

Setting Up a Cytology Laboratory for Cervical Cancer Screening in a Developing Country: A One Year's Early Experience at a Private Facility

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Abstract

Introduction: Widespread cytology-based method of screening such as Pap smear test has significantly led to a reduction in the incidence and mortality associated with cervical cancer in many developed countries. In these countries, facilities needed for early detection of cervical cancer such as cytology laboratories are existent and generally available to their population. In a developing country like Somalia, access to cytology services for cervical cancer screening remains limited and as result majority of patients present with advanced stage disease (stage III & IV) that is too difficult to treat.

Intervention: To address this challenge, the management of AL-Zahra Specialty Hospital contracted a cytologist based in Uganda to guide in setting-up of cytology laboratory in the heart of Mogadishu, Somalia so as to provide cervical cancer screening and diagnostics services to the population. Other interventions made by the visiting cytologist involved guiding the procurement officer in the purchase of basic equipment, reagents, consumables and training of health care staff. This resulted into conducting 1020 cervical cytological tests over a period of 12months (1st September, 2018 to 30th September 2019).

Lesions learnt: In order to increase access to cytology services, we learnt that the federal government of Somalia should consider making cervical cytology (pap smear test) as part of routine screening policy for all sexually active women as part of health care package. An increase in sample volume may be improved through awareness campaigns and conducting community screening activities.

Conclusion: Somalia, a developing country has made great strides towards addressing the limited facilities for cervical cancer screening by using very limited funding. We hope that our experiences shall provide technical guidance & direction to physicians, laboratory managers and investors who wish to establish similar cervical cytology laboratories in an economically constrained low-resource setting.

Keywords

cervical cancer; cytology; tissue-tek slide

Introduction

Globally, cervical cancer is the fourth most common cancer in women with an estimated 570,000 new cases and with about 311,000 deaths in 2018[1]. Up to 85% of these new cases occurs in the low-and middle-income countries [2]. The highest incidence rates are observed in Latin America and the Caribbean, sub-Saharan

Africa, and south and south-east Asia [3]. In Somalia, cervical cancer ranks among second leading cause of female cancer related deaths with an age-standardized incidence rate at 25.1 per 100,000 and a mortality rate at 20.2 per 100,000 [4] Widespread cytology based cervical screening has registered a marked reduction in the incidence of cervical cancer in developed countries.

In such countries the mortality and morbidity associated with cervical cancer has also significantly reduced [5]. Access to cytology services in Somalia remains a challenge due to a limited number of pathology laboratories and trained cytologist's personnel for cervical cancer screening. As a result of this a majority of patients are forced to seek for cytology services in other neighbouring countries such as Kenya & Uganda where resources available for screening are as well as moderately available. Patients who are unable to access these services end up presenting with advanced stage of disease (stage III & IV) that is too difficult to treat. To address this challenge, the management of AL Zahra Specialty hospital contracted a cytologist to guide in the setting up of a cervical cytology laboratory. Terms of reference involved guiding in purchase of equipment, reagents, consumables, training of smear takers & laboratory technicians. In this article we share the experiences encountered by the team in the first twelve [12] months after establishing the said cytology laboratory.

Facility description

The cytology laboratory was established at AL Zahra Specialty Hospital which is a private hospital with a bed capacity of ten [10] beds, located along Liberia road, Hodan district, Mogadishu-Somalia. The hospital receives referrals from other neighbouring private, government hospitals for cytology mainly focuses on

gynaecological cytology and maternity services. The hospital also participates in community cervical cancer screening programs in other states such as Somali land & Puntland

Description of intervention

Planning and setting up

The idea to set up a cytology started as early as February, 2018 which was followed by a series of talks and contractual agreements between the management of AL Zahra Specialty Hospital and with the cytotechnologist based in Uganda. Laboratory space measuring 5 by 2 square meters was acquired at the second floor of the hospital building for setting up a cytology unit. Different suppliers were contacted for invoices on equipment and reagents from which a supplier with the least quotation was selected for the service. At the beginning of the project a total amount of 8,601 USD was mobilized by the hospital management so as to kick start the project (see Table 1). By 26th August, 2018 installations of furniture and purchase of equipment, reagents, solvents and consumables had already started after having identified a potential supplier. Equipment that was purchased included a microscope (Olympus CX 23), tissue-tek slide staining set (sakura), laptop (dell), digital eye piece camera, colour laser printer and air conditioner (see figure 1).



Figure 1: Shows an air conditioner, Olympus CX23 microscope, laptop, printer, chairs and tables
Reagents/solvents purchased included harris hematoxylin, eosin azure 50 (EA 50), orange G6, xylene and graded alcohols (see figure 2A & 2B).



Figure 2: Shows slide staining set for Papanicolaou staining. From Right to Left jars contain; 1-95% alcohol, 2-harris hematoxylin, 3-70% alcohol, 4-95% alcohol, 5-OG6, 6-95% alcohol, 7-EA50, 8-95% alcohol, 9&10-100% alcohol, 11&12-Xylene.

