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Original Research Article

Availability of Resources for Infection Prevention and Control, Including Constraints, over Performance Levels in Bamenda Health District, Cameroon

Ndipowa James Attangeur Chimfutumba[1]*, Yongabi Kenneth Anchang[2] and Dismas Ongore[3]

[1]Department of Nursing, Cameroon Christian University, Bali, Cameroon.
[2]Phytobiotechnology Research Foundation Institute, Catholic University of Cameroon, Bamenda, Cameroon.
[3]School of Public Health, University of Nairobi, Nairobi, Kenya.

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Infection prevention and control has been a very challenging problem to the public health sector in Cameroon in general and in the Bamenda health district in particular. This has led to an upsurge of many infectious diseases and epidemics. With the advent of the Ebola hemorrhagic disease and other existing epidemics such as Poliomyelitis, Cholera and Measles, health personnel ought to be very cautious and conversant with how syringes and needles, blood products and other body fluids and secretions are handled as well as how they carry out various medico-surgical procedures in the various health facilities and units. This research was aimed at determining the Availability of Resources for Infection Prevention and Control and health promotion, including constraints, and Levels of Performance in the Bamenda health district, Cameroon. It was found that various constraints contributed to the poor performance of tasks and procedures. This is very detrimental to infection prevention, control and health promotion. These, and other issues mentioned in the various responses constituted the background of the immediate-term, short-term and long-term recommendations as a way forward.

Keywords: Availability, Resources, Infection, Control, Prevention, Performance, Constraints, Conventional, Standards.

INTRODUCTION

Infection transmission can be quite common, understandably due to patient/client care activities. Clients and patients entering and leaving the hospital or health facility and also, health personnel may disseminate infection from one hospital department to another, from person to person, from the hospital back to the community and vice versa. It is well understood that the prevention and control of infection depends to a large extent on the availability of resources, how health personnel carry out their procedures, handle and dispose of hospital garbage / refuse and various contaminants.

In health units where medico-surgical procedures are carried out handling laboratory specimens, giving injections, and handling the garbage generated could be very highly infectious.

With the advent of the Ebola Hemorrhagic disease in the West African Sub Region adding up to the other existing infectious diseases such as HIV / AIDS, Polimyelitis, Measles, Cholera, Tuberculosis, Tetanus etc, health personnel ought to be very careful and meticulous in handling syringes and needles, blood products and other body fluids and secretions as well as the manner in which they carry out various medico-surgical procedures in the various health facilities and units.

More so, modern public health practices require that stringent measures be taken by the state and health personnel to protect the population from infection, particularly epidemics. This has been a very challenging problem to the public health sector in Cameroon in general and in the Bamenda health district in particular. That is probably why the North West Region of Cameroon in particular and Cameroon in general

Corresponding Author: Ndipowa James Attangeur Chimfutumba. Department of Nursing, Cameroon Christian University, Bali, Cameroon.
E-mail: ndipowajames@gmail.com

have been experiencing an upsurge of many infectious diseases and epidemics in recent times.

The aim of this research was to determine the Influence of the Availability of Resources for Infection Prevention, Control and Health Promotion, including Constraints, over Performance Levels in the Bamenda health district, North West Region, Cameroon.

Special emphasis was laid on HIV/AIDS and the Ebola Hemorrhagic disease without neglecting the other infectious diseases. Task performance levels with regard to infection prevention and control were analyzed in comparison with the conventionally acceptable standards. The constraints encountered during infection prevention and control were also explored.

In this exercise, Fifteen (15) health facilities randomly selected were surveyed and their infrastructure, water supply, environmental hygiene and sanitation, waste disposal facilities and task performance were assessed.

For our research project we had the following assumptions:

1. Poor and inadequate infection prevention and control measures, including inadequate resources were contributory factors to the upsurge of infectious diseases recorded in various health facilities in the Bamenda Health District.
2. Knowledge update coupled with change of attitude and behavior of health service providers with regard to infection prevention, control and health promotion will greatly reduce the incidence of HIV/AIDS, measles, cholera and other infections in the Bamenda Health District.

CONCEPTUAL FRAMEWORK

There exists interrelationship between the background factors, intermediate factors and the outcomes. The professional knowledge, professional experience, professional qualification and professional aptitude greatly rely on the institutional resources in order for the outcomes to be yielded in terms of infection prevention and control and health promotion.

