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ORAL PRESENTATIONS

Sirtuin 1 gene rs2273773 C>T single nucleotide polymorphism and protein oxidation markers in asthmatic patients

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Introduction. Sirtuin-1 (SIRT-1) is a protein that has been found to protect the cells against oxidative stress due to its deacetylase activity.

Objective. In this investigation, we aimed to study SIRT-1 gene rs2273773 C>T single nucleotide polymorphism (SNP) and markers of serum protein oxidation (protein carbonyl and sulfhydryl groups) in asthmatic patients.

Methods. A total of 120 asthmatic patients and 120 healthy controls were genotyped for SIRT-1 gene rs2273773 C>T SNP using the polymerase chain reaction-confronting two-pair primer method (PCR-CTPP). Serum protein carbonyl and sulfhydryl groups were measured using colorimetric methods.

Results. SIRT-1 gene rs2273773 C>T SNP genotyping revealed that the TT genotype was significantly higher in the patients compared with the controls ($p=0.05$). The T allele was significantly higher in the patients compared with the controls ($p=0.017$). The distribution of the genotypes did not differ among the atopic and the non-atopic asthmatic patients, also no difference was found in the genotype distribution according to the severity of asthma ($p>0.05$). Serum protein carbonyl group concentration was significantly higher in the patients compared with the controls ($p=0.001$), while serum protein sulfhydryl group content decreased significantly in the patients compared with the controls ($p<0.0001$). No differences in markers of protein oxidation according to SIRT-1 gene rs2273773 C>T genotype were found.

Conclusion. In the Egyptian population, SIRT-1 gene rs2273773 C>T SNP was associated with asthma, but not with protein oxidation markers.

Prevalence and associated factors of chronic obstructive pulmonary disease among people living with HIV/AIDS in the rural communities of Nakaseke, Uganda

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Introduction. Chronic obstructive pulmonary disease (COPD) is highly prevalent in Africa, yet its prevalence and associated factors remain almost unknown, especially among people living with HIV/AIDS (PLWHA). In Uganda, there is a paucity of evidence about COPD among PLWHA, which negatively impacts efforts to develop integrated non-communicable diseases (NCD) care programmes among PLWHA. Much remains to be learnt about its risk factors and the mechanisms involved in its pathogenesis. Our aim was to determine the prevalence and risk factors among PLWHA.

Methods. We conducted a cross-sectional study and screened 1 000 PLWHA (≥ 35 years old) attending the antiretroviral treatment clinic at Nakaseke Hospital for COPD using the modified BOLD questionnaire and spirometry. Spirometry was performed on the participants before and after bronchodilator therapy (400 μ g of salbutamol using a spacer) following standardised guidelines. COPD was defined as the ratio of post-bronchodilator forced expiratory volume in 1 minute (FEV_1) to forced vital capacity (FVC) less than the lower limit of normal.

Results. Of the 719 participants, 58.9% ($n=424$) were female, 60.2% ($n=433$) were older than 44 years and 89.2% ($n=641$) were on ART. A total of 88.5% ($n=625$) reported exposure to biomass fuel (wood) and 84.5% ($n=599$) reported no history of smoking cigarettes. The prevalence of COPD among PLWHA was 7.2% and COPD was significantly associated with being male (odds ratio (OR) 2.5), smoking cigarettes (OR 3.2), and history of TB disease. There is also a strong association between COPD and duration of ART treatment, CD4 cell count, using biomass as fuel (wood) and age.

Conclusion. COPD is prevalent among PLWHA. Given its chronicity and impact on the quality of life of a patient, it has the potential to reverse the achievements of the global community in the fight against HIV/AIDS. It is thus imperative to extensively study the prevalence of COPD in this population, as well as its associated factors, to inform policy formulation and design of interventions intended to address the ongoing double burden of comorbidity with NCDs and HIV/AIDS.

