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NIGER DELTA MEDICAL JOURNAL

December 2017 | Vol. 1 Issue 3

NIGER DELTA MEDICAL JOURNAL

NDMJ

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Journal of Nigerian Medical and Dental Consultants Association of Niger Delta University Teaching Hospital

December 2017 | Vol. 1 Issue 3

All correspondences should be addressed to
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Content Pages

1. Editorial. We have journeyed so far. **Harry TC** 4

2. Short commentary: The Management of Multidrug-Resistant Tuberculosis (MDRTB) – The WHO Shorter MDRTB regimen. **Ong ELC** 5 - 6

3. Original article: Level of agreement between Ziehl Neelsen (ZN) microscopy and Gene Xpert in the diagnosis of Pulmonary Tuberculosis amongst Smear Negative PTB Suspects and Smear Positive Suspected MDR PTB Patients. **Jumbo J, Ikuabe PO & Ambakederemo TE.** 7 - 15

4. Manpower requirements in Nigeria's health sector: the unmet need to maximize our gains. **Okpani AOU.** 16 - 33

5. Bloodless medicine and surgery: can it be realized here? **Kombo BK.** 34 - 42

6. Physical injuries in the neonatal period - an aftermath of harmful traditional practices. **Ezenwa B, Mokwenyei O, Fajolu I, Akintan P, Ezeaka C .** 43 - 48

7. Occupational health services in small and medium-scale manufacturing industries in Anambra State, South East, Nigeria. **Eguvbe A.O, Rotifa S, Ilika L.A.** 49 - 64

8. Peer-reviewers 2017. 65

EDITORIAL: WE HAVE JOURNEYED THUS FAR

Tubonye C. Harry, FRCOG, FRCP, FWACS
Editor-in-Chief

Niger Delta Medical Journal 2017; 1 (3): 4

The third issue of the NDMJ is marked by the concerted effort of securing the ISSN number for both the print and online versions from the National Library of Nigeria. This marks our trajectory for listing in the various medical databases. Tuberculosis remains a significant cause of mortality with increasing multidrug resistance as poignantly addressed by an internationally renowned expert in the field[1]. Microbiological examination of obtained sputum has always been the bedrock for diagnosis of tuberculosis in tandem with medical imaging with varying level of sensitivity and specificity. In this issue the Pulmonologists of Niger Delta University Teaching Hospital review the outcome using the now accepted benchmark GeneXpert in the diagnosis of tuberculosis[2].

We have sustained the trend of the first issue in publishing formally selected lectures of the Pfizer Pharmaceutical sponsored Deans Lecture Series of 2015-2017. The manpower requirements of the Nigeria health sector remains a vexed issue elegantly dissected by Prof Okpani a renowned Obstetrician practicing in the Niger Delta[3]. Religious contraindication for blood transfusion remain unrelenting and this is reviewed sympathetically[4].

Child abuse remains a concern whether covert or overt. The accompanying case report highlights what can go wrong when traditional practices take sway[5].
We aim to publish medical research primarily derived from the Niger Delta region but not exclusive to the region[6]. We continue to reiterate the value of regular departmental audits, particularly mortality and new misses and review of practice devoid of blame.

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The Management of Multidrug-Resistant Tuberculosis
(MDRTB) – The WHO Shorter MDRTB regimen

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Niger Delta Medical Journal 2017; 1(3): 5-6

In June 2016, the World Health Organisation (WHO) updated its guidance on the management of MDRTB[1]. Worldwide, there were estimated 480,000 cases of MDRTB in 2014 the highest rates being seen in those from Eastern Europe and the Central Asian republics[2]. MDRTB is more complex to manage as it is associated with more adverse effects than standard treatment.

Shorter regimens are preferred by patients and are cheaper and there is increasing evidence indicating that a 9-12 month regimen has a better cure rate than the 20 month course regimen recommended in the WHO 2011 guidelines.

The "9-month Bangladesh" regimen was first reported[3] in 2010. The regimen consisted of gatifloxacin, clofazimine, ethambutol and pyrazinamide for the entire course of treatment supplemented by systemic kanamycin, prothionamaide and high dose isoniazid (900 mg) for the first 4 months or until sputum smear conversation whichever was the longer period. Nearly 50% showed sputum smear conversion within 4 months and most by 7 months during the intensive initial phase of the treatment. Cure rates were 90% (87.8-92.4%) which compares favourably with an estimated 78% (71.2-84%) for the 20 month standard regimen.

This updated WHO guidance recommends that the shorter 9-12 month MDR TB regimen can be used if:

1. No previous treatment with second line drugs for > 1 month
2. Resistance to fluroquinolones and second line injectable agents has been excluded (or is unlikely)

Resistance to flouroquinolones or kanamycin led to frequent relapses and therefore early testing of TB cultures for resistance to ethambutol, pyrazinamide, fluroquinolones and injectable agents by rapid molecular tests is required for those starting the shortened regimen.

The evidence does not yet include the effect of inhA mutations (susceptibility to high dose isoniazid but resistance to prothionamide) and katG mutations (susceptibility to prothionamide but resistant to high dose isoniazid) on treatment outcome or time to smear conversation. Resistance to fluoroquinolones is mainly associated with gyrA mutations.

The guidance also include if moxifloxacin is used instead of gatifloxacin (as it may be unavailable in some countries), a dose of 800mg daily when weight is > 50kg and 600mg daily when weight is 30-50 kg. As with rifampicin, there is almost two log difference in peak drug concentrations of moxifloxacin amongst different individuals[4]. A dose of 800 mg daily ensures that those with a lower peak drug level will still be above the mean inhibitory concentration for most strains of Mycobacterium tuberculosis.

Monitoring patients whilst on therapy includes measures of a response to treatment (sputum smear, chest x-ray and general health especially weight), laboratory markers affected by many of the drugs used such as liver and renal function and specific measure for each of the individual drugs (TB monographs: http://www.tbdrugmonographs.co.uk). QTc prolongation of the order of 6 ms has been reported for both clofazimine and moxifloxacin[5].

In summary, specific advice for using the short course regimen for MDRTB:

1. Confirmation of the diagnosis of tuberculosis and rpoB mutations (for rifampicin resistance) should be sought on all patients with a positive sputum smear
2. A positive test for rpoB mutations should be followed by PCR testing for other first and second line drugs
3. A positive test for rpo mutations requires that cultures for second line drug sensitivity testing are set up simultaneously as for the first line drugs.
4. The regimen should not be used if there is evidence of resistance to fluoroquinolones or second line injectables, pyrazinamide and ethambutol.
5. If gatifloxacin is not available moxifloxacin or high dose levofloxacin (750-1000mg daily) may be used.
6. Amikacin or capreomycin may be used as substitute if kanamycin is not readily available.
7. The shorter MDRTB regimen is not recommended in pregnancy
8. Individualised regimen should be used for those with drug intolerance
9. The shorter MDRTB regimen is not routinely recommended for extrapulmonary disease.

Definitive data from MDR-TB trials will emerge slowly over the next several years including shorter regimens with novel agents such as bedaquline, delamanid, pretomanid. In the meantime, clinicians will continue to work in the midst of uncertainty and evolving guidelines to deliver the best care based on present evidence as highlighted in this most recent WHO June 2016 guidance.

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Original Article:
Level of agreement between Ziehl Neelsen (ZN) microscopy and Gene Xpert in the diagnosis of Pulmonary Tuberculosis amongst Smear Negative PTB Suspects and Smear Positive Suspected MDR PTB Patients.

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ABSTRACT

BACKGROUND

A critical challenge in providing TB care is establishing an accurate bacteriological diagnosis especially in patients with sputum-smear negative pulmonary TB (PTB). GeneXpert , a highly sensitive and specific rapid tool, which was introduced in 2015 to diagnose PTB in priority patients at the TB Referral Hospital, Yenagoa offers a promising solution in addressing these challenges. However, there is paucity of data regarding the performance of GeneXpert assay amongst smear negative suspected PTB patients in our setting.

OBJECTIVE

The objective of the study was to determine the level of agreement between Gene Xpert assay and ZN microscopy among sputum AFB smear negative and smear positive suspected MDR PTB patients in a TB referral hospital, South-South Nigeria.

The GeneXpert MTB/RIF assay was retrospectively evaluated amongst microscopically suspected smear negative PTB patients and smear positive suspected MDR pulmonary TB patients with substantial clinical indications for tuberculosis. The Chi-square test was used to determine statistical significance of association between categorical variables. The Kappa statistic was used to measure agreement and correctly classified rates between the GeneXpert assay and AFB smear test in making diagnosis of TB.

RESULTS

Records of 261 suspected MTB patients were reviewed, 142 males (54.4%) and 119 females (45.6%). *Results of Chi-square test comparing AFB Smear and* Gene Expert in TB Diagnosis amongst the study subjects shows fair agreement *between the two tests and is statistically significant P<0.000.*

However, among 241 ZN smear negative subjects 51 (21.2%) were found to be positive for MTB by GeneXpert. Kappa measurement of agreement between AFB smear and Gene Expert in TB diagnosis shows a fair agreement with a Kappa score of 0.55.

CONCLUSION

This index study demonstrated a fair agreement between the two PTB diagnostic tools , ZN microscopy and Gene

Xpert in the diagnosis of Pulmonary Tuberculosis amongst the study subjects.

Key words: GeneXpert, Pulmonary Tuberculosis (PTB), AFB (Acid Fast Bacilli) Smear, Multi-Drug Resistant (MDR), Kappa Score.

INTRODUCTION

Pulmonary Tuberculosis (PTB) is a chronic communicable disease caused by transmission of a bacilli, Mycobacterium Tuberculosis between humans through the airborne route. The infection (latent tuberculosis) affects approximately one-third of the world's population.

In 2015, there were an estimated 10.4 million new (incident) TB cases worldwide, of which 5.9 million (56%) were among men, 3.5 million (34%) among women and 1.0 million (10%) among children. People living with HIV accounted for 1.2 million (11%) of all new TB cases. Although the number of TB deaths fell by 22% between 2000 and 2015, TB remained one of the top 10 causes of death worldwide in 2015.[1]

Nigeria is among the six high TB burden counties of the world1 and as a resource-poor developing nation this poses a major public health challenge.[2]
Global progress depends on major advances in TB prevention and care in these countries.[1]

The WHO recommended diagnosis of PTB until recently was based on clinical presentations and sputum smear microscopy with its attendant shortcoming of low sensitivity which made the disease under reported and under diagnosed.[3]

Sputum smear microscopy, the most widely used test, cannot be used to identify paucity bacillary TB, extra-pulmonary TB or drug resistance, and its sensitivity is very low in TB HIV co-infected patients.[4]

MTB Culture test is the gold standard to diagnose TB but requires laboratory infrastructure that is not widely available in most countries with a high burden of TB, and test results take up to 3 months to obtain. Treatment gaps in between the patient going to be tested for TB and receiving the test result can lead to high levels of default during the diagnostic process.[5]

In December 2010, the World Health Organization (WHO) endorsed a new rapid molecular test, called Xpert MTB/RIF (Cepheid, Sunnyvale, CA, USA). The Xpert MTB/RIF detects DNA sequences specific for Mycobacterium tuberculosis and rifampicin resistance by polymerase chain reaction.6-7 In five demonstration sites, the sensitivity of the test (compared with culture) for TB was 91% and specificity 99%; for rifampicin resistance, sensitivity was 95% and specificity 98%.[8]

In Nigeria, a country with high TB burden, commenced roll-out of Gene Xpert in 2012.[9]

At the TB Referral Hospital, Yenagoa, Bayelsa State Tuberculosis was diagnosed primarily by a combination of chest X-rays and sputum AFB smear microscopy until 2015 when the use of GeneXpert MTB/RIF assay was introduced to diagnose PTB in priority patients (smear negative PTB suspect and smear positive patients suspected to have MDR PTB).

Justification of Research:

There are limited studies determining the of Level agreement between Ziehl Neelsen (ZN) microscopy and Gene Xpert in the diagnosis of Pulmonary Tuberculosis amongst Smear Negative TB suspects and Smear Positive Suspected MDR Patients in Nigeria worse still in Bayelsa State in the Niger Delta region of the country prompting us to undertake this study.

TB is a endemic and a leading cause of death in Nigeria. The findings of this study would enable policy makers to make policies for good planning purposes and improve case findings and care of PTB patients.

OBJECTIVE

The objective of the study was to determine the level of agreement between Gene Xpert assay and ZN microscopy among sputum AFB smear negative and smear positive suspected MDR PTB patients in a TB referral hospital, South-South Nigeria.

METHODOLOGY

Study location

This study was conducted in the TB Referral hospital, Yenagoa, the capital city of Bayelsa State. Bayelsa State is one of the 36 states in Nigeria, West Africa. It is geographically located within Latitude 04 to 15' North, 05 to 23' South and longitude 05 to 22' West and 06 to 45' East. It shares boundaries with Delta State on the North, Rivers State on the East and the Atlantic Ocean on the West and South. Bayelsa State is a picturesque tropical rain forest, with an area of about 21,110 square kilometres. More than three quarters of this area is covered by water, with a moderately low land.

Gene Xpert program in Nigeria is largely implemented by the KNCV Tuberculosis Foundation in partnership with the government of Nigeria, with support from the U.S Agency for International Development (USAID).

There are 110 Gene Xpert MTB sites nationwide in Nigeria of which TB referral hospital , Yenagoa Bayelsa State is one of the sites. The hospital also caters for infectious diseases such as HIV and Leprosy The use of Gene Xpert MTB/RIF assay was introduced in 2015 to diagnose PTB in priority patients at the TB Referral Hospital.

During the study period, Gene Xpert assay was restricted to only AFB smear negative patients ,and suspected MDR PTB patients for the purpose of determining Rifampicin sensitivity/resistance. Recently a policy change was effected were Gene Xpert has replaced smear microscopy as the primary tool for evaluating persons clinically suspected of having PTB .

Study Design

This was a retrospective comparative analytical study. A retrospective survey was carried out on the records of all Pulmonary Tuberculosis patients who were ZN smear negative and Smear positive suspected MDR TB patients who had GeneXpert tests in the Tuberculosis and Leprosy Referral Hospital between *February 2015 and June 2016.*

Chest X-rays (CXRs) were conducted as standard care for all patients with smear negative results.

Study Subjects

Inclusion criteria for our study were:

1) Patients with signs and symptoms consistent with TB, including prolonged fever and or cough of more than 2 weeks
2) All Sputum AFB smear negative results from two specimens.
3) Availability of sputum Gene Xpert MTB RIF result
4) Suspected cases of MDR with Smear Positive result

Exclusion criteria were:

1) Non-availability of Gene Xpert MTB RIF result
2) New smear positive cases of Pulmonary TB
3) Extra-pulmonary TB .

Data Collection and analysis

A retrospective Gene Xpert program data was collected from the patients chart, tuberculosis laboratory and treatment registers. Data obtained from the patient charts included: age, sex, *sputum AFB smear10* results, indication for Gene Expert, *sputum Gene Xpert MTB results11* and HIV status. *Thirty seven cases were excluded because of incomplete data.*

An error could be associated with the cartridge or the Gene Xpert machine. So the following techniques were put in place to minimize errors:.

i. Each specimen volume was not less than 2 mL
ii. Reference volume containers (1 mL, 2 mL and 3 mL) used for sputum volume estimation
iii. Ratio specimen: buffer (1:2) was ensured through the use of volumetric plastic pipettes rather than by adding unmeasured buffer.
iv. Bubbles were avoided

The diagnostic criteria for TB using ZN microscopy :

I. Smear positive PTB-At least 1+ acid-fast bacilli (10-99 AFB per 100 oil immersion

fields) in at least one sputum smear microscopy

ii. *Smear negative PTB-At least one sputum smear microscopy negative for AFBs.*

The diagnostic criteria for TB using Gene Xpert:

i. *Xpert positive TB-A positive Xpert result or MTB detected in at least one specimen tested.*

ii. *Xpert negative TB-A negative Xpert result or MTB not detected in at least one specimen Tested.*

iii. ***RIF Resistance Detected -****Results that are positive for MTBC and for RIF resistance mean that the bacteria have a high probability of resistance to RIF.*

iv. ***RIF Resistance Not Detected***
Results that are positive for MTBC, but negative for RIF resistance mean that the bacteria are probably susceptible to RIF.

v. ***RIF Resistance Indeterminate***
Results that are positive for MTBC and indeterminate for RIF resistance mean that the test could not accurately determine if the bacteria are resistant to RIF.

In computing proportions, inconclusive AFB and indeterminate Gene Xpert results were carefully excluded or included from the denominators depending on what was reported.

We used descriptive statistics to describe the demographic data, numbers and percentages for categorical variables. The Chi-square test was used to determine statistical significance of association between categorical variables. The Kappa statistic was used to measure agreement and correctly classified rates between the Gene Xpert assay and AFB smear test in making diagnosis of TB. The Kappa statistic is a means of measuring agreement beyond chance between two sets of observations using categorical data and is interpreted as follows: 0.81-1.0 almost perfect, 0.61-0.80 substantial, 0.41-0.60 moderate, 0.21-0.40 fair, 0.00-0.20 slight and < 0 poor agreement. Data obtained were analyzed with Statistical Package for Social Sciences (SPSS) version 16.0. P-value of <0.05 was considered significant.

Ethical Consideration : Ethical approval was obtained from the authorities of the Bayelsa State Ministry of Health.