B: Slide staining with an entire staining area.

Due to limitation of space, the specimen processing area was combined with the reporting area (see figure 3).



Figure 3: Reporting area

In the absence of a cytologist (while on leave) a laboratory technician was trained to take images using a digital eye piece fitted on CX 23 microscope and

transmit the captured images electronically to Kampala for reporting (see figure 4).



Figure 4: Shows a digital eye microscope taking photos of slides (microphotographs)

For safety purposes, personnel protective equipment such as goggles, nasal masks and gloves was provided to

the laboratory staff to minimize exposure to xylene and other toxic substances (see figure 5).



Figure 5: Shows staff conducting a procedure while wearing personnel protective equipment.

Training of health workers

To acquire skills in cervical screening and diagnostics, the laboratory technicians and nurses underwent a three days CME in various aspects of cervical sample collection and processing. Nurses were trained on

standard operating procedures for collecting of an adequate cervical specimen. Laboratory technicians received training in cytopreparatory procedures such as papanicolaou staining, mounting and coverslipping (figure 6A &6B)).



Figure 6: Shows staff conducting a procedure while wearing personnel protective equipment.

Challenges & mitigation

Somalia is a developing country with quite a high economically constrained health systems coupled with limited funding & no policies to tackle non-communicable diseases such cervical cancer. General challenges included failure to acquire local suppliers for cytology reagents and consumables. To minimize stock-outs, supplies were obtained from local distributors based in Uganda and shipped to Mogadishu via DHL. Insecurity in Mogadishu also affected the functionality of cytology laboratory as foreign workers (cytologists) were at risk of getting kidnapped by Al-Shabab militants. To address this challenge, we developed a telemicroscopy system (telectology) where digital images (microphotographs) were sent to the cytologist for reporting in Kampala. Local laboratory technicians were trained on how to take quality images which enhanced continuity of cytology services in the absence of an on-site cytologist.

Lessons learnt

In order to reduce the growing burden of cervical cancer & other non-neoplastic diseases in Somalia, setting up a cytology laboratory proved to be highly beneficial to the population. In order to increase access to cytology services, we learnt that the federal government of Somalia should consider making cervical cytology service (Pap smear test) as part of routine screening policy for all sexually active women and focus on including this in the algorithm of the health care package. An increase in sample volume may be improved through awareness campaigns and by conducting community screening activities.

We hope that our experiences shall provide technical guidance & direction to physicians, laboratory managers and investors who wish to establish similar cervical cytology laboratories in an economically constrained low-resource setting.

Table 1: Start-up items used in setting up a cytology laboratory.

Item	Quantity	Cost (\$)	Manufacturer/Origin	Distributor/Origin
Equipment				
Olympus CX 23 Microscope	1pc	1500	Olympus, japan	Crown Healthcare Uganda Limited
Digital eye piece camera	1pc	200	Amscope	Net keep Healthcare Engineering, Kampala-Uganda
Tissue-tek slide staining set	1pc	2750	Sakura, Germany	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
Printer	1pc	140	N/A	N/A
Dell laptop	1pc	300	N/A	N/A
Air conditioner	1pc	400	N/A	N/A
Furniture (chair, tables)	1set	500	N/A	N/A
Reagents and solvents				
Harris hematoxylin	1ltr	286	RAL Diagnostics, France	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
EA50 Papanicolaou	1ltr	286	RAL Diagnostics, France	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
OG6 Papanicolaou	1ltr	286	RAL Diagnostics, France	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
Bioclear (Xylene)	5ltrs	150	BioGnost, Croatia	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
Histanol (Ethanol absolute)	5ltrs	150	BioGnost, Croatia	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
Biomount DPX	500ml	385	BioGnost, Croatia	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
Oil immersion solution	100ml	22	Cypress diagnostics, Belgium	Medilab Uganda
Consumables & accessories				
Coverslips (24x50mm)	10x100/cs	385	Sakura, Germany	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
Pap smear kits (25 per kit)	4 boxes	216	Andwin Scientific, USA	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
Disposable speculums	150pcs	283	Advin Health Care	Laborex Uganda Ltd
20 Slides folder white	10/cs	308	Sakura, United Kingdom	Al Zahrawi Medical Supplies, LLC/ Dubai-UAE
PPE (Mask, gaggles)	1pc	54	Bioptica, Italy	Histclear diagnostic supplies/ Kampla-Uganda
TOTAL		8,601		

Data Availability

Data is available in hard copies and can be accessed on request.

Conflict of Interest

The authors declare that there are no competing interests associated with the manuscript.

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Ethical consideration

This research followed all ethical standards for research without direct contact with human or animal subjects.

Consent

Approval to publish this manuscript and images was obtained from the management of Alzahra Specialty Hospital.

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Authors' contribution

MB wrote the manuscript. NF, ADB & OE revised the manuscript. All authors have read and approved the manuscript

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