Meanwhile the institutional factors such as human, material and financial resources will facilitate the acquisition of professional knowledge of the personnel, especially as concerns aseptic technique, sterilization, hygiene and sanitation. This acquisition of knowledge is also a positive reinforcement and motivating factor which greatly influences the attitude of the personnel in terms of their infection prevention and control practices (Fig. 1). The ultimate outcome will therefore be the reduction in morbidity and mortality rates.

METHODOLOGY

Study Design

It was a descriptive cross sectional survey of the factors influencing infection prevention and control practices in public, private and denominational health facilities in the Bamenda Health District. There was a cross sectional survey of the health units, health workers, key informants interview, an observation guide, a focus group discussion and also open-ended questions in the last part of the health workers' interview to help explain or validate the findings.

Sampling Method

Selection of health facilities

Multistage sampling with stratification was done to select the health facilities under study. This method was preferable because the health facilities in the Bamenda health district are made of 3 strata, namely: the Public Health Facilities, 12 in number; the Mission Health Facilities, 6 in number; and the Private Health Facilities, 7 in number. A total of 15 out of the 25 available, functional and approved health facilities in the Bamenda Health District were selected proportionately as follows:

- Public Health Facilities = 7
- Mission Health Facilities = 4, and.
- Private Health Facilities = 4.

This was to ensure an adequately representative sample for the study.

Selection of key informants

Purposive sampling was done to select 25 key informants from 15 selected health facilities.

Selection of Focus Group Discussion (FGD) members

The participants for the FGD were basically made of ward charges, coordinators and supervisors of services / units and who were not served the key informants questionnaire. Systematic random sampling was used to select 10 participants out of the prepared list of 15 ward charges and coordinators / supervisors of services and units in the selected health facilities. These constituted the membership for the Focus Group Discussion.

Sample Size Determination

The sample size was determined by the Fisher et al (1998) formula:

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Fisher et al (1998)

Where:

n = The desired sample size where the study population is equal to or greater than 10,000.
Z = Standard normal deviate corresponding to 95% level of confidence (= 1.96).
P = Estimated prevalence of characteristic of interest (unsound practices) (= 0.5).
(Since that of the Bamenda Health District is not known).
d = Level of precision (set at ± 5%).