RESULTS

TABLE 1: ***The distribution of the study subjects based on demographic characteristics , HIV status, AFB and Gene Xpert results.***

Records of 261 suspected MTB patients were reviewed, 142 males (54.4%) and 119 females (45.6%). Majority of the subjects were in the age group of 18-44 years which constituted 52.5%. The study subjects were mostly ZN Smear negative MTB 241(92.3%) with only 10(3.8%) smear positive patients which were suspected cases of Multi-Drug resistant MTB. GeneXpert was positive in only 51(21.2 %) among the smear negative subjects as shown in

Variables	Frequency *n=261*	Percentage %
Age (years)		
<5	7	2.7
5-17	15	5.7
18-44	134	51.3
45-64	79	30.3
65 and above	20	7.7
Missing	6	2.3
Sex		
Male	142	54.4
Female	119	45.6
Acid Fast Bacilli		
Positive	10	38.8
Negative	241	92.4
Inconclusive	10	38.8
HIV Status		
Positive	98	37.5
Negative	150	57.5
Not Tested	13	5.0
Indication for Gene Expert		
Treatment Failure	17	6.5
Relapse	7	2.7
Return After Default	1	0.4
HIV Positive	58	22.2
AFB Negative only	160	61.3
Others	18	6.9
Gene Expert Result		
Positive (AFB Negative)	51	21.2
Positive (AFB Positive	7	2.7
Negative	190	72.8
Indeterminate	13	5.0
Rifampicin Sensitivity		
Sensitive	50	19.2
Resistant	8	3.0
Negative	190	72.8
*Indeterminate	13	5.0

**Results that are positive for MTBC and indeterminate for RIF resistance mean that the test could not accurately determine if the bacteria are resistant to RIF.*

+ Results that are weakly positive (AFB +/-1-2/300 fields) for AFB are reported as inconclusive or doubtful.

TABLE 2:Showing the results of Chi-square test comparing AFB Smear and Gene Expert in TB Diagnosis.

The result is statistically significant P<0.000.

	GENE XPERT N (%)		
ACID FAST BACILLI SMEAR N (%)			N (%)
	POSITIVE N (%)	NEGATIVE N(%)	
POSITIVE N (%)	7 (70%)	3 (30%)	10 (100%)
NEGATIVE N(%)	51 (21.2%)	190 (78.8%)	241(100%)
TOTAL	58 (23.1%)	193 (76.9%)	251 (100%)

Pearson chi-square DF=1 12.89 P= 0.000, 3.30E -04

TABLE 3: Kappa Measurement of Agreement between AFB Smear and Gene Expert in TB Diagnosis.

As shown, Kappa score is 0.55 which is only a fair agreement between AFB Smear and Gene Expert tests in the diagnosis of TB.

	GENE XPERT N (%)		
ACID FAST BACILLI SMEAR N (%)			N (%)
	POSITIVE N (%)	NEGATIVE N(%)	
POSITIVE N (%)	7 (70%)	3 (30%)	10 (100%)
NEGATIVE N(%)	51 (21.2%)	190 (78.8%)	241(100%)
TOTAL	58 (23.1%)	193 (76.9%)	251 (100%)

Concordance Rate is the percentage of time the Gene Expert and the AFB Smear test agree with each other.

Both Gene Expert and AFB Smear tests are either positive or negative in (7+190)/251=78.4%.

Therefore the Concordance Rate (Observed Agreement) is 78.4%.

By chance alone they will agree about 52.3% of the time: (58%x10%) + (193%x241%)=52.3%.

* Kappa is $\frac{\text{Observed Agreement(\%)-Expected Agreement(\%)}}{\text{100- Expected Agreement \%}}$

$= \frac{78.4-52.3}{100-52.3}$

Therefore Kappa score is 0.55.Kappa is ranged from -1 Perfect Disagreement to 1 Perfect Agreement . The Kappa score of 0.55 is only a fair agreement between AFB Smear and Gene Expert tests in the diagnosis of TB.

DISCUSSION

Early diagnosis of TB is necessary to disrupt the disease transmission chain. Although ZN smear positive patients are considered highly infectious and being focused by most of clinicians, smear negative patients are also reported to be responsible for approximately 17% of transmission and its impact on public health could not to be neglected.[12]

Smear negative TB is more difficult to treat due to delay in reaching definite diagnosis, in such cases new diagnostic approaches could be fruitful in early diagnosis and prompt treatment, hence preventing the patients becoming infectious to others.

The lack of TB conventional bacteriological laboratory services in many resource-limited settings, *as was the case in Nigeria* , forced many of the health systems of the country to depend uniquely on the acid-fast smear detection as the only laboratory support available for diagnosis.

Mycobacterial cultures are the gold standard for TB diagnosis but were not performed for the patients in this study because it is not available so is not the standard of care for TB suspects at our centre. Culture results were often obtained several weeks after samples were collected and sent to centres outside Bayelsa State and therefore, a diagnostic delay would also be expected with this method, WHO has strongly recommended this test for diagnosis of TB in various settings.[13]

In this index study, 30% of the AFB smear positive patients were found to have negative Gene Xpert result which could arise from Gene Xpert machine or cartridge error, false positive AFB smear (non-tuberculous mycobacterium NTM), pathogen may show a positive AFB smear other than mycobacteria , and indeterminate results[14].

One of the limitations of microscopy is its inability to differentiate MTB from other smear positive organisms, particularly non-tuberculous mycobacteria. Xpert specifically detects MTB, so smear positive/Xpert negative samples should prompt further evaluation for NTM.

However, the small subset of AFB smear positive used in this study could limit this finding.

In this present study, among 241 ZN smear negative subjects 51 (21.2%) were found to be positive for MTB by GeneXpert and out of 10 ZN smear positive suspected MDR subjects , 7 (70%) were positive for GeneXpert as shown in table 1. The finding of this study shows that 51 (21.2%) additional diagnosis of PTB was made through the use of GeneXpert technology and this could prevent missed diagnosis of PTB with its consequent public health hazards.

Our findings shows a slightly lower concordance rate of 78.4% between Xpert and AFB, *when compared with the findings of a study in AFB-negative specimens reported by others.*[15,16]

Furthermore , our study showed only a fair concordance between Xpert and microscopy in contrast to a recent study[17] *done in North Central Nigeria which showed a higher concordance.*

This study findings of 21.2 % ZN smear negative but GeneXpert positivity is lower when compared to a recent finding by Munir et al[18] where 40.0 % ZN smear negative subjects were found to be positive for MTB by GeneXpert.

This could be explained in our centre by the empirical use of Ant-TB treatment on some selected smear negative patients before Gene Xpert assay which could reduce it diagnostic benefit. .

In this study, Kappa statistic was used to measure agreement and correctly classified *rates between the GeneXpert assay and AFB smear test in making diagnosis of TB. The Kappa score finding of 0.55 demonstrated a fair agreement between AFB Smear and Gene Expert tests in the diagnosis of Smear negative TB. This could be due to poor quality of sputum samples for smear microscopy.*

It is widely known that the sensitivity of AFB smear microscopy, and particularly with raw sputum samples, depends on the quality of the sputum sample obtained from a patient, bacterial load, the skill of the laboratory personnel performing the staining procedure, and the time taken between collection of the sample and test being performed.[19,20]

While smear microscopy requires 10,000 TB bacilli per ml of sputum to be detected/positive, Gene Xpert MTB/RIF requires 130 TB bacilli per ml of sputum for a positive result so making the use of Gene Xpert imperative in smear negative TB patients.

The MTB/RIF assay uses PCR to amplify and detect the MTB complex DNA within pulmonary sputum samples. The GeneXpert assay being a molecular test may not necessarily depend on a high sputum bacterial load and sputum quality to

detect TB bacilli. Thus GeneXpert could be used for monitoring the quality of smear microscopy and may be useful for infection control purposes.

CONCLUSION

In conclusion, this index study demonstrated a fair agreement between the two PTB diagnostic tools , ZN microscopy and Gene Xpert in the diagnosis of Pulmonary Tuberculosis amongst the study subjects.

In our setting using GeneXpert earlier could result in the prompt diagnosis of additional pulmonary tuberculosis patients. *The GeneXpert could have additional role in detecting rifampicin resistance diagnosis amongst suspected MDR PTB patients in contrast to Ziehl Neelsen smear microscopy.*

LIMITATIONS

1. *This study has limitations. The study was carried out at a single site which may limit its generalization.*
2. *Another limitation was that mycobacterium cultures were not available to confirm PTB diagnosis.*
3. *One other limitation was the small sample size of the smear positive AFB patients as only suspected MDR smear positive patients were included in this study and all other AFB smear patients were excluded. .*

RECOMMENDATIONS

1. *It is recommended that the use of GeneXpert MTB/RIF technology should be expanded to cover the state to improve case detection and treatment of TB and MDR TB.*
2. *The GeneXpert could be used for monitoring the quality of smear microscopy and may be useful for infection control purposes.*
3. *We recommend that its position in the diagnostic process is reviewed, utilizing it earlier and more frequently than currently.*

ACKNOWLEDGEMENT

We acknowledge all the doctors and other health workers of the Tuberculosis and Leprosy Hospital Referral Center, Yenagoa, Bayelsa State for giving us all necessary support and access to all the medical records needed to do this work.

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MANPOWER REQUIREMENTS IN NIGERIA'S HEALTH SECTOR: THE UNMET NEED TO MAXIMIZE OUR GAINS.

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Presented in part as the Deans Lecture on 11th February 2016 in the ETF Building, Okolobiri

Niger Delta Medical Journal 2017; 1(3): 16-33

Definition - What is Health?
The World Health Organization (WHO) defines health as a state of complete physical, mental, and social wellbeing, and not merely the absence of disease or infirmity.

In the context of this definition.
Who are the Professionals needed to achieve Health?

- To achieve health we need to invest all that is necessary at environmental and individual levels.
- We need workers whose activities ensure a disease free and enabling environment operating through advocacy and other public health activities.
- We need those who guide us in our health seeking behaviors.
- We need those who ensure that we are treated when we are ill
- And those who rehabilitate us if the illness is severe or long standing.
- We need workers who administer the health centers, those who document the health events, those who advise the authorities on funding issues,
- And those who plan for sustainable services.

Justification for the Lecture.
Within the context of the WHO definition of health, and the implications we presented, it is evident that the personnel, or manpower component of the health sector is critical for actualization of this holistic definition considering that personnel are critical for actualization of disease management, preventive medicine, public (consumer) perspectives, health planning, administration, economics, and research.

In developed countries, socio-economic infrastructure and other components of society that enable health service delivery, research, and training of personnel have been addressed, and for more than a half decade, there are clear definitions not only of the need for all the various health specialties, but also of the roles and responsibilities of staff in those specialties.

This generalization cannot be made for the countries of Sub- Saharan Africa exemplified by Nigeria. Here, multiple socio-economic deficiencies have impacted negatively on development of the health sector to an efficient level. Very salient too, are multiple qualitative and quantitative unmet manpower needs in this sector. In the context of a holistic approach to ensure health for all, personnel or manpower requirements go beyond medical doctors, nurse midwives, pharmacists, and laboratory medical scientists.

Many other categories of staff are needed for equally vital roles, from medical records / statistics officers and nutritionists, through physiotherapists, to health economists and health administrators. The complimentary roles of these other staff can be seen if we consider four different health conditions as illustrative examples.

- Multiple injuries sustained during a road traffic accident
- The recent Ebola virus epidemic in West Africa
- A case of breast cancer.
- The current Lassa Fever outbreak in Nigeria that has resulted in almost a hundred mortalities

Outline of Presentation.

- We will present key words basic to the presentation.
- We will then comment briefly on the evolution of healthcare in Nigeria from traditional medicine to formal scientific medicine, and the current state of Nigeria's health infrastructure.
- Our presentation will next centre on issues of manpower needs for healthcare delivery in the country, current deficiencies , gains made, and the unmet needs for manpower development
- We will then suggest remedies that will result in improvements in the manpower quotient of the health sector, and point out the resultant benefits
- We will end with acknowledgements and a summary.

Key Words For This Presentation

Health ,Nigeria Health Sector, Gains and Limitations ,Health Care Delivery ,Health Care Giver, Health Practitioner, Curative Medicine, Preventive Medicine, Preventive and Social Medicine, Community Medicine, Health Administration, Health Economics, Health Planning, Specialist, Consultant, Federal and State Governments., Non-Governmental Organization , Alternative Medicine, Traditional Medicine, Traditional Birth Attendants, World Health Organization, International Labor Organization, Training , Retraining, Socio Economic Defects, Scientific Medicine

Traditional Medicine in Nigeria - A Brief Resume

Traditional medicine in Nigeria is similar to that found in other African countries and entails a holistic combination of use of indigenous herbs and African spiritual worship , with diviners, traditional midwives, and herbalists as the practitioners. These practitioners are ubiquitous and claim to be able to take deliveries, and cure diverse conditions like high blood pressure, cancers, psychiatric disorders, and venereal diseases.

Belief in illness being derived from spiritual and or social imbalance, diagnoses made by spiritual means, and herbal based oral or topical treatment, are the hallmarks. The principles behind the practice of traditional medicine are at variance with those of the technically and analytically based scientific medicine. Before Colonial presence in Africa, traditional medicine was the dominant means of managing illnesses. In traditional medicine, herbs and other methods used are not subjected to research and public regulation, and education is by verbal transfer to favorites or culturally/ spiritually selected protégées . Empirical training of practitioners, defects in documentation and standardization, practice shrouded in secrecy, ethical breaches, and serious adverse effects of medication are known accompaniments of traditional medicine. Even now in the 21st century, scientific medicine still remains inaccessible to a substantial proportion of the Nigerian populace especially in rural areas because of transport, terrain, and other logistic deficiencies, and traditional medicine remains popular.

Traditional Medicine also gives allowance for the human susceptibility to belief in spiritual/ancestral causation and cure of illnesses.

Origins of Scientific Medical Care in Nigeria

Western medicine was formally introduced into Nigeria in the 1860s, with establishment of the Roman Catholic Mission Sacred Heart Hospital, Abeokuta. The missionaries built a few health centres/hospitals. The British colonial government began providing formal medical services with the construction of several clinics and hospitals in Lagos, Calabar, and

other coastal trading centers in the 1870s. Unlike the missionary facilities, their services were initially for Europeans. Colonial government medical services were later extended to African employees of European concerns and servants of European workers. The hospital in Jos, for example, was founded in 1912 after the initiation of tin mining activities. Initially, there was a preponderance of mission hospitals especially those run by the Roman Catholic Mission. The missionaries treated everyone , and in addition built schools as a vital component of their evangelism.

Establishment of Scientific Medical Care in Nigeria

The services in government hospitals and clinics were later extended to native staff and eventually to the general public. More facilities were later built in other areas of the country with the extension of colonial influence. Mainstream Christian (Roman Catholic ,and later Presbyterian and Methodist), mission run hospitals were concentrated in the South- Eastern and Mid-Western parts of the country. By the mid 1950s The Sudan United Mission and Sudan Interior Mission had established some hospitals, in the Middle Belt areas and Islamic North respectively. The two missions operated twenty-five hospitals or other facilities in the northern half of the country. Many of the mission hospitals remained important components of the health care network in Nigeria until Nigeria gained independence.

World War I had a strong detrimental effect on medical services in Nigeria because a sizeable proportion of the few available medical personnel, both European and African were drafted to serve in the war fronts in Europe . After the war, medical facilities were expanded substantially, and a number of government-sponsored schools for the training of Nigerian medical assistants were established.

Initially, Nigerian physicians, even if trained in Europe, were generally prohibited from practicing in government hospitals unless they were serving African patients. This practice led to protests and to frequent involvement by doctors and other medical personnel in the nationalist movements of the period.

By 1960, there were 118 mission hospitals, compared with 101 government hospitals. In general there was a preponderance of health facilities for maternal and child care in line with established medical trends . At the attainment of Nigerian independence, a noticeable defect was the location of few hospitals in the rural areas where approximately 80 percent of the population resided. The misdistribution of physicians was even more marked because few trained doctors who had a choice wanted to live and work in rural areas. Some doctors were forced to work in rural areas as a requirement for gaining experience and promotion. Later doctors were constrained to serve in rural areas as part of their required service in the National Youth Service Corps, established in 1973. Few, however, remained in remote areas beyond their required term.

With the formation of states and later local governments, ownership of health establishments was divided among federal, state, and local governments. Private clinics/hospitals started evolving and grew in number from the 1970s. By 1985 there were 84 health establishments owned by the federal government (accounting for 13 percent of hospital beds). 3,023 owned by state governments (47 percent of hospital beds); 6,331 owned by local governments (11 percent of hospital beds); and 1,436 privately owned establishments (providing 14 percent of hospital beds).

Nigeria has always faced problems of geographic /regional distribution of medical facilities and health personnel with the South initially faring better than the north, and urban areas faring better than rural ones within the same geographical region . For example, in 1980 there were an estimated 2,600 people per physician in Lagos State, compared with 38,000 per physician in the much more rural Ondo State.

Whereas approximately 60% to 70 % of the population of most states live in rural regions, only 42 percent of hospitals were located in those areas. The mal-distribution of physicians and other health workers was and up till now is even more marked because few trained health professionals would opt to live and work in our welfare hostile rural areas given the choice .

The Role of The Christian Missionaries in Healthcare Manpower Development

The Christian missionaries 'health sector capacity building in Nigeria did not stop at setting up health facilities. They also played a prominent role in promotion of health manpower by providing expatriate medical and other health staff, sponsoring undergraduate and postgraduate medical education, often in Europe, for many of the first generation of Nigerian doctors and pharmacists. They provided local training for indigenous nurses, paramedical , and auxiliary staff . In addition, education of many Nigerians in their primary and secondary schools helped lay the groundwork for a wider distribution and acceptance of modern medical care.

During World War II, partly in response to nationalist agitation, the colonial government tried to extend modern health and education facilities to much of the Nigerian population. A ten-year health development plan was announced in 1946. The University of Ibadan was founded in 1948; it included the country's first full faculty of medicine and university hospital, still known as University College Hospital. A number of nursing schools were established, as were two schools of pharmacy. By 1960 there were 65 government nursing or midwifery diploma training schools.