Release of interleukin-26 from alveolar type II cells in response to bacterial extracellular vesicles from *Haemophilus influenzae* and *Pseudomonas aeruginosa*

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Introduction. To date, known cellular sources of the presumed Th17- cytokine interleukin (IL)-26 include T-lymphocytes, bronchial epithelial cells and alveolar macrophages in human airways. This IL-10-related cytokine is involved in the innate immune response to bacterial endotoxins in healthy human airways. However, alveolar type II cells, which also play a role in the innate immune responses to bacteria, have not been investigated in terms of IL-26 release. Moreover, *Haemophilus influenzae* and *Pseudomonas aeruginosa* are two common causes of pneumonia that may outmanoeuvre innate immune responses while invading human airways, in part through the actions of extracellular vesicles (EV). The IL-26-stimulating properties of EV from these pathogens have not previously been investigated. We hypothesised that alveolar type II epithelial cells release IL-26 protein in response to EV from *H. influenzae* and *P. aeruginosa*.

Methods. The EV from *H. influenzae* and *P. aeruginosa* were isolated and separated after overnight culture of the bacteria. A model of alveolar type II epithelial cells (A549 cell line) was utilised. Cells were cultured and stimulated in triplicates with different concentrations (0.1 and 1µg/mL) of the respective EV during several incubation times (1, 3, 6 and 24 h). IL-26 protein concentrations were thereafter measured in the cell-free conditioned media using an enzyme-linked immunosorbent assay (ELISA)

Results. We found that A549 cells released substantial amounts of IL-26 protein in response to the EV from *H. influenzae* ($p=0.03$; $n=6$), as well as from *P. aeruginosa* ($p=0.03$; $n=6$). Notably, we found a concentration-dependent ($n=3$) as well as time-dependent ($n=6$) increase in IL-26 concentrations.

Conclusion. Our results suggest that human alveolar type II cells produced IL-26 in response to EV from *H. influenzae* and *P. aeruginosa* *in vitro*. Thus, given the documented involvement of IL-26 in bacterial responses in human airways, and our current finding suggests that IL-26 is involved in the innate immune responses during bacterial infections. This data also argues for the further exploration of the mechanisms through which alveolar type II cells and IL-26 are involved in the pathogenesis of pneumonia as well as other bacterial infections in the airways.

Treatment outcome of tuberculosis at a specialist hospital in North-Western Nigeria

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Introduction. Tuberculosis (TB) is a chronic infectious disease that is preventable, treatable and curable, yet it is a major cause of morbidity and mortality. The prevalence and mortality of TB are under-estimated

in many high burden countries, including Nigeria. In order to decrease transmission of the disease, effective identification, diagnosis and treatment of infectious TB patients is required. A proven strategy to ensure patients' adherence to anti-tuberculosis medication is the use of Directly Observed Treatment Short course (DOTS) therapy. DOTS lead to improved treatment outcome with overall reduction in morbidity and the development of multidrug-resistant TB.

Objective. We aimed to determine the form of TB and treatment outcome of patients managed at our DOTS clinic.

Methods. A retrospective study of patients managed for tuberculosis at the DOTS clinic of Ahmad Sani Yariman Bakura Specialist Hospital, Gusau, Zamfara State, Nigeria over a 30 month period (Jan 2015 to June 2017). All patients that were treated for TB over the study period were included in the study. Relevant information from the register was reviewed. Tuberculosis treatment outcomes were assessed according to World Health Organisation (WHO) and National TB and Leprosy Control Programme guidelines. 'Cured' and 'treatment completed' outcomes were referred to as successful treatment.

Results. Of the 415 patients, 18.3% ($n=76$) were children, 81.7% ($n=339$) were adults and 61.2% ($n=254$) were male; the male:female ratio was 1.6:1. Most of the patients (83.9%; $n=348$) had pulmonary TB, while 16.1% ($n=67$) had extra-pulmonary TB. More males had pulmonary TB than females, which was not significant ($\chi^2=0.678$; $p=0.410$). There were more male adults than females or children which was significant ($\chi^2=18.504$; $p=0.000$). The majority (97.6%) of the patients were new cases, 4 (1.0%) relapsed, while 3 (0.7%) were TB patients with unknown previous TB treatment history. Completed treatment was observed in 44.2% ($n=184$), 38.8% ($n=161$) were cured, 8.4% ($n=35$) were transferred out, and 7.0% ($n=29$) died; 2 (0.5%) were removed from the register and 2 (0.5%) were lost to follow-up. The treatment success rate was 83.0%.