Therefore,

$$n = \frac{1.96x1.96x0.5x0.5}{0.05x0.05} = 384.16 = 384 \text{ persons}$$

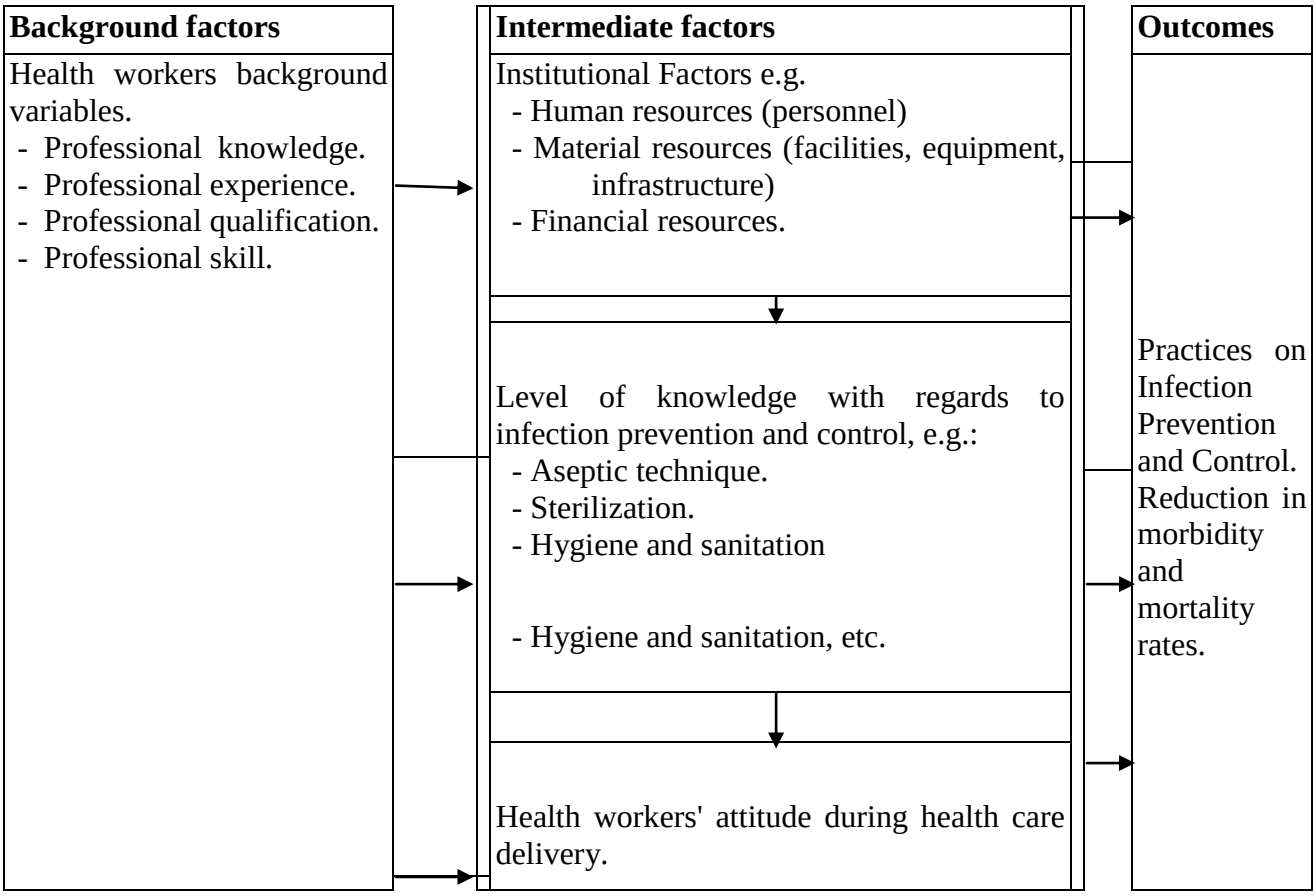

Fig 1. Conceptual Framework

Meanwhile, in this study, the study population was 531 health workers, distributed as follows:

(a) Government health units = 248 H.Ws (46.7%)
(b) Denominational health units = 190 H.Ws (35.8%)
(c) Private health units = 93 H.Ws (17.5%)

To obtain the sample size for this study the adjustment formula was used as follows:

$$\text{T}nf = \frac{n}{1+\frac{n-1}{N}} = \frac{384}{1.72} = 221.51$$

Therefore the sample size, *nf* = 222 persons.
The samples were therefore allocated proportionately as follows:

(a) Government Health Units (46.7%) = 103.7 = 104 persons.
(b) Denominational Health Units (35.8%) = 79.5 = 79 persons.
(c) Private Health Units (17.5%) = 38.9 = 39 persons.

N.B. This sample size was slightly increased due to the situation found on the field. Where there was an operating theatre and / or a blood bank, 2 more participants were selected from each of the units during the working shifts by convenience sampling. That is why the sample size finally came up to 232 persons instead of the 222 previewed.

Stock Outs in basic items during the last three months were very significant in 15 health facilities. In some of the health facilities, boots were regularly used in theatre; in others masks were used regularly in theatre and yet in others, gloves and mackintoshes were not regularly used (Table 2).

It was reported that in the mission and private health facilities, hand–washing was a rule of thumb before and after attending to patients in the medico-surgical units. But in the other health facilities, it was done, but not systematically. The participants were observed as they performed various procedures that had to do with infection prevention and control. The use of gloves was quite satisfactory as 95% used gloves and 5% did not (Fig 2). Concerning the availability of refuse and waste disposal facilities, refuse and waste disposal facilities were distributed in the health facilities under study as follows: Waste disposal pits (2); Placenta pits (3); Incinerators (4); Sharps containers (12) and Dust bins (14)

Various constraints contributed to the poor performance of procedures. These included: Lack of equipment/materials, lack of qualified personnel, lack of knowledge by both patients and staff, frequent power failure, rampant water cuts, staff demotivation and negligence by the staff etc. (Fig 4). Lack of qualified personnel and inadequate equipment/ materials are very huge impediments to infection prevention and control. In the same line of thought, no effective sterilization can be done without water and electricity.