The 1946 health plan established the Ministry of Health to coordinate health services throughout the country, including those provided by the government, by private companies, and by the missions. The plan also budgeted funds and facilities for hospitals and clinics concentrated in the main cities with neglect of the rural areas. There were initially very few health practitioners consisting of missionaries, British Government doctors and nurse midwives on secondment or some other special posting. Nigerian doctors trained either in the Yaba School of Medicine, or Britain, other practitioners – nurses, pharmacists, and laboratory technologists also benefitted from expatriate sponsored training. A good proportion of the indigenous non-doctor staffs were locally trained auxiliaries. The senior staffs were transferred from one hospital to another across the country - for example from General Hospital, Degema or Port Harcourt, to that in Sokoto.

Deficiencies in Manpower Requirements

The colonial and missionary establishments concentrated on training of doctors, nurses, pharmacists, and laboratory technologists (scientists) in descending order of preference.

Very noticeable was the absence of provision for other healthcare professionals including health administrators. This defect still persists up to date. Another defect was a total absence of planning for the geographical distribution of health facilities and staff to man the facilities. Noticeable too in the establishment of health services by both Federal and State governments in Nigeria was the provision of physical structures for the health facility far ahead of planning for efficient staffing and staff manpower, and glossing over the manpower requirements for management of the facility.

The typical sequence in establishing a health facility was, and till now is a politically motivated announcement of the intention to start a facility, followed by budgeting/ sourcing for funds since a commitment had been made , awarding the contract for the physical structure, and when it was completed, posting a few reluctant and inadequately oriented staff to commence health services there. Provisions for housing and other components of onsite staff welfare were generally neglected. Staff consequently reported intermittently for duty because of difficult terrain

and transport challenges, and offered epileptic services.

Governments on occasion reacted by employment of expatriate staff from India, other Asia countries, and Cuba and a few other countries as advisers, health practitioners/ consultants, or managers in these facilities. It is generally not clear if these expatriate staff /advisers are conversant with the disease pattern and other specific health needs of our country. These defects have resulted in an inability to manage primary healthcare issues. They are also reflected in the unacceptable mortality and morbidity patterns seen in maternal and child health, and vaccine preventable infectious diseases.

Qualitative and Quantitative Defects in Basic Staff Training.

The Christian missionaries, and The British colonial governments who started the Nigerian Health Sector apparently concentrated on provision for training of medical doctors and few nurse midwives because of limited funds, and they deemed these staff to be core health staff. To provide complimentary staff, they trained auxiliary nurses, pharmacy, laboratory technology, and radiography staff, and workers to keep patient records . These cadres of auxiliary staff are still present today and function in the health sector.

Because of inadequate numbers of qualified health personnel in developing countries, The World Health Organization, Governments, and Non Governmental Organizations have approved the fact of their existence, training, and function; and so we have a variety of auxiliary staff who fill the personnel gaps in the health sector in developing countries. These auxiliary staff are able to perform basic functions in several health specialties but their background defects in secondary education and basic sciences training implies that they are unable to understand the implications of pathophysiology of disease and scientific issues related to patient management, recovery, and rehabilitation.

It makes sense to think that inadequate funds underlie the apparent neglect of the need to train other health professionals since the entry requirements for undergraduate degree admission in pharmacy, optometry, physiotherapy, radiography, laboratory science and a few other courses which are science based (physics, chemistry, biology and mathematics) with english are virtually the same as those for medicine.

Nigeria's Budget in 1966 was 92 Million Pounds.

But one must face the realities of ensuring efficient health care delivery. Even though the functions of the doctors and nurses are very important in managing the patient's illness, the functions of the other health professionals from medical records officers, through clinical psychologists and health educators, to medical rehabilitation officers and home visitors are necessary adjuncts without which efficient treatment, complete recovery and rehabilitation will be impossible.

The few university faculties and the professional councils of most of the other health professionals also designed undergraduate and fellowship training programs often with sub-optimal clinical input. The absence of sufficient numbers of these staff have resulted in logistic bottlenecks in the flow of service delivery in hospitals, unnecessary delays, and marked frustration for both patients and healthcare givers alike. Staff deficiencies in clinical issues have often led to misinterpretation of laboratory results, and unwarranted statements that leave the patients and public confused Recently too , with the introduction into health service delivery of physical sciences models, computerized and automated equipment, and protocols using mathematical models , it is imperative that all health staff need continuous updates if they are to keep abreast of recent developments in theory and use of equipment in their respective fields.

Qualitative and Quantitative Defects in Retraining, and Orientation of Staff

Federal and State governments, international NGOs, and other foreign sponsors yearly commit considerable funds to training programs, but there is no central coordinated appraisal of needs at individual service levels, nor is there sufficient collaboration between the sponsors to maximize the beneficiaries' needs for sponsorship. Beyond managing patients disease conditions, issues surrounding hospital administration, preventive medicine and other aspects of public health, planning for efficient sustainable health services (including health financing, and economics) have all suffered considerable neglect over the years, with a vicious cycle being created in which the end result is inadequate numbers of personnel in these specialties to give service and conduct basic and post basic training of staff. The situation is compounded by poor/inappropriate funding, deficiencies in planning, and disparities in employment of staff in our health institutions. There are several institutions in which there are redundant non- contributory staff employed for various reasons, and a noticeable deficiency in quality and number of staff needed for efficient service delivery.

The Classic Medical Training Model in The University of Ibadan (UI)

During the initial undergraduate medical training for six years at The UI, students admitted with Ordinary level credits were taught advanced level physics, chemistry, and zoology for the first one year (Preliminary Year) to replicate the Higher School advanced level requirements for the five year direct entry program. The University of Lagos adopted a similar program

Later both University of Nigeria, Nsukka, and the University of Ife (now The Obafemi Awolowo University, Ile-Ife) included a variety of student friendly social science courses during the Preliminary year.

Holistic Healthcare Educational Programs as Conceived and Taught by UI from the Mid 1970s

The University of Ibadan and the UCH later expanded the number of health related departments for undergraduate, postgraduate, and fellowship training programs. The scope of their various curricula was modified to include many aspects of preventive and social medicine, nursing/midwifery, nutrition, health education, health economics, and sociology in relation to health service delivery. Development of faculty programs emphasizing a multidisciplinary holistic approach to medicine has multiple advantages including increased international recognition, and provision of a sound educational base for service delivery, undergraduate and postgraduate training, and research. It also facilities collaborative research and obtaining international research grants

It is unfortunate that most other Nigerian Universities especially the newest one have been unable to replicate this model in their Colleges of Health Sciences. Constraints to universal establishment of this desirable model in other Nigerian universities include lack of funding and competition by other institutional demands. Another constraint centers on conservative attitudes with resistance to changing global educational and professional trends. This has led to a vicious cycle in which most of the tertiary health training institutions – Colleges of Medicine, teaching hospitals, and research institutes remain grossly deficient with respect to number and quality of personnel and other indices of capacity building.

Health Infrastructure in Nigeria

The Federal Government has the role of funding and coordinating/ supervising the affairs of tertiary healthcare, university teaching hospitals, federal medical centres , and research institutes. State governments fund and manage secondary healthcare the various general hospitals.

Primary healthcare is largely managed by local governments with focus on primary health centers and dispensaries, which are regulated by the federal government through the National Primary Healthcare Development Agency. Average total expenditure on healthcare as a percentage of the country's gross domestic product averages 4% to 5% . There are also a few missionary hospitals, and many private clinics hospitals operating at different levels of specialization.

The Ideal Manpower Situation for Nigeria's Health Sector

Manpower requirements for the health sector have already been well defined by the World Health Organization (WHO), and in developed countries the optimal socio-economic infrastructure and presence of national health insurance has promoted the establishment of well defined roles for all cadres of healthcare workers with stringent guiding professional rules and regulations. Platforms for litigations, and sanctions are available to address erring staff. Very noticeable too are the well defined roles for health administrators, health planning and health economics. A minimum of 75% of the health services including basic and post basic training, and research is provided by the private sector. Federal and State governments' roles are limited to enacting of enabling laws/ regulations, supervision of few key establishments, maintaining the databases, taxation, coordination of all activities through the National Institutes of Health and The Centres for Disease Control and Prevention, maintenance of sanctions, and collaborating with WHO and other international bodies.

Managing The Need for Medical Specialists in Nigeria.

Initially, expatriate mission and government general medical practitioners, and their few available Nigerian counterparts were adequate for maintenance of health services. The need for specialists arose with the expansion of health services, and challenges in managing complications of disease. The need for lecturers with establishment of medical schools, and public health specialists also arose.

Local residency training was started in the University College Hospital, Ibadan by The Royal Colleges of Physicians and Surgeons. Some Nigerian doctors became specialists by travelling to The UK to take the examinations after completing their undergraduate training in Ibadan, and with their respective postgraduate qualifications were appoint able as consultants,

The Defunct Master of Medicine (M Med) Program

Later attempts to establish the Master of Medicine (MMed) degree were not successful and the advent of the West African and National Postgraduate Medical Colleges led to suspension of any further attempts to start university based medical residency programs.

Local Post Graduate Training Colleges – Their Fact

The National and West African Postgraduate Medical Colleges were founded in the 1960s but started formal training of residents several years later through two sections – Colleges of Physicians and Surgeons respectively. The West African Colleges have affiliation with the examining board of the Francophone Postgraduate programs. The residency programs of both National and West African Postgraduate Medical Colleges formerly had some degree of reciprocity with the respective Royal Colleges in The UK , but have recently lost this reciprocity because of alleged deficiencies in the standard of training of the local colleges.

The West African College of Physicians

This college was formally inaugurated in Lagos, Nigeria, on 23rd October 1976. It is one of the two Colleges of the West African Post-graduate Medical College (WAPMC), the largest specialized agency of the West African

Health Community (WAHC). The WAHC has recently changed into the West African Health Organization (WAHO) to accommodate other West African countries with its headquarters at Bobo-DiouLasso, Burkina Faso

The West African College of Surgeons

The College was founded in 1960 following a casual discussion between Victor Anomah Ngu a Cameroonian professor of Surgery and a British surgeon Dr. Charles Bowesman on the need for an association of Surgeons in practice in West Africa. In 1973,

the association metamorphosed into the College and in 1975 the college was inaugurated as a constituent college of the West African Postgraduate Medical College (WAPMC) - a specialized agency for the West African Health Community. It has sixteen member nations

The National Postgraduate Medical College of Nigeria

The National Postgraduate Medical College of Nigeria was established in1979 as a parastatal of the Nigeria Federal Government Ministry of Health with the mandate to train medical specialists capable of providing world-class service delivery, training, and research. In conjunction with The West African Colleges, The National College is the apex of postgraduate medical education in Nigeria

Collaboration Between The Postgraduate Training Colleges

Nigeria is the main sponsor of the West African Colleges, and by virtue of its population has the largest number of both trainers and resident doctors taking the exams. There is currently maximum collaboration between the National and West African Colleges to maximize all efforts and reduce operating costs. The establishment of these colleges has resulted in improvements in the available medical manpower for service delivery, training, and research in the west African sub-Region

Unfortunately a good number of the specialists find themselves constrained to leave the sub - region to other countries all over the world in search of better working conditions and actualization of their professional/academic goals .

Benefits of Local undergraduate and Post Graduate Training in the Health Sector.

The benefits of local training of both undergraduate and post graduate training of medical officers and other health specialty staff are

- Allowance for training of increased numbers of staff.
- Familiarity of both trainers and trainees with the local disease pattern and health sector challenges,
- Retention of trained staff and products to work in the country,
- Saving of funds especially foreign exchange,
- Promoting the capacity of the country to train health personnel for local and international needs.
- Promotion of basic and advanced cutting edge research in the country.
- Attraction of research grants to the country.
- Development of medical science and technology in the country.
- Promotion of service delivery and access of the public to quality health services.
- Reduction of the tendency for Nigerian individuals to migrate to and settle in the Diaspora with loss of our local culture and heritage
- The proliferation of medical Schools, combined with the activities of the local postgraduate medical colleges has not only been beneficial for sustaining health services in the country, but has also served as a very critical intervention for manpower development in the Nigerian health sector, and indeed those of other countries in the West African Sub-Region.
- Local Colleges of Medicine and their affiliated teaching hospitals have served as the pivots for development of undergraduate, postgraduate, and professional fellowship training programs for nursing, radiography, medical laboratory science, physiotherapy, medical records, and a few other health related courses.
- Currently, more than 95% of health workers in Nigeria received both undergraduate/diploma, and postgraduate/post diploma/fellowship training locally.

- The local training in an estimated 15 % of resident doctors are supplemented by some form of experience in centers of excellence outside the country, while about 25% to 75% have to do postings outside the hospital of their residency depending on their specialty, and the requirements of the respective faculty.

Issue of Continuing Professional/Academic Development

On acquisition of the postgraduate fellowship (for doctors), and professional diplomas/fellowships for other professionals, the onus for further training, sub-specialization, retraining and ensuring updates in the profession lies solely with the candidate. There is perennial limitation in funding by the government and often issues of continuing education and professional activities are glossed over during appraisals /promotion. A good percentage of staff are therefore contented with continued service while neglecting continued professional /academic development.

Limitations of Local undergraduate and Post Graduate Training in the health sector

Our universities, hospitals, and other health institutions are currently suboptimal compared to institutions in developed countries with respect to capacity for quality service delivery, training and research

Local training promotes inbreeding and a false sense of achievement

- The international rating of our graduates and institutions will remain low with local training
- Locally acquired certificates and fellowships may not gain wide international acceptance

The Overseas (Year Abroad) Training

In the early 1970s, the defunct Federal Military Government conceived a medical manpower enabling program in which resident doctors at the senior registrar level spent one year in pre-arranged approved centers abroad to improve their clinical, and research skills while at the same time acquiring exposure to international standards appropriate for their specialty. The program which lasted about ten years was very beneficial in that the trainees and their mentors were able to harmonize. The Overseas (Year Abroad) Training with local healthcare delivery needs. Unfortunately the program was latter stopped for unclear reasons. (lack of funds). Its products are currently at the apex of Nigerian medical service delivery, undergraduate and postgraduate medical education, and research. A few recipients of the year abroad training deviated from the program's objectives to do foreign fellowship examinations, and some were subsequently employed there or in Middle East Countries. A variant of the Year Abroad (The Double Sponsorship Program) evolved years later and still exists in some faculties up till date.

The Role of The National Youth Service Corps Year in Health Service Delivery

A health related objective of the National Youth Service Corps (NYSC) year was to provide basic health services (by young graduate doctors, nurses, pharmacists, radiographers, optometrists, and other staff) in rural areas in all the states.

These Corps members were to work in primary health centers and small general hospitals, and accompany public health workers in mobile clinics to do community based primary healthcare distribution projects.

Actualizing the national healthcare objectives of the NYSC year has not been easy. Inadequate numbers of healthcare graduates, preference for postings to urban and other conducive areas, inadequate planning and preparation for the corps members welfare and service delivery, difficult terrain, security issues, and sub-optimal remuneration, have all been factors militating against maximizing the health related benefits of the NYSC posting. To compound matters now, there is insecurity in a sizeable proportion of the areas in the country where the corps members' health services would have been needed, and no one wants to be posted there.

Issues of Cohesion, or The Lack of it among the Tiers of Health Service Delivery

The original conception of healthcare in Nigeria assumed that institutions at the various levels of care will be interdependent and collaborate with each other. This same assumption was also entertained for Federal, State and private hospitals with teaching hospitals, specialist hospitals, and research centres at the apex of healthcare under guidance of the Federal Ministry of Health. Unfortunately, this much needed cohesion and collaboration has not been achieved , and currently each group apparently operates independent of the other.

Training of Allied Professionals in The Health Sector.

Most of the allied health professionals have established diploma, undergraduate, postgraduate, and professional training programs. Currently, university undergraduate degree programs are the gold standard of basic training . This can be supplemented with professional fellowship training. Pharmacy and Nursing have West African College fellowships programs.

Pharmacy, laboratory science, radiology, and physiotherapy all now have university based professional doctorate degree programs

The Recent Proliferation of Medical Schools and Teaching Hospitals, and Faculties of Related Health Specialties.

The last two decades has witnessed a proliferation of universities and inevitably, establishment of medical schools and teaching hospitals, and faculties of related health specialties. With ownership by federal government, state governments, religious missions, and private entrepreneur groups. Most of the initial effort has been concentrating on establishing medical schools . Issues of substandard funding, accreditation difficulties, staff deficiencies, and over intake of students are topical Most of these ventures have left the respective health profession regulating council busy trying to enforce standards .

Regulation of Best Practices and Ethics in Nigeria's Health Sector.

The Medical and Dental Council of Nigeria (MDCN) is empowered to address ethical issues and regulation of professional standards (including reduction of quackery and malpractice) among medical doctors and dental surgeons. There are similar Councils for the pharmacists, laboratory scientists, nurse midwives , radiographers, etcetera. Their respective disciplinary panels have the status of a high court of the Federal Government, and convicted professionals can seek legal redress at the level of The Federal Court of Appeal.

Unfortunately the presence of these councils has not been able to facilitate reduction of inter disciplinary discord in the health sector.

Geographic inequality and Inadequate Coverage of The Sub-Urban and Rural Areas

Access of the public to health facilities in any region in Nigeria is influenced by different local and regional factors including geographical location, terrain difficulties, public confidence in the type and quality of services offered, and hospital bills. Also, the Nigerian Ministry of health usually spends about 70% of its budget on urban facilities where only approximately 30% of the population resides.

Interdisciplinary Discord in The Health Sector.

