Nursing interventions.	✓	
27.	Nursing process application.	✓	
28.	Personal hygiene.	✓	
29.	Critical areas setting & preparation.	✓	
30.	Essential critical care procedures	✓	✓
31.	Continuous Renal Replacement Therapy	✓	
32.	Basic ICU course		✓

DISCUSSION

The senior author of this article travelled to 16 major cities in Sudan, none of them has a well-functioning ICU apart from the cardiac center in Madani (Jazera state 180 kilometres from the capital). Interestingly, many states in Sudan have a dedicated ICU area ranging from 6-12 beds and reasonable equipment but they are not able to deliver critical care service due to lack of trained personnel. Human resources are one of three principles of health system inputs, with the other two major inputs being physical capital and consumables (6).

The most important component of the health system depends largely upon the knowledge, skills and motivation of those individuals responsible for delivering health services (6). The commissioning team built the capacity of the local staff by focusing on common and simple clinical activities and then moving to complex and less frequent ones. New options for education and in-service training of health care workers are required to ensure that the workforce is aware of and prepared to meet a particular country's present and future needs (7). In this report, the commissioning team was able to recruit a total of 20 (initial 6 then 14) skilled nurses from Khartoum to work in Kordofan. They gave them special salary "150% above the average salary", free housing and opportunity for additional income "programmed overtime shifts". In addition to salary incentives, developing countries should use other strategies such as housing, infrastructure and opportunities for job rotation to recruit and retain health professionals (7). In spite of that the hospital lost 31.6% of its critical care staff in 10 months. The majority of them were from the expert hired from Khartoum 60% compared to the local staff 16.2%. The relatively better rate of retention of local staff in encouraging to repeat this process in the same place and other parts of the country. Data from the World Bank show that, if the productive workforce in rural were persuaded to stay in rural areas for a longer period of time, it is more likely to have a stronger impact on rural health outcomes when compared with recruitment with multiple incentives (8).

Though the initial recruitment model given to the expert hired from the capital was attractive, it was not able to sustain significant retention for long term. The major reason for human resources turnover in this report was migration to other country for better financial support. Many healthcare workers in developing countries are underpaid, poorly motivated and very dissatisfied (9). The commissioning team believe that sustainability can be achieved proactively, by continuously prepare new providers from the local community and make them ready to replace the lost one. To keep the ball running the next phase is to generate local educator who are able to graduate skilled service providers and new educators.

CONCLUSION

Utilizing the concept of importing commissioning team to low resource area is an attractive idea to solve some of the human resource challenges for the short term. Creation of a continuous capacity building program for local staffmight help to sustain staff retention and generate continuous supply of skilled workforce in underserved area.

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