Table 1. Stock Outs in basic items during the last three months (n = 15)

Basic Item	Number of Health Units with Stock Outs
Cotton wool and Gauze	6
Clean Hand Towels	6
Soap	5
Heavy Duty Gloves	4
La Croix	4
Disposable Sterile Gloves	2
Non Sterile Examination Gloves	1
Disposable Needles and Syringes.	1

Table 2. Use of protective equipment in theatre (n= 15)

Equipment	Worn Always.	Worn but Not always.	Not worn at all.
Boots	3	1	2
Masks	6	2	0
New gloves	7	1	0
Mackintosh	6	1	0

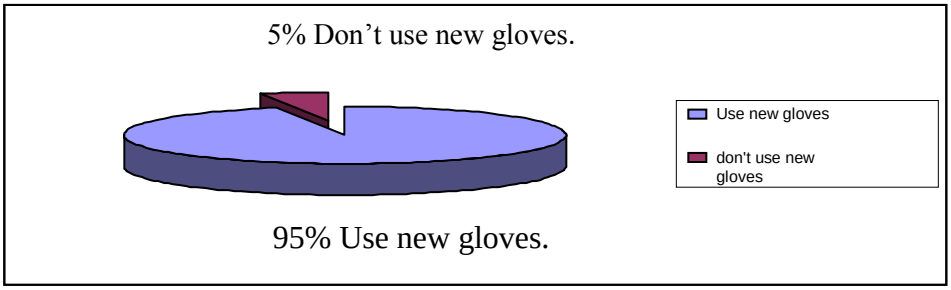

Figure 2. Use of gloves for patient care (n = 100)

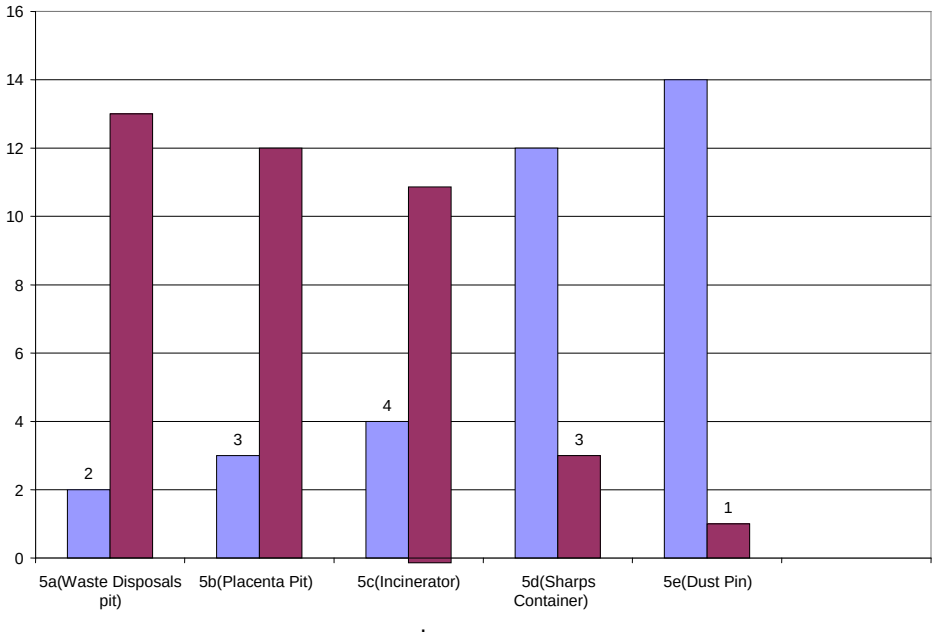

Fig 3. Availability of waste disposal facilities.

KEY: Blue = Available. Red = Not available.