Interdisciplinary discord in the health sector is a recent and very unfortunate occurrence . The causes of this discord are multiple , with a background conception of allied health practitioners being equal to medical doctors from perspective of academic background, training, and professional usefulness; and therefore demanding equal remunerations and administrative positions. This situation persists despite The Hippocratic Oath taken by all health professionals emphasizing their total commitment to safeguard life above all other inclinations, and explicit guiding statements by both WHO and the International Labor Organization on roles and responsibilities of different cadres these health workers.

The government has not been able to resolve the differences , and the results have been contentions, accusations and counter accusations , litigations, and strikes that have paralyzed the health sector.

The Scramble for Administrative and Political Positions.

This phenomenon has been insidious and on face value justified by a need to have qualified and experienced professional in administrative positions to assist in moving the health and other public sectors forward. But on critical appraisal, it has resulted in loss of the vital services offered by many of these staff . To compound matters, these positions are associated with attractive conditions of service and are enticing prospects for the beneficiaries who were already eager to escape from professional frustration, inability to achieve their goals, and poor remuneration /other welfare packages general for all civil servants in the country. This contrasts with the situation in developed countries where professionals are valued by the society, actualize their professional and academic ambitions, and earn reasonable incomes from these endeavors.

Inadequacies of The Organized, and Unorganized Private Health Sector.

Ideally, up to 75% of health service delivery should be driven by the private health sector. But currently, private health hospital/clinics in the main are often small, and run on part time basis by government employed health staff for the sole purpose of augmenting their poor salaries. These private health institutions charge medical bills that a substantial percentage of the public cannot afford, and unfortunately a proper working public health insurance has not been established in Nigeria They therefore lack capacity to provide a critical level of healthcare delivery for the public. But they are useful in providing healthcare delivery for those who are financially stable, and in their availability during the ever present strikes by government workers.

Manpower Challenges Related to Inadequacies of The Organized, and Unorganized Private Health Sector.

Many private hospitals are defective qualitatively and quantitatively with respect to qualified and experienced health manpower. They use staff from government and other private hospitals on adjunct or part time basis. This implies that twenty four hour patient management may not be assured most of the time.

Attrition Related to sub- optimal implementation of Governing Edicts, and other defects in Legislation.

On paper, there are well spelt out regulations, edicts, and ethical requirements for best practices with stipulations for sanctions, but empowerment of these edicts by both professional bodies and governments has largely not been very effective. This has resulted in widespread observed breaches of ethics and best practices. Fortunately, the public is increasingly aware of their rights and there are now occasional audits and cases of litigation.

Tertiary Level HealthCare Challenges

Actualization of efficient health service delivery, basic and post basic training, and research in Nigerian tertiary institutions is limited by lack of funding, qualitative and quantitative manpower defects, lack of appropriate/viable equipment, staff indiscipline, inter professional discord, health workers strikes, and inefficiencies in supervision at the level Federal and State Ministries of Health.

Current Benefits and Limitations of sponsored staff training and re-training programs

All categories of health workers on occasion are sponsored to academic and professional programs. The institution and indeed the trained worker should benefit from these programs if a platform is set up to step down the gained experience to other staff and commence service delivery of the new techniques. Several new services and specialty /sub Specialty units have arisen from such programs.

Issues Related to Training of Sub-Specialists

On face value, both doctors, and their colleagues in other allied health professions are committed to having a core of well trained and certified sub specialists. But the prevailing sub-optimal state of the health sector, funding difficulties, and logistic problems negate actualization of this noble dream. Doctors, allied health professionals, and on occasion health administrators should be trained at the same time to form a complete enabled team. The current trend has been to train doctors and one or two nurses/ laboratory scientists for the project, and neglecting the mandatory minimal requirements needed to offer the subspecialty service

Security Issues

Security is a fundamental requirement for human existence. The past few years have witnessed repeated episodes of assault, kidnappings, assassination, armed robbery, and other acts of violence directed against health workers and their families especially medical doctors. This episodes have resulted in several deaths and physical disability. The Nigeria security authorities have apparently been powerless in relation to either preventing these acts of violence, or apprehending the culprits

The Attrition of Industrial Action (Strikes) in The Health Sector

Strikes and other forms of industrial action are common even though unwelcome occurrences in the Nigerian Health Sector. The reasons for these industrial actions range from unresolved industrial disputes over issues of pay and welfare packages, through protests against alleged disparities in the remuneration of different professional groups to the recent phenomenon of strikes as a protest against kidnapping and other acts of violence against professional colleagues. Whatever the reason(s) for these industrial actions, they result in paralysis of health services for varying ,and often significant periods of time, neglect of service delivery to the vulnerable low income segment of the public who cannot afford the expensive bills of the private clinics, avoidable mortalities and morbidities especially those associated with pregnancy and child health, loss of continuity in health service delivery, training and research, and artifacts in interpreting health data.

In the University of Port Harcourt Teaching Hospital for example, in 2014 strikes resulted in epileptic hospital services for only 56% of the year, there were only 1089 deliveries. Trainee staff (resident doctors, other hospital staff) and candidates from elsewhere suffered from suspension of training activities, irregularities in data collection, suspension of projects, and inability to meet timelines in their respective academic goals. The hospital lost accreditation in some medical postgraduate training faculties. Undergraduate, postgraduate and fellowship programs of different health professional groups had to be rescheduled with resultant elongation of the timelines for the training programs

The effect of these strikes on the public are worthy of mention. Rescheduling of investigations, treatment regimens, surgical operations, and post –operative rehabilitation implies continuous high levels of public frustration and eventually loss of confidence in government health services. Those who can afford the expensive bills of the private clinic abandon government hospitals. The less privileged low income earners are constrained to borrow money to patronize private clinics. Neglected and unheard, many suffer and die in silence .Auxiliary health staff, native / naturopathic healers, and TBAs are too happy to fill in the gaps left by striking scientific medicine professionals

The Medical Outreach Phenomenon

Medical outreach programs are recent phenomena which evolved about a decade ago . In these programs sponsored by local and internationally based benevolent individuals and organizations, groups of health workers headed by doctors offer rural populations community based treatment of medical conditions for short periods of time generally not more than two weeks. This measure has its usefulness but is inadequate since it covers only a small proportion of each year. It has also been noticed to create an unwholesome situation in which the beneficiaries are constrained to wait for variable periods of time without any medical care between one outreach program and the next .

Special Concerns Related to Research

Even outside academic communities, there is a worldwide tendency to document and give meaningful statistical interpretation of events. Nigerian health workers are enthusiastic about research activities .But they are limited by insufficient funding to do multidisciplinary collaborative cutting edge research, absence of optimal research enabling facilities like equipment, consumables, and basic and anti plagiarism databases, peculiarities of our local disease patterns, and other public health issues like illnesses compounded by alternative medicine treatment.

Manpower Challenges and Inefficiency in the Regulation of Pharmaceuticals

A 1989 legislation listed essential drugs. The regulation was also meant to limit the manufacture and import of fake or sub-standard drugs and to curtail false advertising. This list of essential drugs has undergone recent amendments.

Drug quality is primarily controlled by the National Agency for Food and Drug Administration and Control (NAFDAC). The NAFDAC is generally apathetic towards constituting scientific think tanks under the medical research institutes to conduct clinical trials that would ascertain the suitability of locally manufactured pharmaceuticals and those imported from elsewhere. The country is apparently contented with accepting The USA Food and Drug Administration (FDA) as the gold standard and having units here collaborate with drug trials conceived in other countries. The clinical trials that introduced Artemesinin based anti-malarial treatment were conducted in five African countries excluding Nigeria

Several major regulatory failures have produced international scandals:

The year 1993 recorded more than 100 adulterated paracetamol syrup related child mortalities in Oyo and Benue State, the end result was the death of 100 children. A year later, batches of the offending drug containing poisonous ethylene glycol, the major cause of the deaths, were still being sold over the counter.

In 1996, about 11 children died, and up to a hundred suffered severe morbidity from contamination during the Kano Pfizer experimental trial of the drug trovafloxacin. Between 2008 and 2009, a contaminated teething medication caused mortality in over 80 children.

More health staff including those trained in food and pharmaceutical administration and control are needed to monitor the activities of Nigerian private entrepreneurs who import generic brands of drugs from Asian countries.

Health Insurance in Nigeria

Historically some limited form of health insurance can be said to have been present in Nigeria since independence in that government and private establishments were and are still committed to paying bills for workers treatment when they were ill. In May 1999, the Nigerian government introduced the National Health Insurance Scheme which encompasses government employees , the organized private sector, and the informal sector . The scheme also covers children under five, permanently disabled persons, and prison inmates. In 2004, the Federal Government under President Obasanjo expanded the scheme to include administration by agents (Health Management Organizations - HMOs) in the private sector. The current level of the scheme is still unsatisfactory for various logistic reasons.

Health Insurance in Nigeria- Are there any benefits for healthcare professionals ?

Currently because of defects in the establishment of the National Insurance Scheme which was conspicuous in not mentioning health workers' remuneration, HMO activities would appear to be geared only towards maximizing their financial gains at the expense of the healthcare workers , the patronizing public, government, and private health hospitals. Several health workers in the bid to improve their earnings from the insurance scheme have been constrained to join HMOs, or establish their own organization.

Issues of Public/Private Partnership

Public /Private Partnership (PPP) is of proven benefit in development and maintenance of the health sector in developing countries. Unfortunately there are currently few PPP ventures involving established multinational organizations and a currently a preponderance of private individual entrepreneurs from the unorganized private sector. This has caused resistance of health professionals to PPP ventures in health institutions, and friction between health professionals and their respective establishments.

The Brain Drain 1 -Emigration of healthcare Workers to the Diaspora

Retaining health care professionals is an important objective of any healthcare delivery system. Migration of health care personnel outside a country is a topical issue that gives cause for concern. In the last three decades, developing countries have suffered from migration of qualified and experienced health professionals to developing countries in Europe and North America.. The principal reasons for this unwelcome development are the apparent benefits of better pay, realization of professional /academic goals, and improved quality of life in those countries. A reasonable percentage of all cadres of health professionals migrating abroad benefited from government funds for education, and personnel time and effort during their training in the various institutions here, Their migration has resulted in patriotism identity crisis, loss of Nigerian funds invested in health care education, and health professional shortages. Retaining these trained professionals has been identified as an urgent goal

The Brain Drain 2. Is the gap left by health workers given Political /Administrative Appointments Justified?

On occasion, health workers of administrative grade and union leaders are given federal, state administrative or political appointments, and a few leave the service in search of private or political enterprise. On face value it is easy to argue that many of them are highly knowledgeable/skilled and their temporary or permanent exit will create a vacuum in the service.

A critical appraisal of the situation brings out the following facts:

Life is dynamic and all individuals should feel free to pursue their respective goals provided they are within the tenets of professional regulations and the law. With their wealth of experience they will contribute positively to politics and government. They are empowered to contribute to and head committees related to health, and automatically become advocates for the health sector

The Brain Drain 3 . When should health workers retire/disengage from the service ?

With our dire need for health workers, are we justified in retiring/disengaging qualified, experienced and internationally exposed staff who are still active and very productive on the grounds that they are up to retirement age ?

Which staff are preferable ?

Overage/retired but efficient staff who not only improve the international rating of the institution but can also groom younger staff ?

Or younger staff who come late to work, contribute minimally, and seek every excuse to absent themselves from work ?

Summary of The Current Situation in The Health Sector - Our Gains in Manpower Development

From humble beginnings set up by the Christian missionaries and British Colonial Government, Nigeria has been able to accumulate a core of educationally knowledgeable and professionally competent health workers most of whom were locally trained. These health professionals have sustained the service delivery, training and research components of the country's health sector. The training activities have also provided healthcare manpower for the developing countries (North America, United Kingdom, and Europe) . The

proliferation of academic and professional health training institutions have ensured that we have health professionals and specialists to manage complicated clinical cases and public health issues. The background for actualization of international standards in health service delivery, training, and research is already present needing only logistic refinements to actualize our goals A good number of our locally trained health professionals , all Nigerian born, are employed in international centers of excellence in the Diaspora, but are still affiliated to their relatives, associates and their country Nigeria. Many Nigerian health professionals are currently serving in administrative and political positions and can act as advocates for progress in the health sector especially manpower development.

How then do we Maximize Our Gains, and Reduce Our Limitations?

We can maximize our present gains by first advocating for reduction of the country's current socioeconomic deficiencies. This goal will facilitate enabling activities which will correct the deficiencies that prevent health professionals from achieving their respective academic and professional goals .

The Way Forward - Suggested Remedies

A composite appraisal of the current manpower situation in the country should be undertaken. This move will provide data to enable short and long term planning . The total number of professional groups that are necessary for efficient function of the Nigerian Health Sector should be itemized and the unmet qualitative and quantitative deficiencies with respect to orientation, training, and re-training of these staff carried out. Advocacy for establishing the required faculties and other institutions for academic and professional training for all categories of health workers should be undertaken with governments. Attempts should be made to compile a composite list of Nigerian health workers in the Diaspora to enable incorporating them into capacity building in the health sector even if it is done on adjunct basis.

Advocacy should be undertaken for improved funding of the health sector, improved security in the country, improved social amenities including establishment of health institutions in the rural area , and sponsorship of deserving health workers for training, retraining and other capacity building activities .

Other potential interventions needing advocacy are including health workers in the already established Tertiary Education Fund (TETFUND) and Petroleum Development Trust Fund (PDTF) sponsorship programs, and establishment of special funds for improving capacity in the health sector especially in relation to staff welfare and academic/professional development.

The Federal Ministry of health should reorganize the health sector with respect to established ILO and WHO models for health workers (including welfare packages) which are already operative in developed countries. Orientation seminars for all categories of health workers should be carried out to create a forum for resolving inter professional discord promoting issues Academic assemblies resembling university senates should be set up in tertiary health institutions to include all senior staff of administrative grade. Well defined regulations and edicts should be put in place for managing the health sector especially tertiary institutions. Finite practicable time limits should be assigned to duration of headship of all health institutions, and within institutions for all departments.

Meaningful PPP arrangements with the organized private sector should be introduced in ownership and management of selected health institutions. Well defined PPP management of residency programs should also be commenced

Emphasis should placed on performance not attendance. Properly defined ratios of clinical/technical staff to administrative staff should be introduced.

Establishment of National Institutes of Health and Centers for Disease Control and Prevention should be a priority. Development of staff programs using USA models and in line with ILO and WHO recommendations should be started . Retention of experienced staff who are productive should be recommended. Creation of a situation in which productive staff in areas of need can serve in multiple institutions on an adjunct or consultancy basis should also be commenced . Government should create well defined pyramidal structures in health service delivery with tertiary institutions at the apex, and the Federal/ State Ministries offering supervisory roles, and defining levels of collaboration between different levels of health care delivery.

All health institutions should use the ILO and WHO recommendations to define staff employment requirements, and organograms for professional activities /roles, and remuneration packages.

Addressing the perennial defects in funding of the health sector is of top priority. When sponsoring staff for programs, their institutions should ensure that facilities are made available for the trained /retrained staff to commence work on return to their institutions.

A Futuristic Projection.

It is unlikely that our country will remain in this situation of suboptimal indices of healthcare delivery. Once the socio-economic background has been laid for correction of most of the basic defects in the health sector, over a period of time most of these defects will be corrected. We look forward to the near future in which there will be minimal deficiencies in the number of all cadres of well trained healthcare workers with all respecting their well defined roles in health care delivery, training, and research, and collaborating with each other to ensure holistic health for all Nigeria.

The prevailing situation then will be proper funding of the health sector, proper training and certification of health workers in line with international standards, and their adherence to professional ethics and inter- professional collaboration. Then too, our private health sector will be well organized and operating at levels consistent with what obtains in developed countries.

Mass drift of health workers to developed countries will be reduced to a minimum because working standards, training and research opportunities, and rates of remuneration in Nigeria will be acceptable.

The consuming public will no longer be constrained to seek medical care elsewhere. Strikes and contention between different cadres of health workers will be reduced to a minimum, and industrial/workplace harmony will be increased .

The roles and responsibilities of different cadres of health workers will be better defined, workers within each profession will have optimum welfare packages and workers will be able to actualize their respective professional/academic dreams.

The consuming public will have more access to efficient and affordable healthcare , and the need to travel out of the country will be reduced with savings in our much needed foreign reserve.

Similarly, the current drift of healthcare professional to other countries will be reduced and Nigeria may approach the level where it attracts professionals from other countries seeking improved professional, and welfare opportunities here.

What is Most Crucial in Solving The Manpower Needs in The Nigeria Health Sector

We hope that ultimately, socio-economic development with increased levels of public formal education, individual and public empowerment, and access to human rights

to addresses inconsistencies in the system will provide the answer. The Unmet need to maximize our gains in manpower development in the health sector will then be addressed gradually with time.

NMA Recently Faulted the 2016 Budgetary Allocation to Health

The Nigerian Medical Association (NMA) recently faulted the 3.6% 2016 budgetary allocation to the health sector and the absence in the budget proposal of the N60bn (equivalent of at least one per cent of the Consolidated Revenue Fund) envisaged to accrue as the Basic Health Provision fund as enshrined in the National Health Act of 2014.

Summary

Nigeria has a core of well trained health professionals in many specialties. Most of them are locally trained and have been able to sustain service delivery, training, and research activities. However, socioeconomic deficiencies reflected in challenges in funding, staff welfare, infrastructure, and artifacts created by insecurity, strikes, inter professional discord have prevented the staff from realizing their academic and professional goals . Advocacy for correction of the country's socioeconomic deficiencies will pave the way for correction of the qualitative and quantitative manpower challenges in the health sector.