Conclusion. Treatment outcome of patients treated for TB in our centre was good, with a success rate close to the WHO benchmark of 85%. However, it shows that childhood TB is still under diagnosed and under treated as the number of paediatric cases were low.

Longitudinal changes in lung function in HIV- infected adolescents on antiretroviral therapy in Cape Town, South Africa

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Introduction. Over 90% of HIV-infected children live in sub-Saharan Africa. Despite increased access to antiretroviral therapy, respiratory illness remains common in HIV-infected youth. There is limited information on progression of lung function in HIV-infected adolescents on antiretroviral therapy.

Objective. The aim of this study was to investigate progression of lung function over 2 years in HIV-infected adolescents on antiretroviral therapy in a prospective cohort, the Cape Town Adolescent Anti-retroviral cohort (CTAAC).

Methods. HIV-infected adolescents aged 9 - 14 years, with at least 6 months of antiretroviral therapy, enrolled on CTAAC, underwent lung function testing. Spirometry and bronchodilator testing was done at enrolment and annually for two years. Healthy HIV-uninfected, age, sex and ethnically matched controls were also tested. Linear mixed-models were used to compute longitudinal changes in lung function outcomes.

Results. A total of 428 HIV-infected and 90 HIV-uninfected adolescents were tested at baseline and at 24 months. The mean (standard deviation) age was 12.0 (1.6) years and 50.4% were male. Median (interquartile range (IQR)) viral load and CD4 cell count at baseline were 2.2 (IQR 1.6 - 3.3) log copies and 731 (IQR 580 - 959) cells/ μ L, respectively. HIV-infected adolescents had lower lung function compared to the uninfected at all time points, $p < 0.05$. FEV₁ and FVC Z-scores showed similar change over two years in both groups. Obstructive and mixed spirometry patterns were more common in HIV-infected adolescents compared to the uninfected, $p < 0.05$ for both time points. Previous pulmonary tuberculosis and previous lower respiratory tract infections were significantly associated with lung function ($p < 0.05$ for both).

Conclusion. HIV-infected adolescents had significantly lower lung function and more obstructive and mixed spirometry patterns than HIV-uninfected at all time points. Lung function tracked similarly over 2 years between groups, suggesting no catch-up growth or lung function deterioration over time. This study informs the importance of lung function surveillance in HIV-infected adolescents.

Exhaled nitric oxide in the first two years of life in African infants: Impact of maternal smoking and indoor air pollution

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Introduction. Environmental pollution and maternal smoking may increase risk of infant respiratory disease. Exhaled nitric oxide (eNO), a marker of airway inflammation, is increased in respiratory disease. The impact of indoor air pollution on eNO in early life is poorly understood.

Objective. To assess changes in eNO in the first two years of life in African infants and the impact of tobacco smoke exposure and environmental pollutants on eNO at birth and two years.

Methods. Infants enrolled in the Drakenstein Child Health Study underwent lung function testing at 6 weeks and again at 23 - 25 months. Lung function testing, completed during unsedated quiet sleep, included eNO and tidal breathing (tb_{fv}) measures. Antenatal smoke exposure was confirmed on maternal urine cotinine. Postnatal smoke exposure was self-reported by questionnaire. Benzene, particulate matter (PM₁₀) and nitric dioxide (NO₂), were measured during antenatal home visits over a two-week period. The association between exposure and lung function outcomes was investigated using multiple linear regression, with statistical significance set at $p = 0.05$.

Results. At 6 weeks and at 2 years, 839 and 640 infants, respectively,

had eNO levels measured. Exhaled NO₂ increased from an average (standard deviation (SD)) of 10.4 (7.6) ppb at 6 weeks to 17.5 (12.6) ppb at 2 years. At 6 weeks, infants of mothers who smoked during pregnancy, had lower eNO (10.2 (6.7) v. 11.5 (7.9) ppb; $p = 0.016$) and NO₂ output (32.2 (22.1) v. 38.6 (25.4) nL \cdot sec⁻¹; $p = 0.001$); and lower tidal volumes (33.2 (6.1) mL v. 35.5 (6.5) mL; $p = 0.001$) compared with unexposed infants. After adjusting for size, sex and race, males and HIV-exposed infants had higher tidal volumes, average 2.1 mL (95% CI 1.0 - 3.1; $p = 0.000$) and 1.7 mL higher (95% CI 0.2 - 3.2; $p = 0.024$), respectively. Household smoke exposure was not associated with lung function. Adjusted Results showed that high benzene levels were associated with reduced eNO (average 1.47 ppb lower; CI 2.77 - 0.17; $p = 0.027$) and NO output (average 5.5 nL/sec lower; 95% CI 9.6 - 1.3; $p = 0.009$) at 6 weeks but not at 2 years. Other air pollutants were not associated with eNO levels at 6 weeks or 2 years of age.