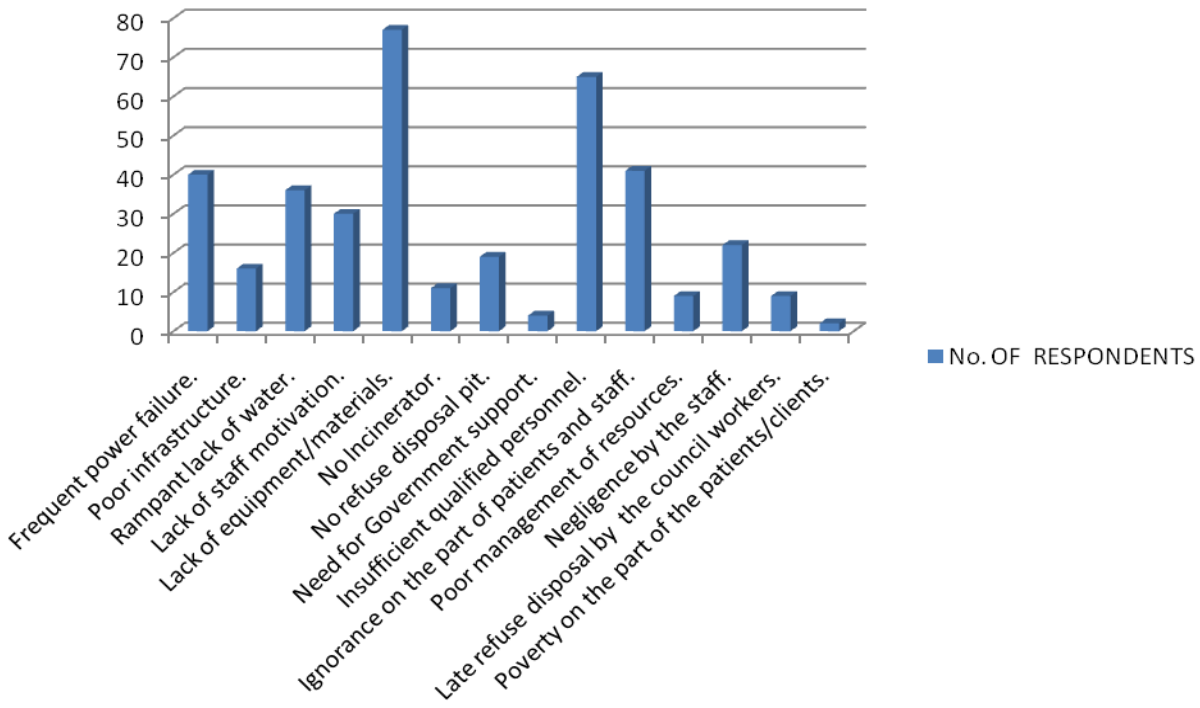

Fig 4. Problems encountered during practice

These constraints are characteristic of low-income countries and Cameroon is not an exception. The lack of resources is not the main issue, but how to effectively manage the available, though scarce, resources.

Brassard and Ritter (2004) state that minimum inputs are necessary in order to achieve reasonable output of services or health care, and human resources are an integral part of these inputs. The new human resources management perspective is that it goes beyond training and focuses on learning, teaches skills and tools for problem solving, looks at self-directed development involving knowledge, attitudes and skills and develops capacities as well as capabilities. Without the qualified and competent staff, quality health care cannot be achieved. The staffing situation was assessed using a health workers' questionnaire and a key informant's interview schedule. Research findings revealed that there is an acute shortage of qualified and competent staff in the Bamenda Health District. It is worth noting that the lack of qualified and competent personnel constitutes a huge impediment in terms of health care delivery in general and infection prevention and control in particular. The consequence of the acute shortage of staff was that staff were hardly deployed or allocated to duties according to their qualification and competence as declared by 52% of the respondents. The overworked staff would consequently be exhausted, inefficient and negligent of important values during health care delivery.

This corroborates with a study which was carried out in Botswana on adherence to health care guidelines by Boonstra. E. et al in 2002. This study showed that formally well trained staff performed significantly better than non-trained or informally trained staff and utilization of human resources impacts directly on the demand for staff. In this regard the Bamenda Health District is in serious need of trained and competent personnel.

The UNDP (2006) states that Angola, in Southern Africa, is illustrative of many resource-limited countries in Sub-Saharan Africa. Several years after the end of a 27-year civil war, the country is rebuilding under the weight of extreme poverty and a destroyed infrastructure.