Acknowledgements

I wish to express my gratitude to Prof T C Harry, Dean, Faculty of Clinical Sciences, The Provost, Prof Fente, The Vice Chancellor, and the entire Staff of the Niger Delta University and its Teaching Hospital for giving me the opportunity to deliver this lecture.

I acknowledge the efforts of Emeritus Profs Kelsey Harrison and N D Briggs, and Profs Chris Anah, C T John , R S Oruamabo, Felicia Eke, Ndu Eke, Dr E D O Mangete, and other pioneer staff of the University of Port Harcourt College of Health Sciences for their untiring contributions to manpower development in Nigeria's health sector especially with respect to our South East and South South locality

My medical and nursing colleagues in The Department of O&G, UNIPORT/UPTH made very useful contribution to the content of this lecture and have always been very supportive in all my academic and clinical ventures.

I also acknowledge the goodwill and support of other colleagues in the University of Port Harcourt and Niger Delta University Academic Communities, and The Eastern Sector of The Society of Gynecologists and Obstetricians of Nigeria.

Finally to The Almighty God be The Glory for His Mercies and Grace that enabled us survive 2015.

An Afterthought.

As we look forward to the future in which most of our health professionals working in Nigeria can actualize their professional dreams, a future in which all indices of healthcare delivery, training, and research in Nigeria will be at par with those found in developed countries, and health workers in different specialties will work together in harmony in an industrial strike and kidnapping free Nigerian environment,

We remind ourselves that from humble beginnings the pioneers in the Nigeria health sector made substantial gains in service delivery, manpower development, and research. They worked tirelessly, did not go on strike, and managed all challenges resulting from inter-professional differences such that discord was virtually unknown of.

Prof Nimi Briggs and C T John as first and second head of the Obstetrics & Gynaecology Department, UNIPORT/UPTH respectively shared the single available office with five other consultants and the chief nursing officer in charge of the department for eleven years. They focused on the terminal objectives of improved service delivery, manpower development, and research. The results of their efforts in manpower development are obvious today

We Should Continue to Hope for of Socio-Economic Advancement

Socio-economic development and advocacy will enable improved funding and most of the suggested remedies in the health sector. Money does not buy happiness but pays the rent and enables the candidate's transport and other logistics to search for it. But We as health practitioners should not be discouraged by current funding difficulties and other deterrents. We Should Emulate the Asians (especially India and China) who are moving forward despite nature's challenges.

Families and communities in Asia now pool their financial resources together to train deserving young relatives in The USA , UK, and Europe. They also collectively set up family or community health institutions (health management organizations, hospitals, drug companies, and non-governmental health organizations) .We are witnesses to their efforts . Sick individuals worldwide, even from The USA and Europe now travel to India for medical treatment.

Nigerians are Equally Capable . After All, We Built Abuja, Our Magnificent Capital. We must rise to the occasion, and ensure that we make our maximum input each day.

Last Words

I wish to end by saying:
Thank You all for a Hitch – Free Transition from 2015 to 2016 and God Bless You For Listening.

Suggested Further Reading:

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Review article: Bloodless medicine and surgery: can it be realised here?

Presented in part as the Deans Lecture on 11th June 2015 in the ETF Building, Okolobiri

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Niger Delta Medical Journal 2017; 1(3): 35-43

HISTORY OF BLOOD TRANSFUSION

In 1616, William Harvey first described the circulation of blood and by the late 19th and early 20th century blood was transfused randomly without cross match until 1900s when Landsteiner discovered the ABO blood groups. Blood banks operations were first started in 1937 by Dr. Bernard Fantus in Cook County, Chicago.

Bloodless Medicine (and Surgery) refers to the clinical methods in providing medical care without allogeneic blood transfusion. This is an accepted definition except in the case of such religious groups as Jehovah's Witnesses for whom blood transfusions of either whole blood, red blood cells or its products are not accepted. They do not accept autologous blood.

Blood is normally given in conditions of haemorrhage, anaemia and bone marrow dysfunction and exchange blood transfusion in neonates with jaundice. Common causes of haemorrhage include trauma of external and iatrogenic origin. Low haemoglobin levels as in anaemia and bone marrow dysfunction in the leukaemias, lymphomas are other accepted indications for blood transfusion.

Blood is transfused after it has been grouped and cross-matched – that is, the donor and recipient using the ABO and Rhesus systems. The ABO has AB, A, B and O groups, while the Rhesus is either positive or negative.

FUNCTION OF BLOOD

It is the medium of transport of nutrients, enzymes, hormones and gases such as oxygen and carbon dioxide. Tissue oxygenation depends on blood oxygen levels for optimum function.

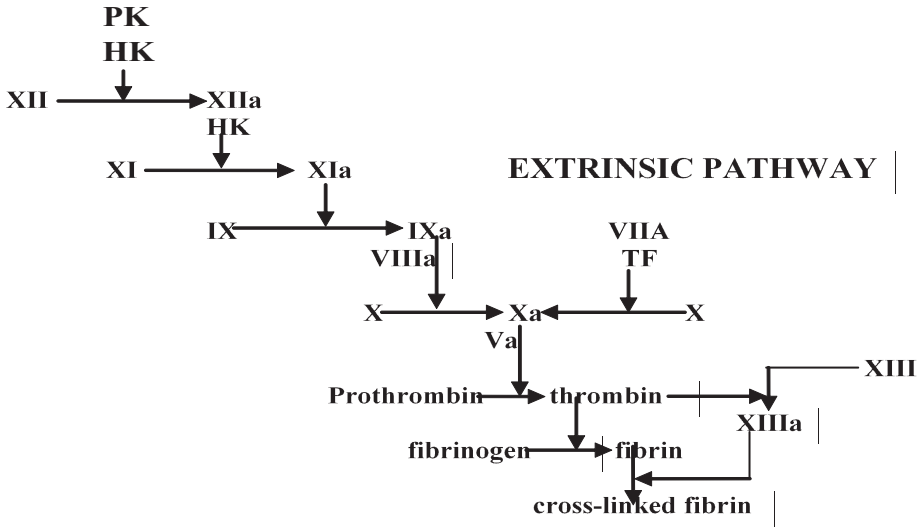
PROCESS OF COAGULATION

Also, the blood in the cardiovascular system should remain fluid and yet have the capability of local haemostasis by plugging injuries to the vessel wall to prevent excessive bleeding. The plug is formed by a thrombus which is a solid from the blood constituents. These are platelets, vascular endothelium and the clotting factor. The coagulation process leads to fibrin deposition and the plasmin system digests fibrin.

Platelets are disc like in shape and adhere to damaged endothelium. They release vasoactive amines which commence the process of thrombosis but they also have inherent vasodilatory and vasoconstrictive properties. They do these via prostacyclin and thrombaxane.

The coagulation system is one of cascading of reactions by sequential activation of inactive precursors to the active form which in the long run activates thrombin to convert fibrinogen to fibrin. There are both extrinsic and intrinsic pathways.

Figure 1: **The Cascade Model of Coagulation INTRINSIC PATHWAY**



There is also the fibronolytic (plasmin) system that degrades fibrin to soluble products. This is a safe method that ensures that there is no excess fibrin or clot in the circulation that can form emboli. Despite the advantage of blood transfusion, its use is fraught with challenges which include infection transmission, issues of compatibility and transfusion reactions, over transfusion, the demand and supply of blood and the cost of blood itself.

List of Complications

Early - Haemolytic Reactions
- Massive transfusion shock
- Oliguria
- Infectious
  - HBC, HBV
  - HIV
  - Herpes
  - Treponema
  - Toxoplasma
  - Cytomegalovirus
- Allergic
- Pyrogenic
- Circulatory Overload
- Bacterial Contamination
- Air Embolism
- Citrate Toxicity
- Clotting Anomalies

Late - Transmission of infections
- Transfusional iron overload
- Transplant associated graft v host disease

Bloodless medicine has been shown to effect positive patient outcomes[1]. Patients report that they receive exceptional care and have a high degree of satisfaction. It is practiced by the use of multiple blood conservation techniques. Drugs, technological devices and surgical and medical techniques. It demands an inter-disciplinary team approach of specialists who are committed to avoiding the use of allogeneic blood transfusion[2].

Table 1: Over Review of General Principles of Bloodless Medicine

1.	Formulate a plan of care for avoiding and controlling blood loses tailored to the clinical management of individual patients, including anticipated and potential procedures.
2.	Employ a multidisciplinary treatment approach to blood conservation using a combination of interventions.
3.	Proactive management by the lead clinician: anticipate and be prepared to address potential complications.
4.	Promptly investigate and treat anaemia, preferably preoperatively.
5.	Decisive intervention, including surgery, should not be delayed in the actively bleeding patient who refused allogeneic blood transfusion. In general, avoid a "watch and wait" approach to the bleeding patient.
6.	Exercising clinical judgment, be prepared to modify routine practice when appropriate.
7.	Consult prompt with senior specialists experienced in blood conservation at an early stage if there is physiologic deterioration or if complication arises.
8.	Transfer a stabilized patient, if necessary, to a major centre before the patient's condition deteriorates.
9.	Restrict blood drawing for laboratory tests.
10.	Decrease or avoid the perioperative use of anticoagulants and antiplatelet agents.
11.	Emergencies: establish in advance a management plan for rapid location and arrest of haemorrhage, as well as for transfer to an appropriate centre. Avoid delay

PRE – OPERATIVE MANAGEMENT

Good history taking and physical examination and attention is paid to personal or family bleeding disorders.

1. Pre – Operative Blood Conservation

Restrict blood taking to the barest minimum - the number of tests and the volumes withdrawn. Discontinue or substitute agents that affect clotting in the peri-operative period (aspirin, NSAIDS, anti coagulants, anti platelet agents).

2. Pre – Operative autologous blood donation (PAD)

Blood is pre-donated by the patient a week before surgery and the blood is used during the operation. There are cost implications, clinical errors and infection risks. PAD is inacceptable to Jehovah's Witnesses.

INTRA – OPERATIVE MANAGEMENT

The sine-qua-non of reducing blood transfusion need is the prevention of blood loss during operation. Gentle tissue handling, recognition and avoidance of potential bleeding sources and rapid control of unexpected haemorrhage. Traditionally, this is done with a diathermy either of a bipolar or monopolar type. There is also the cutting diathermy. New devices include argon enhanced beam that coagulates vessels of 3 mm size with minimal tissue trauma. Others include water jet, gas, ultrasounds, microwaves used as dissecting media and they have been in practice.

Table 2: Surgical and anaesthetic principles of bloodless medicine

1. Preoperative assessment and planning: management of anaemia, management of anticoagulation and congenital and drug-induced coagulopathies, prophylactic interventional radiology and embolization, prescribing and scheduling of cell salvage apparatus, restricted diagnostic phlebotomy.
2. Intraoperative blood conservation: meticulous surgical haemostasis, blood salvage, hemodilution, pharmaceutical enhancement of haemostasis, maintenance of normothermia, surgical positioning to minimize blood loss and hypertension.
3. Postoperative blood conservation: blood salvage, tolerance of anaemia, optimum fluid and volume management, restricted diagnostic phlebotomy, adequate analgesia, maintenance of normothermia.
4. Maintain appropriate fluid resuscitation. Significant normothermic anaemia is well tolerated in hemodynamically stable patients.
5. In actively bleeding patients, the first management priority must be to stop the bleeding. Avoid attempts to normalize blood pressure until haemorrhage is controlled.
6. Prevent or treat coagulation disorders promptly.
7. Oral or parenteral iron may be used to improve iron stores. rHuEPO effectively increases RBC mass.
8. Haematology and oncology: aggressive Human recombinant EPO (rHuEPO) and iron therapy for prophylaxis of anaemia; individualized chemotherapy protocols to minimize haematologic toxicity, pharmacologic prophylaxis and treatment of bleeding, tolerance of anaemia, restricted diagnostic phlebotomy.

The harmonic scapel, cavitational ultrasound surgical aspirator, waterjet dissections pump a fine spray of saline through a sapphire tip. Sealants use a combination of fibrinogen, thrombin from bovine and animal sources that reproduce the last stages of the coagulation cascade i.e. fibrinogen to fibrin.

Positioning of the patient thereby elevating the surgical site to reduce arterial pressure and facilitate venous drainage away from the surgical wound. Also the use of tourniquets, wound infiltration with vasoconstrictors, direct control of bleeding, use of topical haemostats and the diathermy.

Staging of complex procedures may minimize blood loss such as in massive trauma by controlling haemorrhage and contamination and surgery for life threatening injuries. This is followed by temporary packing of the wound and rapid closure to allow for adequate resuscitation. A planned re-operation can then be planned later for definitive repair of injuries.

Anaesthetic techniques include controlled hypotension, maintenance of normothermia, blood cell salvage and tolerant normovolaemic anaemia[3].

Acute Normovolaemic Haemodilution (ANH) is a low cost and effective blood conservation techniques that reduces RBC mass in surgical cases[6,7,8]. Immediately before or after induction, units of blood (2 units) are collected from the patient and replaced with either crystalloid or colloid or both. Blood lost during operations will contain fewer RBC and clotting factors because of the dilution. At the conclusion of surgery or at the HB level that transfusion is deemed necessary, collected blood is returned to the patient. There is minimal pre-operation preparation and very little inconvenience to the patient. ANH units are collected and stored at room temperature.

BLOOD RECOVERY AND RETURN

Autologous blood cell salvage (intra operative autologous transfusion) involves recovery of the patient's shed blood from the wound, washing and return of blood to the patient. In cases of massive blood loss or on religious ground, it is an effective option in minimizing blood loss.

Technological advances have added filters in cancer and obstetric patients to avoid cancer cells and amniotic fluid being infused. The blood in addition can be irradiated before reintroduction into the patient's circulation. Cell recovery has found a place in cardiac, orthopaedic, vascular and trauma procedures. They are also cost effective.

POST OPERATIVE PERIOD

There is now an understanding of the tolerance of anaemia. The figure of 10gm% was the cut off for blood transfusions but now, in haemodynamically stable patients levels of up to 7gm% are accepted. In those who are not, the earlier of figure of 10gm% is.

PHARMACOLOGIC AGENTS

Erythropoietin (EPO) Therapy. 1 unit of blood per week can be obtained from EPO and if well planned 3 – 4 units of blood can be obtained ahead of the procedure. EPO is usually given with iron and multivitamins such as B_{12}, vit c[4,9].

FUTURE DEVELOPMENTS Artificial Oxygen Carriers

Perflourocarbon emulsions, cell free Hb solutions. In these, there is absence of immunologenic cell membranes and they have a prolonged shelf life at room temperatures. They may interfere with laboratory tests, have a short circulating time (20 – 24 hours), have methaemoglobin production, nitric acid mediated vasoconstriction and GIT discomfort.

Perflourocarbon emulsions are capable of dissolving large amounts of gases including oxygen and carbon dioxide. They are effective for oxygen delivery during haemodilution in patients for orthopaedic surgery. They also prevent micro-embolic bubbles from cardiopulmonary bypass or preservation of solid organs for transplantation.
They have not been fully certified for use in clinical settings except the Bovine Hb solution in South Africa though it is approved for veterinary use in the US.

CLINICAL STRATEGIES
The alternatives can be used successfully in a blood management strategy that is individualized to a specific patient. For example, elective joint replacement surgery may need 2 units of RBC transfusion13. Weeks before the surgery, assess anaemia and or iron deficiency and correct with EPO and iron to increase HCT level. The use of ANH reduces RBCs per unit volume and thus decreases RBC volume lost. Shed blood can be collected and returned within 6 hours after surgery.
In post operation Hb is above 8 – 9gm% and in a patient with cardiovascular stability, there is no need for further transfusion. He can be built up. This combination has been found very useful even in coronary artery bypass grafting without the use of blood.

PERI – OPERATIVE FLUID USE - UPTH EXPERIENCE
We have studied fluid usage at the University of Port Harcourt Teaching Hospital (UPTH) in the peri operative period. The data have not been statistically analyzed but some inferences can be deduced from them. The UPTH data have numeral advantage over our hospital here (NDUTH) and the years chosen gave a representation of the theatre function.

Table 3 : Males / Females Relationship

Year	Males	Females	Total
2001	403	1001	1404
2002	408	1461	1869
2003	570	1452	2022
2004	288	1184	1472
2005	348	1166	1514

Table 7 shows the number of patients per year and the sex distribution. It shows a female sex preponderance of x 2 – 3 over their male counterparts. The study involved all operations in the UPTH theatres. This high female rate is probably because of a high caesarian section rate in that hospital.

Table 4: Infused Patients

Crystalloids Volume Infused	Total No. of Patients
> 500ml	794
501 - 1000	2211
1001 - 2000	3400
2001 - 3000	1380
> 3001	496
Total	8281

Table 8 shows how crystalloid infusions were distributed in the patients. Three groups are seen. Those with less than 1000ml of infusion, those with high infusions of more than 2000ml and an intermediate group of 1000 - 2000ml. We can then see that those who received less than 2000ml were four times those who received more than 2000ml. Correspondingly, the blood usage per unit of blood is shown in table 3.

Table 5: Pattern of Blood Transfusion

1 Unit	666
2 Units	214
3 Units	87
> 3	9
Total	976

Single unit transfusions were received and had about two thirds of all transfusions. In the old order, single unit transfusions were frowned upon as they were regarded as unnecessary but in the current light of less allogeneic blood, single units have become permissible especially in our setting where blood availability is not guaranteed during surgery. Operations needing more than three units of blood were quite few.

In this study, the blood transfusion rate is quite low. This is the percentage of infused patients who received blood – that is 976 patients out of a total of 9257 giving us a figure of 10.5%. Finally, table 9 shows the pattern of blood loss amongst the operated patients.