The leadership of the Angolan military has expressed concern that the rate of HIV infection may quickly increase as post-war mobility and cross-border traffic increase. Thus, there is both the need and the political will for an effective HIV prevention intervention in the Angolan military. In sum, this study presents evidence that militaries, even in resource-limited post-conflict countries, can provide effective HIV prevention to their soldiers.

It is hoped that if the leadership of the BHD in particular and that of the North West Region in general had this type of concern then infection prevention and control will register significant successes. As a matter of fact, members of the focus group discussion expressed dissatisfaction with regards to salary, working conditions and the allocation of "code part". They therefore felt very demotivated.

Under normal circumstances every worker needs a decent salary to be able to survive and also concentrate on the job. One of the shortcomings of inadequate salary is that workers will always seek other sources of income. This means that they would either use some of their work time in other places in a bid to supplement their income or they resort to extra charges on patients and clients within the service and when they do not pay the extra charges they may not be well attended to by the staff. This is common practice in most health facilities in Cameroon in general and especially in the BHD.

These demotivating factors, aggravated by the lack of knowledge update, negatively influence the performance of the health personnel in terms of health care delivery in general and infection prevention and control in particular. Consequently, the level of infection prevention and control inevitably goes on the decline because most of the scarce personnel seem to have very little time for their patients and clients since their main preoccupation is survival of the fittest.

Boddy (2008), states that any purposeful human activity needs some degree of supervision and control if it is to achieve what is intended. Frequent supervision and control ensures that corrective action is taken quickly to avoid waste of effort and resources. That's why supervision and monitoring of infection prevention and control within the health facilities is very important and mandatory. Unfortunately an infection control unit does not exist in any of the health facilities surveyed. This gave room for poor supervision in the Bamenda Health District.

Israr et al (2000) found out that one of the reasons for health workers in Cameroon maintaining their poorly paid government jobs was the absence of a strict supervision and monitoring system.

Without proper supervision and monitoring, personnel performance will be difficult to know; hence fruitful correction can hardly be made. It is believed that even the most well trained workers in any sector if not well supervised and monitored cannot perform to the maximum expected standard. More so, supervision is another means of motivation to the workers as it makes them more conscious, committed and the team spirit is more evident. In the Bamenda Health District this was lacking.

Therefore, supervision and monitoring of health services is a very crucial issue and ought to be given priority since it is part of the day-to-day running of the services. It is less costly and affordable with proper management of the available resources. This can dramatically change and improve the infection prevention and control practices in the health district at a minimal added cost.

In the BHD and beyond, it suffices for a decree or a decision to be signed by the Ministry of Health and a Health Facility is created. The community concerned, then creates a health committee, which takes the responsibility of looking for accommodation for the newly created health facility, basic equipment and a means of running the health facility; else it stands the risk of being closed down. Glaring examples of health facilities without infrastructure and very poorly equipped were Mulang Integrated Health Centre, Ntambag Integrated Health Centre, and Atuakom Integrated Health Centre, just to name a few.

The situation on the field showed that most of the health facilities had no refuse and waste disposal facilities, functional sterilization equipments were inadequate, other sterilization equipment such as chemical, steaming, infrared and external fumigation equipment completely inexistent in the health district, with 14 health facilities not equipped with needles and sharps decontamination facilities. Many health facilities also experienced significant stock outs in some basic items during the last 3 months.

Availability of Blood transfusion services

A service for coordination, supervision and control of blood transfusion neither exists in the Bamenda Health District nor in the entire North West Region. It would be very beneficial for such a service to be created and sustained in the health district and even in the whole region so as to ensure effective blood safety activities including prevention and control of blood borne diseases.

The WHO Regional Office for Africa estimates that 25% of the blood transfused in Africa is not screened for HIV (WHO Blood Safety Initiative, 2002). Current evidence also suggests that countries that have embarked on organized national or other level of blood transfusion services that are well monitored have registered great success. For example: in Mbarara University Teaching Hospital at the Regional Blood Bank of South Uganda, **577 units** of donated blood were found to be HIV positive using ELISA technique out of 12,768 units donated between 1992 and 1994. The blood was consequently not transfused to the recipients.

The impact of laboratory screening for HIV infection can be illustrated dramatically in countries with high HIV prevalence among potential donors. Furthermore, the WHO Blood Safety Initiative (2002) reported that those countries that have established national blood banks have seen major improvements in the safety and quality of their blood supply.

If such coordinated and well controlled blood transfusion services were available in the Bamenda Health District, or even in the entire North West Region, then great successes could also be registered in terms of infection prevention and control, especially blood-borne infections.

Performance of Tasks

In the Bamenda Heath District, injection safety, sterilization and aseptic technique are a major problem. Standards and Guidelines on Infection Prevention and Control don't exist in most of the health facilities, unlike in Kenya, where there exist National Standards and Guidelines on Injection Safety and Medical Waste Management. This document could be very useful in the Bamenda Health District and elsewhere in Cameroon. In fact, there is an acute problem of hospital waste disposal in the Bamenda Health District. Even if syringes are new, sterile, and not being reused, some instruments such as scissors, forceps and other medico-surgical equipment will continue to be used after sterilization. This therefore is an indication for training and provision of necessary inputs and equipment for infection control to the health care providers and ensuring continuous monitoring of their practices.

Concerning asepsis, unfortunately, one respondent said that equipment must not necessarily always be sterilized. This was a midwife in a private clinic who tried to argue out that sometimes, clean gloves and clean forceps could be used to attend to the baby after delivery, especially, when there is no electricity in the unit, and that clean equipment could be used to conduct a delivery and the client puts on strong antibiotics thereafter. This is a very serious issue and could be very disastrous in terms of infection transmission. This could account for the high rate of sepsis in some of the maternities in the health district leading to the high maternal morbidity rates noticed in the health district.

It is also worth noting that HIV/AIDS, Hepatitis B, Ebola Hemorrhagic Fever and Syphilis are top on the list of infectious diseases that were known by the respondents, indicating that they are of priority importance and should be automatically and routinely tested for before the use of blood products as well (Table 3)

It was observed that decontamination of examination table or other surfaces was done by only 13 out of 22 staff observed. Meanwhile, 6 staff did it unsatisfactorily while 3 never decontaminated their surfaces at all. Also, 20 staff removed their gloves correctly while 2 of them did it wrongly.

Table 3. Knowledge about Infectious / Transmissible Diseases (n = 100)

Diseases	Number	%
HIV/AIDS	100	100
Hepatitis B	100	100
Ebola Fever	93	93
Syphilis	89	89
Malaria	68	68
Tuberculosis	15	15
Meningitis	11	11
Hepatitis C	4	4
Toxoplasmosis Gondi	3	3
Tetanus	1	1
Venereal Diseases	1	1
Measles	1	1
Cellulitis	1	1
Osteoporosis	1	1

The rest of the tasks were satisfactorily carried out by all the staff observed. These activities need to be standardized.

Only 9 out of 22 staff members observed were able to carry out autoclaving satisfactorily. The rest missed out some tasks, especially, the task of timing and the duration of sterilization. The 20 minutes minimum duration of sterilization was never respected. Instead the duration was simply estimated.

Disrespect of the recommended temperature and duration of heating is very dangerous. This implies that the instruments under such conditions have not been effectively sterilized. Some resistant microbes may not have been destroyed. This is peculiar of spore forming microbes. In this case infection transmission will be facilitated even though using presumably sterile instruments.

Thirteen staff members used a cheatle forceps from a disinfectant to remove the items from the boiler while 9 staff members used forceps and pick-ups from dry and dusty containers, without any disinfectant and which were probably not sterile. 17 staff members made sure the items were placed in a covered, dry and sterile container while 5 staff members didn't. Their instruments and other items were carelessly exposed to air-dry.

There was therefore a high risk that items were potentially contaminated even though just from the boiler. This kind of practice greatly favors infection transmission.

The non-respect of aseptic technique during injection administration could lead to abscess formation, infection transmission and even septicemia. That's why a lot of caution and scrupulous aseptic technique are mandatory when giving an injection.

This poor technique was common in the pediatric units where dozens of children were lined up for injection and the staff would use the same clean tray or kidney dish for all of them, and also in the maternity units.

With this state of affairs, coupled with the frequent power failure that rendered many activities queasy difficult to carry out, one can hardly be sure of the sterility of the instruments and materials used for medico-surgical procedures. One can rightly consider sterilization in the health facilities as below expected standard. This undoubtedly means that infection prevention and control, especially asepsis, are below required standards.