Table 6: Blood Loss Versus Number of Patient

> 500 ml	3510
500 - 1000 ml	3694
1001 - 2000 ml	710
2001 - 3000 ml	269
> 3000 ml	97

Here too, two groups are seen. Those of them who lost less than 1000ml (mild to moderate loss) and severe loss (more than 1000ml). This could well tally with the figures in table 2 where those whose blood loses were less than 1000ml are managed by crystalloid infusion giving us a high infusion figures and the severe blood losers who need blood transfusion and so received less crystalloids. As stated earlier, these are not statistically analyzed but they are still relevant figures on their face value. Crystalloid infusions were received by more than 89% of patients as opposed to blood and the crystalloids could have been used for a greater part of the peri operative course in theatre. This is also borne out of the Anaesthetists experience of not transfusing an unconscious patient whose blood transfusion reactions may not be fully manifested.

The point being made is that even in this environment, we are being cautious in the use of blood in the peri operative period. I believe that the era of an Anaesthetist palpating 2 – 3 units of blood before surgery is becoming a thing of the past[5].

CAN IT BE REALISED HERE?

I believe that bloodless medicine can be achieved here. All hands must be on deck literally. The brief review of crystalloid usage shows that our Anaesthetists are already working in that direction.

In bleeding patients, the aim of management should be to stop the bleeding and not just to replace the lost blood. In fact, they should be done together.

It is quite feasible to correct anaemia using EPO, iron and vitamins. EPO increases blood levels by 3 – 5 units in 6 weeks at which time planned elective major surgery can be scheduled.

For the haemodynamically stable patient, ANH offers a good alternative to blood transfusion as well as intra operative autologous blood transfusion for shed blood. The kit is not too expensive and the procedure is already in use in a number of centres in this country. It has been very useful in haemothorax and haemoperitoneum and in most non-cancer surgeries. The RBCs can be harvested and re-infused so long as it is done within 6 hours[10,11,12].

In conclusion, these are safe and cost effective therapeutic options for the potential management of all patients without allogeneic blood transfusion. Blood in this country is in short supply. There is poor blood donor service and with all our taboos, reliance is placed mainly on blood traffickers – blood for sale. The blood donors (sellers) are not without the infections, diseases earlier enumerated and we do not have test kits for most of these infections.

We have before us a new horizon and a new outlook for minimizing allogeneic blood transfusion. Let us all embrace bloodless medicine for the good and future of mankind and our profession.

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PHYSICAL INJURIES IN THE NEONATAL PERIOD - AN AFTERMATH OF HARMFUL TRADITIONAL PRACTICES

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Key words: Harmful traditional practices, injuries, newborn, Nigeria

Abstract

Harmful traditional practices in the newborn period are those practices and customs that have bad effects on a newborn's health and may prevent the newborn from achieving its normal growth potential and development. The practices are usually well intentioned, but misguided and misinformed. We present two neonatal victims of unintentional physical injuries inflicted by caregivers resulting in severe morbidity and therefore highlighting the need to eradicate these deleterious practices and replacing them with evidence-based newborn care practices.

Baby OM an 11 day old term female neonate presented on account of spreading cellulitis of the left breast area and fever which started following the traditional practice of hot water massage of her breasts and expression of witches milk which her mother's aunty had been practicing on her since the fourth day of life. A diagnosis of necrotizing fascitis of the left hemithorax secondary to neonatal mastitis of the left breast was made and child admitted

Baby NB was a 6 week old term female infant who presented on account of huge ulcers on both buttocks. She was noticed to have developed progressively increasing swellings on both buttocks on the 8th day of life which subsequently ruptured and drained purulent discharge. There was no history of fever but there was a positive history of spanking of buttocks with bruises at birth during resuscitation, as patient did not cry at birth. A diagnosis of bilateral gluteal ulcers secondary to gluteal subcutaneous fat necrosis was made. She was admitted and co-managed with the Burns and Plastics Surgical unit.

Traditional practices inflicting injuries on the newborns are prevalent in our environment. There is need to expose and eradicate these deleterious practices. All hands need to be on deck to promote, educate and empower mothers and caregivers on the best newborn practices to imbibe so that together we can decrease the alarming neonatal mortality and morbidity in Nigeria.

Introduction

Harmful traditional practices in the newborn period are those practices and customs that have bad effects on a newborn's health and may prevent the newborn from achieving its normal growth potential and development. The practices are usually well intentioned, but misguided and misinformed. [1] Harmful traditional practice occur in all societies [2] but are more prevalent in developing countries.

Nigeria has a large number of harmful traditional practices which are harmful both to individuals and to the society at large. [3] Some of these harmful practices include early marriages, female genital mutilation and outcast system. The newborns are also not exempt from these practices.

Some notable harmful newborn practices include application of cow dung on the cord, discarding of colostrum, giving pre-lacteal feeds [4,5] giving water to breastfed babies [2] and hot water massage of newborns. Some practices inflict severe injuries in these vulnerable recipients. The inflicted injuries are wide ranging, from bruises and lacerations to outright cutting of body parts during the neonatal period such as the neonatal uvulectomy practiced in some parts of Nigeria. [6] Postnatal injuries resulting from harmful traditional practices are most often not recognized by perpetrators as harmful. These practices are protected by customs and traditions and handed down from one generation to the other by elders in the family. [7] These practices make neonates more vulnerable and increase their morbidity and mortality risks. We present two neonatal victims of unintentional physical injuries inflicted by caregivers which resulted in severe morbidity and thereby highlighting the need to eradicate these deleterious practices and replace them with evidence-based newborn care practices.

Case 1

Baby OM an 11 day old term female neonate was brought to Children Emergency Centre on account of swelling of the left breast area of three days duration and fever of one day duration. Swelling of the left breast started following the traditional practice of hot water massage of her breasts and expression of witches milk which her mother's aunty had been practicing on her since the fourth day of life. The swelling had progressively increased in size with associated high grade fever. Fever was temporarily relieved by oral paracetamol. At onset of symptoms baby was taken to a peripheral hospital, where she was given intravenous antibiotics but was subsequently referred to our facility as the swelling progressively worsened involving the whole left side of the chest. Baby was a product of term gestation delivered to a 17 year old now P1^{+0} unmarried teenage mother who resides with her maternal aunty. Mother had no antenatal or delivery complications. Baby cried at birth with a birth weight of 3200g. Significant findings on examination of the infant at presentation were fever, irritability, erythema of the left hemithorax extending to the abdomen; multiple sinuses around the left nipple with firm, tender indurations measuring 8 by 4cm extending to the back (Fig 1). The sinuses were all discharging pus. A diagnosis of necrotizing fascitis of the left hemithorax secondary to neonatal mastitis of the left breast was made and she was admitted for intravenous antibiotics. A complete blood count done was not suggestive of sepsis. Chest radiograph showed soft tissue swellings and opacities. Retroviral screening was negative. Baby had a proper incision and drainage of the indurated mass with removal of 40mls of pus and necrotic tissues. The aspirate sent for culture isolated Methicillin resistant Staphylococcus aureus sensitive to clindamycin. Patient had intravenous Clindamycin for 10 days. Wound significantly improved with healthy granulation tissue over sinuses and minimal discharge. She was discharged on the 11th day on oral antibiotics and to continue daily wound dressings on outpatient basis in a nearby health centre.

Fig:1

Fig 1: Necrotizing fasciitis from Neonatal mastitis

Case 2

Baby NB was a 6 week old term female infant brought to Children Emergency Centre on account of huge ulcers on both buttocks.

Baby was said to have developed swellings on both buttocks on the 8th day of life. Swellings were firm and progressively increased in size, with purplish discolouration of overlying skin. The swellings subsequently ruptured and drained purulent discharge. There was no history of fever or swellings on any other part of her body. There was no history of hot water massage at birth; however there was a positive history of spanking of buttocks with bruises at birth during resuscitation, as patient did not cry at birth. There was no history of intramuscular injections on the buttocks. Baby had failed to gain weight since birth. Mother took baby to the General hospital (where baby was born) on the day the swelling was noticed. She was given oral paracetamol and told to apply petroleum jelly on swellings to enhance softening of the lesions. She however represented two days later with worsening symptoms and was then admitted for a month. While on admission she received intravenous antibiotics and had a surgical drainage of the mass which later developed into extensive gluteal ulcers. Following the ulcer formations, she was referred to our hospital for expert management. At presentation, pertinent physical examination revealed a wasted and pale infant. Her weight was 2900g (below the 3rd centile for age). She was afebrile but tachypnoiec. Examination of the gluteal region showed bilateral irregularly shaped ulcers measuring about 6cm by 5cm and 5cm by 4cm on the right and left buttocks respectively with sloping edges. (Fig 2) The floor of the ulcers were covered with slough and serous discharge. A diagnosis of bilateral gluteal ulcers secondary to gluteal subcutaneous fat necrosis was made. She was admitted and co-managed with the Burns and Plastics Surgical unit. Full blood count done was suggestive of sepsis; there was also anaemia packed cell volume (PCV) of 8%. Serum electrolytes showed hyponatraemia, hypochloraemia and acidosis. Calcium levels were within normal limits. Wound swab culture yielded Methicillin resistant Staphylococcus aureus sensitive to clindamycin and linezolid on the left buttocks while the right buttocks grew both Methicillin resistant Staphylococcus aureus sensitive to clindamycin and linezolid and Acinetobacter baumani sensitive to imipenem and Amikacin. Antibiotics were changed accordingly and deranged electrolytes corrected. Baby was transfused with packed red blood cells on account of the anaemia and nutritional rehabilitation was commenced with fortified breast milk.

Patient started gaining weight and wound healing commenced with good granulation tissue. She was subsequently discharged home after 12 days of intravenous *Meropenem* and *Amikacin*, to continue daily wound dressings on out-patient basis and to be followed up in both Paediatric and Burns and Plastics clinics.

Fig 2: Gluteal ulcers from subcutaneous fat necrosis

Discussion

Harmful traditional practices reflect norms of care obtainable in a given community and it differs from one society to the other. [2,8] The practices during the newborn period can constitute a determining factor for neonatal survival. [8] Every culture has its own set of newborn practices. Some of these practices may be useful, inconsequential or downright harmful. [2,8] Physical injuries due to traditional practices may be unheard of in developed and affluent countries but in lower income countries it may not be so uncommon. It contributes significantly to the high neonatal morbidity and mortality in developing countries.

The two cases presented highlighted the physical injuries that can result from harmful traditional practices in the newborn. These practices occur in the home and even hospital environments as

illustrated from the second case which actually arose from the severe spanking meted to the buttocks of the asphyxiated newborn at birth in a bid to make her cry (breath). The injury was meted out by healthcare providers who were supposedly 'knowledgeable' on neonatal resuscitation. This emphasizes the need for renewed efforts to train and retrain health care providers at the grass root level on neonatal resuscitation and Helping Babies Breath programs.

Neonatal mastitis is a common presentation during the neonatal period in Nigeria and majority of the cases present with preceding history of hot water massage of the newborn breasts. Hot water massaging is a traditional practice aimed at softening the usually large breast tissue of the neonate. The neonatal breast enlargement is due to the maternal hormonal influences which act on the baby's breasts in-utero, enlarging them [9] and even stimulating them to secrete milk transiently post-nataly called witch's milk. [10]

In the process of massaging and expressing the witch's milk by caregivers, the breast tissue rapidly gets infected. Though the mechanism of neonatal mastitis is not fully understood, it is thought to occur because of skin-colonizing bacteria migrating into the breast parenchyma. [11] The symptoms of neonatal mastitis may include fever, redness, swelling, induration or fluctuance, purulent nipple discharge and lymph node enlargement on the ipsilateral side. [12] Laboratory investigations may show evidence of infection such as elevated white blood cells and procalcitonin levels. The complete blood count of our patient with neonatal mastitis was not suggestive of sepsis. This may not be surprising as the child had been on intravenous antibiotics before referral to our facility. It has also been documented that bacteraemia is rare in neonatal mastitis occurring in only about 4% of cases. [12] Our patient's wounds grew *Staphylococcus aureus*. *Staphylococcus aureus* has been the commonest organism implicated in neonatal mastitis. Tzen et al [13] in their study noted *S. aureus* in 90% of cultures in babies with neonatal mastitis. Other organisms that have also been reported include *S. epidermidis, E.coli, Proteus*, *Pseudomonas, Klebsiella* and *Aceinetobacter.*[14]

The influence of older relatives in newborn care in Nigeria cannot be over emphasized. Our patient's teenage mother lives with her aunty who became the primary caregiver. Though the Aunty was educated she still believed in performing hot water massage as the remedy for breast hypertrophy in the newborn. Several studies in Nigeria have documented the influence of grandmothers and other elderly relatives in some harmful traditional practices in the newborn period. [15-17] Peterside et al [16] reported the case of repeated abdominal massage of a newborn by the grandmother with subsequent recto-vaginal prolapse and eventual demise of the neonate.

Subcutaneous fat necrosis is a panniculitis that presents in the newborn period with firm indurated nodules or plaques especially in areas with large amounts of fat such as cheeks, thighs, buttocks, upper arms and trunk [18,19] It is usually associated with traumatic birth and hypoxaemia and develops after a few days to weeks of delivery. It has no sex predilection. Our patient had birth asphyxia requiring some resuscitation which the midwife erroneously provided with severe spanking of the buttocks. Mother noted her baby's buttocks were discoloured since birth but the indurations started after one week of life. This course of progression was in keeping with other studies that have reported on subcutaneous fat necrosis in the newborn. [20] It is however different from these other studies in the sense that our baby progressed to develop ulcers over the indurated areas. This may be due to improper management of the initial condition leading to infection of the necrotic tissue and subsequent wound breakdown. Subcutaneous fat necrosis can be differentiated from other causes of swellings in the newborn period by clinical history. It is not present at birth unlike congenital tumours and it is usually only seen in term babies differentiating it from sclerema neonatorum seen in critically ill preterm neonates. Ordinarily, subcutaneous fat necrosis is

self-limiting with its major complication being hypercalcaemia. Our patient did not develop hypercalcaemia but developed infection with ulceration of the affected areas. It is possible she may not have developed this disease if not for the spanking received.

Conclusion:

Harmful traditional practices inflicting injuries to the newborns are prevalent in our environment. There exists a need to expose and eradicate these deleterious practices. Government, neonatologists, paediatricians and other stakeholders should increase effort at awareness creation on harmful neonatal practices so that those taking care of the newborns should avoid them. Both healthcare providers and mothers need repeated training on the appropriate essential newborn care. They should be trained on neonatal resuscitation emphasising the availability and use of bag and mask devices and improve their proficiency in its use. The new curriculum being rolled out by the Federal ministry of Health on Essential Newborn Care Course (ENCC) for health care providers in Nigeria could not have come at a better time. Also the importance of female education and empowerment via universal basic education should be advocated at all levels as poor maternal education has been associated with poor neonatal practices. [15] All hands need to be on deck to promote and educate mothers and caregivers on the best practices to imbibe so that together we can decrease the alarming neonatal mortality and morbidity in Nigeria.

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OCCUPATIONAL HEALTH SERVICES IN SMALL AND MEDIUM-SCALE MANUFACTURING INDUSTRIES IN ANAMBRA STATE, SOUTH EAST, NIGERIA

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Abstract

Background: *The provision of adequate health care facilities to cater for the health of workers is an important consideration in the management of small and medium scale manufacturing industries. The health status of the work force of an industry is an important determinant of their social and economic productivity to industrial and national growth.*

Objectives: *To assess the occupational health services available to the workers in small and medium- scale manufacturing industries in Anambra State.*

Methods: *This was a comparative descriptive cross-sectional study amongst registered medium and small-scale manufacturing industries in Anambra State. Data were collected using an interviewer administered semi-structured questionnaire and were analyzed using SPSS version 17.*

Results: *The medical staffs constituted 7.4% of workers in the medium scale industries and 2.1% in the small scale industries. The medical staff in both categories of industries constituted only 3.9% of the total work force. Most of the small and an average number of the medium scale industries used part time private healthcare practitioners. Two (25%) of the medium scale industries had their individual practice. None of the small or the medium scale industries were involved in group occupational health practice. The percentage of health care workers with industrial training and those that visit the factory floor was 2.2% and 22.9% of the total. All the medium scale industries did pre-employment and periodic medical examinations, while 63.1% of the small scale industries did pre-employment medical examinations and only 1.9% did periodic medical examination. The only health service facilities present in most of the small scale industries was first Aid box in 50.6% and were mostly empty.*

Key words: *Occupational health, services, small, medium-scale, manufacturing industries.*

Introduction:

According to the ILO occupational health service recommendation 1959 (no. 112), occupational health service (OHS) means a service established in or near a place of employment for the purpose of protecting the workers against any health hazard which may arise out of their work or the conditions in which it is carried on; contributing towards the workers physical and mental adjustment, in particular by the adaptation of the work to the worker and their assignment to jobs for which they are suited; and contributing to the establishment and maintenance of the highest possible degree of physical and mental well-being of the workers.[1]
Occupational Health Services can be organized by the industries or be attached to an outside body; it could be organized as a separate service within a single industry; or as a service common to a number of industries. In order to extend occupational health facilities to all workers, OHS could be set up for industrial, non-industrial and agricultural industries and for public services. Where the organization of OHS as defined by the recommendation is not for the time being practicable for geographical and other reasons defined by national laws or regulations, the industry could make arrangements with a physician or a local medical service for administering emergency treatment; carry out medical examinations prescribed by national laws and regulations; and exercising surveillance over hygiene conditions in the industry.[1]

The ILO convention 161 and recommendation 171 further developed the aims and basic functions of OHSs, re-defining it as "services that should be essentially preventive". There should be surveillance within the industries of factors which may affect the health of the workers and advice in this respect to management and to workers or their representatives in the industry; job analysis in the light of hygiene, physiological and psychological considerations; participation with the other appropriate departments in the undertaking in the prevention of accidents and occupational diseases and in supervision of personal protective equipments and its use; surveillance of the hygiene of sanitary installations and other facilities for the welfare of the workers such as kitchens, canteens, rest homes etc; to carry out pre-employment, periodic and special medical examinations; surveillance of the adaptation of jobs to workers in particular handicapped workers, in accordance with their physical abilities, participation in the rehabilitation and retraining of such workers; handling situation of job placement or reassignment of workers; emergency treatment, training and retraining of first-aid personnel; health education of personnel; compilation and periodic review of statistics concerning health conditions, research in occupational health or participation in such research in association with specialized services or institutions; OHS should begin and be maintained by appropriate records.[2]
OHS are placed under the direction of a physician who will be directly responsible for the management of the service. The physician is entitled to full professional and moral independence of both employer and workers. He must have had special training in occupational health or at least should be familiar with industrial hygiene, special emergency treatment and occupational pathology, as well as with the laws and regulations governing the various duties of the service. The nursing and other first-aid personnel must possess appropriate qualifications according to standards prescribed by the competent body.[2]

The organizational structure of OHS in any location depends on the geographical, political, climatic, health status, economic situation (wealth of industries), employment policy (size of labor force), and social conditions of the generality of the people. Equally important are the availability of medical and paramedical personnel. The definition of small and medium scale industries varies from country to country, region to region and from agencies to agencies in today's world.[3] But however, in developing countries like Nigeria, industries can be subdivided, based on labour size, into three categories: Small-scale, employing 50 or less workers; Medium-scale, employing between

51 and 1000 workers; and Large-scale, employing more than 1000 workers. This division however, is not meant to be a rigid measure.[4] Small and medium scale industries are generally regarded as the engine of economic growth and equitable development in developing economies.[5] They are labour intensive, capital saving and capable of helping create most of the billion new jobs the world will need by the end of the century. They are perceived as the key to Nigeria's economic growth, poverty alleviation and employment generation.