In the Infection Prevention and Control publication No. 41002 by Pub Med (2009), standard preventive practice focuses on interrupting the transmission of an infectious agent. Practices will vary according to practice setting, the level of care that is being provided, and the inherent risk to the client and client population if transmission occurs.

Considering the various flaws and inadequacies observed during the research project, it would be very right to say that the infection prevention and control practices in the medico-surgical units of the Bamenda Health District are unsatisfactory compared to the required conventionally accepted standards.

Generally the performance of the health workers in terms of infection prevention and control was averagely good, but a lot still has to be done to meet up with the recommended conventional standards. This could be achieved if the important issues raised with regards to performance and also the proposals and recommendations are adequately addressed.

CONCLUSIONS

There was significant lack of knowledge, coupled with negligence of the staff. This apparently contributed to the laxity and lack of commitment among the health personnel in terms of infection prevention and control.

The greatest constraints encountered by the staff during practice include the inadequacy or complete absence of basic equipment and supplies. The situation is aggravated by irregular supervision and staff demotivation. There is an acute insufficiency of human resources. This is demonstrated by an acute shortage of qualified and competent staff in most of the health services in the Bamenda Health District. This constitutes a huge impediment to quality health care delivery.

Poor and inadequate infection prevention and control measures are therefore practical in health facilities in the Bamenda Health District, contributing enormously to the high prevalence of HIV/AIDS and other infections. This is marked by unsatisfactory or ineffective sterilization of equipment and materials; Poor garbage and hospital refuse disposal and, Unsatisfactory aseptic technique in most of the health facilities. Considering the on-going status quo, one would very rightly conclude that the infection prevention and control practices in the Bamenda Health District are good but not very satisfactory. They do not meet up with the required conventionally acceptable standards. Serious improvement is therefore mandatory.

PROPOSALS AND RECOMMENDATIONS

Immediate / short term

1) Health authorities should ensure that hand washing / surgical scrub is reinstated and reinforced, especially when carrying out medico-surgical procedures. This is in principle the first step in the respect of aseptic technique.
2) The relevant authorities should supply adequate consumables and functional materials and equipment such as Autoclaves; Boilers; Hot Air Oven and other modern sterilization equipment, repair those that are broken down and ensure constant maintenance.
3) There is need for the authorities concerned to redeploy their personnel such that the staff are posted to services taking into account their training, experience and competence.
4) More modern methods of sterilization such as chemical sterilization, steaming, internal fumigation and infrared sterilization should be taught and made available to the staff of various health facilities.
5) District work plans should be handed down to the staff at various levels for implementation. At the same time, parallel activities and programs from hierarchy should be carried out such that they do not constitute an obstruction or impediment to district work plans.
6) Good management of resources should be encouraged. This involves good and effective management of human, financial, and material resources including time and space. Here transparency and accountability are mandatory.

Moderate term

1) There is acute need for health authorities to recruit more qualified personnel.
2) Pipe born water and energy supply should be made more permanent..
3) A health district census or an inventory of incinerators and refuse disposal pits should be made and provision made in health facilities where there are no incinerators and refuse disposal pits.
4) Sensitization and health education of the masses with regards to infection prevention and control in the health district should be re-launched and carried out regularly in the form of seminar/workshops.
5) Authorities of the Health District and Regional Delegation should set up an operational system of infection control. None exists for now.
6) The relevant authorities should create and sustain a District Blood Transfusion Coordination and Control service for effective and scrupulous supervision and control of the use of blood products.

Long term

1) There should be regular revision of the curricula of various training schools for health personnel in order to harmonize training objectives and contents in terms of infection prevention and control.
2) Regular refresher courses, seminars, workshops and in-service training should be made available to the personnel in order to update their knowledge on infection prevention and control.
3) There is absolute need for government to decentralize the health care delivery system. This will enable the public health authorities take more concerted decisions and actions in health care delivery at various levels.

FURTHER RESEARCH WORK

1. A similar research project is recommended to be carried out covering the whole North West Region and possibly more regions of the country so that the results could be highly inferrent on the national territory.
2. A study is also recommended on blood transfusion safety with emphasis on HIV infection prevention and control in the Bamenda Health District.

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