But their unimpressive performance in maintenance of existing employees and employment generation in recent years has generated a lot of research interest on their challenges and prospects. Most small and medium scale industries in Nigeria die within five years of existence as a result of insufficient capital, irregular power supply, infrastructural inadequacies, lack of focus and inadequate market research.[5]

The provision of adequate health care facilities to cater for the health of workers is an important consideration in the management of small and medium scale manufacturing industries. The health status of the work force of an industry or enterprise is an important determinant of their social and economic productivity to industrial and national growth. Enterprises with fewer than 50 employees may constitute as much as 87% of all enterprises in a country like Nigeria, and most of these are small companies with weak financial base or structure.[6]

Occupational health in developed countries has made a gradual progression from first aid to well establish health services through the treatment of work injuries and diseases with the curative, the preventive and the practical primary health care approach. In some countries, group practices have sometimes provided the much needed medicare in industries. In developing countries, not much progress has been made in this direction as there are few functional occupational health services in the work places and services provided tend to be that of general practice.[7,8]

The concept of occupational health service came to Nigeria, and indeed to all of West Africa largely through the British colonial industries. The first occupational health and Safety programmes in Nigeria derived from commercial and industrial enterprises were set up in Nigeria when the country was a British colony.[9] Nowadays, about 23% of cases seen in health facilities in Nigeria are for occupationally-related ailments.[10] Most small scale entrepreneurs in Nigeria cannot afford individual clinics nor an equipped first aid box,[3] and have little or no plans for the health of their workers due to many reasons such as poor financing, poor knowledge and attitude to occupational health services. This situation is worsened by lack of organized workers union in such industries that could demand or agitate for active occupational health services from employers.[6] Most workers subsequently settle for different options of healthcare financing, in most cases, out of pocket payments, or patronage of public hospitals with long waiting time and loss of man-hours which may be counter-productive for industrial growth.[7]

In Nigeria, especially in Anambra State, occupational health practitioners are few and are mostly engaged in multinational and large national establishments and medical schools. There are few independent consultant firms especially in Lagos and Port-Harcourt. They provide services to medium and large-scale industries. Workers in small-scale industries, particularly those in the informal sector have little or no access to occupational health services. For this category of workers which constitute about 60% of the total Nigerian work force, government hospitals, private general practitioners clinics, chemist shops and dispensaries are the main sources of health care for their general health problems.[11]

OHSs are often not provided to workers in small and medium size industries, and in the informal sector. There are significant gaps between the workplace needs and the available OHS. Due to

globalization, new occupational hazards are increasingly spreading to developing countries.[12] The WHO published *global plan of action on workers' health* in May 2007. It recommended several strategies such as, establishing national policies for occupational health and covering all workers with essential interventions and basic OHSs.[13]

An employee's good health condition at the workplace does not only helps him spend a healthy life, but helps the company make the most of profit through that particular employees work process done in the best manner. As the complete accumulated cost caused due to illness of employee, absenteeism, attrition deficiency and workplace hazards are all calculated, most business owners or even governments conclude that having better occupational health or safety precautions can be the solution to it. Most of the insurance service providers put pressure on such agencies to reduce liabilities on their part and pay-out amounts. As a result of it, many industrial organizations these days are employing experienced occupational health professionals. This process ensures permanent and quite a consistent service at hand to handle issues as soon as they arise.[14]

Further reasons for occupational health services include the need to ensure that people are fit to do the job for which they are employed to do by making sure pre-employment medical examinations are done and for employers to demonstrate that workplace health controls are adequate. For employers to also detect adverse health effects in their workers work environments and identify work-related disease when they arise.[14]

A study on occupational health services (OHS) in South Carolina manufacturing plants reported that eighty-three percent of the responding plants had some arrangements for medical and nursing care of employees. At least 60% of the plants had onsite healthcare personnel. The majority of the plants with a nurse onsite also indicated that they had some arrangement, formal or informal, for providing physician services. Overall, 495 plants (79%) reported that they had a designated physician or clinic. Of these, 14 (2.8%) had full-time physicians, while only 35 (7%) indicated that their part time physicians visited the plant regularly and 32 (6%) indicated that these physicians visited occasionally or irregularly. The study revealed that the size of the workforce in a plant partly dictated the level of OHS it offered.[15]

A study on occupational health services in a multinational company by the Occupational Medicine Section of the Department of Public Health and Primary Healthcare of the University of Bergen, Norway, using the OHS recommendation from the ILO as a standard, reported considerable differences in the activity profile of the OHS in the different locations of the company. The inter-enterprise, multinational OHS spent most of their time on surveillance of workers health in relation to work and on preventive activities in the work environment. Little time was spent on curative services for individual workers. OHS made up of individual physicians and nurses generally spent much of their time on treatment of occupational and non-occupational diseases. This study clarified the status of the OHS providers and the potential for improvements in order to meet the health needs of the company's workers in their different locations and also to comply more closely with the ILO recommendations for OHS.[16]

Cross-sectional studies in South Africa on the distribution and content of OHS in manufacturing Industries reported that offering of health services, defined minimally as at least a part-time nurse or doctor employed on the premises, was reported in 11% of work places and this is in contrast to the study in South Carolina[15] where as high as 60% of the manufacturing industries had onsite health personnel. In this study, OHS provision was positively related to workforce size,[17] as in the study in South Carolina.[15] while OHSs in Johannesburg and Randburg areas, reported a general deficiency in the quality of OHSs offered. Only 57 factories (18%) offered medical services on site, while pre-employment medical examinations were provided by 59 (19%) of the companies. It was observed that the larger factories provided OHSs more than the smaller ones.[18]

A study of Japanese OHS for small-medium-scale enterprises (SMEs) in comparison with the Finnish system revealed that Finland had a higher coverage of OHSs for SMEs than Japan, not only through legislation but also by using flexible OHS models. More so, in Finland, the content of the services is determined according to a risk assessment of each work place and emphasis is placed on prevention, whereas the Japanese health service is based on a general health examination as the major type of OHS.[19]

A study reviewing empirical studies on OHSs reported that there are many methods to evaluate OHSs. Most of the 52 studies reviewed, were descriptive rather than evaluative. According to the review, the methodological quality of most of the studies was not high. Occupational health consultations and occupational health rehabilitation were found to be poorly studied despite much time spent on consultation by occupational health physicians. The study revealed that there was lack of effectiveness and efficacy of pre-employment medical examination, periodic health monitoring or surveillance, and education on occupational health hazards.[20]
Studies in the United Kingdom (UK) on occupational health provision and health surveillance in manufacturing industries[21,22] reported a wide range of occupational health provisions, ranging from none, to use of an accredited specialist. Most companies used the services of external providers. Thirty nine percent contracted the services of qualified occupational health nurses and occupational health physicians. While 26% used contract occupational health nurses alone; general practitioners (GP) alone or contract nurses and GPs were also used. Where health surveillance was provided, it was poorly targeted with limited interpretation and feedback to management.[21] The ratio of occupational health physicians and occupational health nurses to workers in Europe varied between 1 per 500 and 1 per 5000 respectively.[22]

A cross-sectional study on OHSs in manufacturing industries in Edo and Delta State, Nigeria reported that the response rate was 91.1% and that the medical staff comprised 2.5% of the total work force, with the large scale industries contributing the highest proportion of these. About 4.5% of the medical staff had formal training in occupational health. The doctor: staff ratio in the medium and large scale industries were 1:819 and 1:618 respectively. It was found that all the industries use the government healthcare facilities, there were no clinics in all the small scale industries and group practice was not used by any of the industries studied. Pre-employment medical examination was carried out in each of the groups of industries; 100% in large scale, 39.4% in medium and 5% in small scale industries. Periodic medical examination during employment was 100%, 13.2% and 0% in large, medium and small scale industries respectively. The findings in the small and medium scale industries in this study, reflects that of the study reviewing empirical researches on OHS[20] where pre-employment medical examinations were ineffective. The above findings in this study, suggest that there is a reasonable standard of healthcare provision for large scale industries and somewhat less availability of OHS for medium and small scale industries.[7] This is similar to findings in a cross-sectional study in Oshogbo, Southwestern Nigeria on the knowledge and attitude of small scale entrepreneurs towards group occupational health services. The study reported poor occupational health service provision in small scale industries. Most of the small scale entrepreneurs sited poor financial base and ignorance of what to do as reasons for this poor services.[6]

A study on occupational health research priorities in Malaysia reported a participation rate of 71% for the first questionnaire and 76% for the second questionnaire. The participants identified occupational health problems for specific groups and industries as the top research priority areas. The priorities for occupational health determined with the Delphi approach showed differences between Malaysia, a developing country, and findings from similar European studies. This was

not unexpected, as differences exist in stages of economic development, types of industries, occupational activities, and cultural attitudes to occupational health and safety. Chemical poisonings and workplace accidents were accorded a high priority. By contrast with findings from western countries, workplace psychosocial problems and musculoskeletal injuries were deemed less important. OHS in these industries was focused more on curative rather than preventive services.[23]

A study on activities of occupational physicians for occupational health service in small scale enterprises in Japan and in the Netherlands reported that total service time per month was longer for occupational physicians in the Netherlands than occupational physicians in Japan. Japanese occupational physicians spent more hours for health and safety meetings, worksite rounds, and prevention of overwork-induced ill health (14–16% each). Dutch occupational physicians used much more hours for the guidance of absent workers (48%). Thus, service conditions were not the same for occupational physicians in the two countries. Nevertheless, both groups of occupational physicians unanimously considered that employers are the key persons for the improvement of OHS especially in SSEs and their education is important for better OHS.[24]

A study in Finland that combined the financial statements provided by Statistics and employers' reimbursement applications for occupational health services (OHS) costs to the Social Insurance Institution that covered the years 1997, 1999 and 2001 with over 6000 companies reported that preventive OHS had had a positive influence on the companies' economic performance after two or four years. Resources invested in preventive OHS were not positively related to a company's economic performance. In fact, the total cost of preventive OHS per turnover was negatively correlated to economic performance.[25]

Methods

The study was conducted in Anambra State, South-East Nigeria. The capital and seat of government is Awka while Onitsha and Nnewi are the largest commercial and industrial towns respectively. The major indigenous ethnic group in Anambra State is the Igbo (which comprise 98% of the population). Anambra state has a land area of 4,844km^2 and a population of 4,055,048 according to the 2006 census.[26,27] The study areas included major towns like Nnewi, Onitsha and Awka where there is high concentration of industries.

This was a comparative cross-sectional study amongst registered medium and small-scale manufacturing industries in Anambra State. There were one hundred and seventy nine (179) manufacturing industries registered with the Anambra State Ministry of Commerce and Industries. These industries were categorized according to labor size into large (employing more than 1000 workers), medium (employing between 51 and 1000 workers) and small scale industries (employing 50 or less number of workers). There was only one large scale manufacturing industry in Anambra State (and this large scale industry was excluded from this study); Eight (8) medium scale and one hundred and seventy (170) small-scale manufacturing industries registered in the state.[28] Although, the minimum calculated sample size was 31 industries in each category, a total population study of all registered small and medium scale manufacturing industries (the one hundred and seventy small scale and the eight medium scale industries) was considered more beneficial because there were only eight medium scale manufacturing industries registered with the Anambra State Ministry of Commerce and Industries.

The instrument used for data collection was a semi-structured questionnaire, that were interviewer administered to the company managers such as the personnel manager or the managing director or any other individual assigned to do so in the participating industries. Information got included the labor strength, medical services available to workers, environmental conditions, sanitary, social and welfare facilities and operational legislative measures. Data collected were analyzed using the computer software package SPSS version 17. A descriptive analysis of data was done using

the comparison of proportions between medium and small scale industries. T test statistics was done for the comparison of means. The level of statistical significance was set at 5%.

Ethical clearance for this study was obtained from the Research and Ethics Committee of the Nnamdi Azikiwe University Teaching Hospital, Nnewi. Permission to carry out the study was obtained from the Anambra State Ministry of Commerce and Industry. Participating industries were informed of the scope, demand and benefits of the study. They were also assured of confidentiality with the information they provided. To further ensure confidentiality, codes were used instead of names on the questionnaire. Written informed consent was obtained from each participating industry. Participating industries had the right to withdraw from the study at any time in the course of the study if they choose to do so. The study was conducted over a six (6) month period from 1st of March to 31st of August 2014.

Results

A total of 8 medium scale manufacturing industries, which represent 100% of the registered medium scale manufacturing industries and 160 small scale manufacturing industries, which represent 94% of the 170 registered small scale industries in Anambra State, were studied. Ten (10) out of the 170 small scale industries did not respond for various reasons such as company policies, fear of prosecution following what is considered "bad report" by researcher and outright aggression and refusal without reason. It was observed that occupational exposure to hazard, work practices and the health services provided in the non-respondent small scale industries were essentially the same as those that responded.

Table 1:
Categories of industries (small and medium scale) with the total staff complement and sex distribution.

	Categories of industries			
Sex	**Small scale n (%)**	**Medium scale n (%)**	**Total n (%)**	**Test/p-value**
Male	4090 (77.6)	2050 (75.0)	6140 (76.7)	$x^2 = 6.67$
Female	1182 (22.4)	683 (25.0)	1865 (23.3)	df = 1 p< 0.05
Total	5272 (100.0)	2733 (100.0)	8005 (100.0)	

A preponderance of male staff was found in the small scale (77.6%) and medium scale (75.0%) industries. The male/female ratio in the small scale industries was 3.5:1 and 3:1 in the medium scale industries. There was a statistically significant difference in the number of male staffs as compared to the number of female staffs in the studied industries p < 0.05).

Table 2:
Distribution of personnel in the different departments of the two categories of the studied industries.

	Categories of industries			
Distribution of personnel	**Small scale**	**Medium scale**	**Total**	**Test/ p-value**
Production staff n (%)	3957 (75.1)	1551 (56.8)	5508 (68.8)	x^2 =240.7
Maintenance staff n (%)	599 (11.4)	586 (21.4)	1185 (14.8)	df = 4
Administrative staff n (%)	401 (7.6)	277 (10.1)	678 (8.5)	P < 0.05
Medical staff n (%)	112 (2.1)	202 (7.4)	314 (3.9)	
Other staff n (%)	203 (3.9)	117 (4.3)	320 (4.0)	
Total n (%)	5272 (100.0)	2733 (100.0)	8005 (100.0)	

Most of the workers were in production unit/department. For the small scale 3957 (75.1%) were in the production units, while in the medium scale industries 1551 (56.8%) were in the production units. The administrative staffs constituted 7.6% in the small scale industries and 10.1% in the medium scale industries. The medical staffs constituted 7.4% in the medium scale industries and 2.1% in the small scale industries. The medical staff in both the small and medium scale industries constituted only 3.9% of the total work force. There was a statistically significant difference in the distribution of personnel in the different departments of the studied industries with the production department having the highest numbers of workers. ($p < 0.05$).

Table 3:
Types of health services in the two categories of the studied industries.

	Type of health service			
	Individual practice n (%)	**Group practice n (%)**	**Use of part time private practitioner n (%)**	**Use of Government/ Mission hospital n (%)**
Category of Industry				
Small scale (n = 160)	0 (0)	0 (0)	143 (89.4)	17 (10.6)
Medium scale (n = 8)	2 (25.0)	0 (0)	4 (50.0)	2 (25.0)
Total (n = 168)	2 (1.2)	0 (0)	147 (87.5)	19 (11.3)

Most of the small scale industries used part time private healthcare practitioners 143 (89.4%), while 17 (10.6%) used government or mission hospitals. Most of the medium scale industries 4 (50%), also use part time private healthcare practitioners, while 2 (25%) had their individual practice. None of the small or the medium scale industries were involved in group occupational health practice.

Table 4:
Health personnel in the two categories of the studied industries.

	Health personnel						
	Doctors n (%)	**Nurses n (%)**	**Hygienist n (%)**	**First Aiders n (%)**	**Lab. Tech. n (%)**	**Others n (%)**	**Total n (%)**
Category of industry							
Small scale	0 (0)	12 (10.7)	0 (0)	62 (55.4)	6 (5.4)	32 (28.6)	112 (100.0)
Medium scale	6 (3.0) (2*) (3**)	19 (9.4) (5*)(9**)	0 (0)	92 (45.5) (60**)	11(5.4)	74 (36.6)	202 (100.0)
Total	6 (1.9)	31 (9.9)	0 (0)	154 (49.0)	17 (5.4)	106 (33.8)	314 (100.0)
% of total work force	0.07	0.39	0	1.92	0.21	1.32	3.92

**Number with industrial training (2.2% of total)*
*** Number that visit the factory floor (22.9% of total)*

The table indicates that none of the small scale industries had any doctor in their employment, but the medium scale industries had a total of six doctors in their employment and this constitutes only 0.07% of the overall total workforce in both the small and medium scale industries. There were 12 (10.7% of total health workers in the small scale industries) nurses employed in the small scale industries and 19 (9.4% of total health workers in the medium scale industries), constituting a total of 0.39% of the total workforce in both the small and medium scale industries. None of the industries had in their employment any occupational hygienist. Health workers in the small scale industries constituted a total of 2.1% of workers in the small scale industries. Health workers in both the small and medium scale industries constituted a total of 3.92% of the entire work force. The percentage of health care workers with industrial training was 2.2% of total, while the percentage of the healthcare workers that visit the factory floor was 22.9%.

Table 5:
Type of medical examinations carried out in the two categories of the studied industries.

	Types of medical examinations			
Category of industries	**pre-employment n (%)**	**pre-placement n (%)**	**periodic n (%)**	**special n (%)**
Small scale (n = 160)	101 (63.1)	0 (0.0)	3 (1.9)	0 (0.0)
Medium scale (n = 8)	8 (100.0)	0 (0.0)	8 (100.0)	2 (25.0)

All the medium scale industries did pre-employment and periodic medical examinations, while 101 (63.1%) of the small scale industries did pre-employment medical examinations and only 3 (1.9%) did periodic medical examination. Two (25%) of the medium scale industries did special medical examination. None of the small scale industries did pre-placement or special medical examinations.

Table 6:
Drinking water supply conditions in the two categories of the studied industries.

	Category of industry	
Indicators	**Small scale (n =160) n (%)**	**Medium scale (n = 8) n (%)**
Presence of drinking water:		
Yes	160 (100.0)	8 (100.0)
No	0 (0.0)	0 (0.0)
Source of drinking water:		
Tap	160 (100.0)	8 (100.0)
Well	0 (0.0)	0 (0.0)
Stream/river	0 (0.0)	0 (0.0)
Rain	0 (0.0)	0 (0.0)
Adequacy of water supply:		
Always adequate	75 (46.9)	8 (100.0)
Sometimes adequate	85 (53.1)	0 (0.0)
No water supply	0 (0.0)	0 (0.0)

All the industries studied had drinking water supply and the source of this drinking water supply was tap water. The medium scale industries always had adequate water supply, while supply to the small scale industries were less adequate 85 (53.1 %).

Table 7:
Health service facilities present on site in the two categories of the studied industries.

	Category of industry	
Health service facility	**Small scale (n = 160) n (%)**	**Medium scale (n = 8) n (%)**
First Aid Box	81 (50.6)	8 (100.0)
Medical clinic	0 (0)	2 (25.0)
Paediatric clinic	0 (0)	0 (0)

Health service facility	Small scale (n = 160) n (%)	Medium scale (n = 8) n (%)
Surgical clinic	0 (0)	0 (0)
O & G clinic	0 (0)	0 (0)
Surgical theatre	0 (0)	0 (0)
X-ray	0 (0)	0 (0)
Medical laboratory	0 (0)	2(25.0)
Dispensary/pharmacy	0 (0)	6 (75.0)
Treatment room	0 (0)	6 (75.0)
Medical records	0 (0)	2 (25.0)
Other	0 (0)	0 (0)

The only health service facility present in most of the small scale industries was first aid box in 81 (50.6%). All the medium scale industries had first aid boxes, 6 (75%) had dispensary/pharmacy and treatment room, while 2 (25%) had medical clinic, medical laboratory and medical records unit. None had surgical theatre, X-ray, paediatric and O & G clinic.

Table 8:
Medical/Clinical cases seen in health facilities in the two categories of the studied industries in the last one year.

Medical/Clinical cases seen in healthcare facilities

Category of industry	Medical n (%)	Occupationally related n (%)	Surgical n (%)	Paediatric n (%)	O & G n (%)	Referrals n (%)	Total %
Small scale (n = 160)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Medium scale (n = 8)	456 (55.6)	55 (6.7%)	5 (0.6)	234 (28.5)	2 (0.2)	68 (8.3)	820 (100.0)
Total (n = 168)	456 (55.6)	55 (6.7%)	5 (0.6)	234 (28.5)	2 (0.2)	68 (8.3)	820 (100.0)

The two medium scale industries with individual clinics see more of medical cases 456 (55.6%), followed by paediatric cases 234 (28.5%). Eight point three percent (8.3%) of cases seen were referred. There was no information on number of medical/clinical cases seen in the small scale industries since none of the small scale industries had individual clinics or were involved in group occupational health practice.

Table 9:
Social welfare facilities present in the two categories of the studied industries.

Category of industries

Social welfare facility	Small scale (n = 160) n (%)	Medium scale (n = 8) n (%)
Staff transport scheme	0 (0.0)	3 (37.5)
Staff housing scheme	0 (0.0)	1(12.5)
Cloak room	73 (45.6)	8 (100.0)
Accident free annual bonus	36 (22.5)	6 (75.0)

Social welfare facility	Small scale (n = 160) n (%)	Medium scale (n = 8) n (%)
Canteen/dining room present	12 (7.5)	8 (100.0)
Meals provided by management	0 (0.0)	1 (12.5)
Staff children's school	0 (0. 0)	0 (0.0)
Pension scheme	41 (25.6)	7 (87.5)
Safety committee	38 (23.8)	8 (100.0)
Recreational/sports facilities	0 (0.0)	1 (12.5)
Practice/promotion of safety for promotion	46 (28.8)	6 (75.0)
Pre-resumption orientation	92 (57.5)	8 (100.0)

None of the small scale industries had a staff transport or housing scheme, recreational/sports facility or provide meals for their workers. However, 73 (45.6%) of the small scale industries had cloak room, 36 (22.5%) had accident free annual bonus, 38 (23.8%) had safety committee. Most 92 (57.5%) had pre-resumption orientation. Only 41 (25.6%) had pension scheme for their workers.

All the medium scale industries had safety committees, cloak rooms, canteens/dining rooms, and pre-resumption orientation for their workers. Only one medium scale industry had recreational sports facility and also provided meals for their workers. Most 7 (87.5%) had pension scheme for their workers.

Table 10:
Sanitary conveniences in the two categories of the studied industries.

	Sanitary conveniences			
Category of industries	No. of males Per Bathroom	No. of males per toilet	No. of females per bathroom	No. of females per toilet
Small scale	30	31	25	20
Medium scale	45	39	31	33

In the small scale industries, an average of 30 males and 25 females used one bathroom while an average of 31 males and 20 females used one toilet. In the medium scale industries, the numbers were higher with an average of 45 males and 31 females to one bathroom and 39 males and 33 females to one toilet facility.

Discussion

The responding medium scale industries constituted 100% of the medium scale industries registered with the Anambra State Ministry of Commerce and Industries, while the small scale industries constituted 94% of the total number of registered small scale manufacturing industries in the State. This is a slightly higher response rate as compared with the study in Edo and Delta State that reported an average response rate in the small, medium and large scale industries of 91.1%[7] and a far higher response rate as compared with a study in Jordan[29] that reported a response rate of 21.9% amongst the small scale industries and 58.6% amongst the medium scale industries. This can be explained by the fact that the Ministry of Commerce and Industry gave the researcher a letter of introduction to facilitate co-operation by factory owners and managers. In this study, the medium scale industries were quite receptive and willing to discuss the various issues raised in the study. However, the small scale industries were

less receptive. This may be due to the fact the small scale industries may have poorer health and social welfare services and other things that they may want to hide from investigators especially with respect to hazards in their workers work environments and fear of indictment by the law.

A preponderance of male staff was found in the small scale (77.6%) and medium scale (75.0%) industries with a male/female ratio in the small scale industries of 3.5:1 and 3:1 in the medium scale industries. There was a statistically significant difference in the number of male staffs as compared to the number of female staffs in the studied industries ($p < 0.05$). The male/female ratio also compared with the Edo and Delta State study that reported a male/female ratio of 3:1.[7] The male preponderance is in keeping with the prevailing gender labour force. Females were found to be mainly engaged in secretariat, cleaning and packaging jobs which are less strenuous in terms of physical strength. The males were found to be involved with the more strenuous and risky jobs in these industries. This is in tandem with a study in Australia[30] that reported that 78% of the men were involved in risky and hazardous jobs and also a study in Ethiopia[31] that reported that men were 2.5 times at higher risk of occupational injury as compared to women due to the kind of jobs they undertake.

Most of the workers were in production unit/department. For the small scale industries 75.1%, and the medium scale industries 56.8% were in the production units. This may be due to the fact that the study was on manufacturing industries that are mainly involved in production of products. As observed, the percentage of workers in the production units was higher in the small scale industries as compared with the medium scale industries. This may probably be due to the fact that processes become more automated as one move towards the larger scale industry types. The administrative staffs constituted 7.6% in the small scale industries and 10.1% in the medium scale industries. The medical staffs constituted 7.4% in the medium scale industries and 2.1% in the small scale industries, with an average from both the small and medium scale industries of 4.8% of medical staffs. The percentage of administrative and medical staffs is observed to be higher in the medium scale industries as compared to the small scale industries. This is higher as compared to the Edo and Delta State study[7] that reported that the medical staffs constituted 2.5% of the total staff of the manufacturing industries. This higher rate therefore, implies that there is better awareness now on the need for more medical staffs to be employed to meet the workers health needs as compared with the situation then when the Edo and Delta State study[7] was carried out.

Most small scale industries used part time private healthcare practitioners (89.4%), this may probably be due to the inability of the small scale industries to afford individual clinics. It may also be due to lack of awareness among the managers of these small scale industries of the feasibility of the establishment of group occupational health practice amongst them. Most of the medium scale industries (50%) also use part time private healthcare practitioners, while 25% have their individual practice. The reason for the high patronage of private healthcare practitioners may due to poor financial base of these industries and the need to seek for quick and cheaper avenues of health care for their workers. This is in contrast to the study in Edo and Delta State[7] where most of manufacturing industries used government hospitals. In this study, none of the small scale industries had their own individual practice. This may be due to poor financial standings of these industries and also lack of management awareness of the need for individual practice as reported by the study in Osogbo[6] South West, Nigeria. None of the small or the medium scale industries were involved in group occupational health practice. This is in tandem with the study in Edo and Delta State[7] and that of Osogbo.[6] First aid box was present in 50.6% of the small scale industries and in all of the medium scale industries. However, it is interesting to note that in most of the small and medium scale industries, the contents of the boxes were scanty and in some cases completely empty

and with no trained first aid attendant to administer them.

None of the small scale industries had any doctor in their employment. This may be due to the fact that none of the small scale industries had their individual clinics, and also the inability of these small scale industries to afford the payments of doctors or maybe due to their management's ignorance of the need for such level of healthcare professionals. The medium scale industries had a total of six doctors in their employment and this constitutes only 0.07% of the overall total workforce in both the small and medium scale industries. Only two of the medium scale industries had their own individual clinic. There were 12 nurses employed in the small scale industries and 19 in the medium scale industries, constituting a total of 0.39% of the total workforce in both the small and medium scale industries. None of the industries had in their employment any occupational hygienist. The first aiders in both group of industries constituted only 1.92% of the total workforce. Health workers in the small scale industries constituted a total of 2.0% of workers in the small scale industries and 1.39% of the entire workers in both the small and medium scale industries. While, health workers in the medium scale industries, constituted 6.62% of workers in the medium scale industries and 2.52% of the entire workers in both the small and medium scale industries. This shows that the medium scale industries employs more health care workers as compared to the small scale industries and therefore provide more health care services to their workers. Health workers in both the small and medium scale industries constituted a total of 3.92% of the entire work force. This is a higher rate as compared to the study in Edo and Delta State[7] that reported that health care workers constituted 2.5% of the entire workforce. Only 2 of the 6 doctors (2.2% of the total healthcare workers) in the medium scale industries had occupational health training. Only 22.9% of the healthcare workers visit the factory floor regularly. This is a higher rate of visits by doctors as compared to the study in South Carolina[15] that reported that 7% of the physicians visited the factory floor regularly. That showed that much of the medical practice by these practitioners were clinic based curative services and less of preventive services. This is in tandem with the study on evaluative research on OHS[16] and the study in UK[21] where preventive services were poorly targeted and more of curative services were rendered to workers, and contrary to the study in Bergen, Norway[16] and Japan and Finland[19] where the multinational companies OHS was more of surveillance and preventive services. The use of part time private practitioners, who were paid based on the number of the workers and their dependants who were treated was seen in 89.4% of the small scale industries and 50.0% of the medium scale industries. This is a higher rate of use of private part time practitioners as compared with the study in UK[21] where 26.0% used contract nurses or general practitioners. These findings are in consonance with the findings from the key informant interview where most of the union leaders from both the small and medium scale industries reported that their industries used mostly private hospitals to cater for their curative health needs and also for pre-employment medical tests and examinations.

Twenty five percent (25%) of the medium scale industries had medical clinic, medical laboratory and medical records; while 75% had dispensary pharmacy and treatment rooms; none had a surgical theatre, X-ray, paediatric and O & G clinic. In the small scale industries, there were hardly any medical records, in the medium scale industries, medical records were poorly kept and it was not possible to assess the activities carried out in the clinics. The medical staff were also not willing to allow access to these records. However, analysis of the few available records showed that the medical cases constituted 55.6% with the occupationally related cases and injuries accounting for only 6.7%. The reasons for the above may probably be due to the presentation of occupationally related cases and injuries as medical.

All the medium scale industries did pre-employment and periodic medical examinations;

this is in consonance with the findings from the key informant interview, where union leaders of the medium scale industries all agreed that pre-employment medical examinations were being done for all their newly employed workers and it is also in compliance with the ILO recommendations on OHS. While 63.1% of the small scale industries did pre-employment medical examinations and only 1.9% does periodic medical examination. This is a far higher rate as compared to the study in Edo and Delta State[7] where pre-employment medical examination was been done in 39.4% of medium scale industries and 5% in the small scale industries. It is also higher than that of the study in Johannesburg and Ranburg, South Africa[18] where 19% of the industries did pre-employment medical examinations. It is also higher in a study in Sheffield, UK[32] (28%) and the study on evaluative research on OHS[20] that reported poor pre-employment medical examinations amongst manufacturing industries. Twenty five percent of the medium scale industries did special medical examination. None of the small scale industries did pre-placement or special medical examinations. The reasons for this may be due to ignorance of the need for pre-placement and special medical examinations or may also be due to financial constraints amongst the small scale industries. This is totally not in consonance with the ILO recommendations for OHS that requires that pre-employment, periodic and special medical examinations be carried out for all workers at the time of employment to ascertain fitness for their jobs; during employment to ascertain fitness on their jobs and at retirement to ensure that no damage has been done due to their possible exposure to occupational hazards over their working years.[1,2]

The general standards of social welfare facilities were very low in the small scale industries. None of the small scale industries had a staff transport or housing scheme, recreational/sports facility or provided meals for their workers. This is not surprising since the economic down turn has imposed a lot of financial constraints on most businesses in Nigeria. In the small scale industries, 45.6% had cloak room, 22.5% had accident free annual bonus, and 23.8% had safety committees. Most (57.5%) had pre-resumption orientation. Only 25.6% had pension scheme for their workers. This may be due to the fact that most small scale industries in Nigeria are owned by single individuals with the selfish drive to make profit at all cost not caring about the comfort and safety situations of their workers. All the medium scale industries had safety committees, cloak rooms, canteens/dining rooms, and pre-resumption orientation for their workers. This may be attributed to the fact that the medium scale industries are more organized, with larger numbers of workers, more educated and informed managers and may also have a more organized trade union that can make effective demands from their managers. Only one medium scale industry had recreational sports facility and also provided meals for their workers. Most (87.5%) had pension scheme for their workers. All the industries studied had tap water supply for drinking. The medium scale industries always had adequate water supply, while supply to the small scale industries were less adequate (53.1 %). This is not surprising considering the fact that the medium scale industries have more workers, better organized as compared to the small scale industries, and some of the medium scale industries are subsidiaries of multinational companies, while most of the small scale industries are owned by single individuals and are struggling to survive in the harsh Nigerian economy. Also important here is the issue of the small scale industries' manager's awareness and education on the need to provide potable water for their workers.

CONCLUSION

The study revealed that health workers constituted the lowest percentage of the work force in these industries. Only 22.9% of the healthcare workers visited the factory floor regularly. Pre-employment medical examinations were rarely done especially in the small scale industries, and also, periodic medical examinations were hardly done, while special medical examinations were not

done at all in these small scale industries. The only onsite health services in the small scale industries were the presence of first aid boxes that were mostly empty. The general standard of social welfare services was low in both the small and medium scale industries. Most of the industries used private health care practitioners and services rendered were mostly curative in nature and hardly preventive. In all, the medium scale industries provided better occupational health and welfare services to its workers as compared to the small scale industries and it's still generally below the minimum recommended standard by the ILO.

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