Conclusion. Maternal smoking during pregnancy and high benzene levels were associated with lower eNO and NO output at birth in African infants. The effects did not persist to 2 years. Further investigation on the impact of eNO levels on disease risk in early life is needed.

Exposure to indoor air pollutants and childhood pulmonary tuberculosis

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Introduction. There is increasing evidence in studies that have used proxy measures of exposure that indoor air pollution increases the risk for tuberculosis.

Objective. To determine the association between exposure to indoor air pollution (IAP) in the homes and childhood pulmonary tuberculosis (PTB).

Methods. In this age- and sex-matched case-control study, cases were children diagnosed with PTB and controls were children without PTB. Questionnaires about children's health; and house characteristics and activities (including household air pollution) and secondhand smoke (SHS) were administered to all the caregivers of the participants. A subset of the participants' homes was sampled for measurements of PM₁₀ over a 24-hour period ($n = 105$), and NO₂ and SO₂ over a period of 2 to 3 weeks ($n = 82$). IAP concentrations of PM₁₀ and NO₂ were estimated in unsampled homes using predictive models. Logistic regression was used to look for association between IAP concentrations, crude measures of IAP and PTB.

Results. Of the 134 participants, 107 were cases and 127 were controls. Pollutants concentrations (μ g/m³) for were PM₁₀ GM.50.50 (47.50 - 53.70) and NO₂ GM.15.74 (14.99 - 16.53) and SO₂ GM.0.2 (95% CI 0.2 - 0.3). Day-to-day variability was large. All multivariate models were adjusted for age, sex, socioeconomic status, TB contact and HIV status. No significant association was observed between pollutant concentrations and PTB in children for PM₁₀ and NO₂. When using

the crude exposure measure of pollution, i.e. fuel type (clean or dirty fuel) and SHS, the association was positive but not significant. The presence of dampness in the household was a surprising significant risk factor for childhood TB with aOR ranging from 2.10 - 2.17 for different models. The crude predictors are less influenced by day-to-day variability.

Conclusion. Our study suggests a risk of childhood tuberculosis disease when children are exposed to SHS and dirty cooking fuel but this is not supported by objective measurement of air pollution in the homes. HIV status and TB contact are important factors of childhood PTB in this population.

Impact of a primary care-led asthma clinic model on asthma control in a resource-limited setting

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Introduction. Recent advances in healthcare have dedicated efforts to reduce unnecessary healthcare spending while improving the quality of patient care and outcomes. Despite asthma being a very common disease with immense social impact, data on strategies for its control is very limited especially in resource limited settings.

Objective. We assessed asthma control and its evolution over time among asthmatics treated using a primary care-led asthma clinic model which included evidence-based asthma diagnosis and step-wise management.

Methods. Asthma patients aged ≥ 5 years presenting at Mulago Hospital between August 2013 and April 2017 were enrolled and followed up every 6 months for 2 years. A separate clinic manned by a medical officer, a nurse and a counsellor was set up within the pulmonary unit. These individuals were trained in evidence-based asthma diagnosis and step-wise asthma management. At each visit, clinical assessments, including history, physical exam, asthma control test (a short tool to assess symptoms, use of rescue medications, and activity), and spirometry were performed. In addition to recording clinical assessment, providers recorded modification of treatment as 'stepped down', 'no change', or 'stepped up' and classified patients as 'controlled', 'partially controlled', or 'uncontrolled' based on the Asthma Control Test.

Results. A total of 449 patients, with a mean age of 32 years were enrolled; 33.2% ($n=149$) were classified as controlled, 38.8% ($n=176$) were partly controlled, and 28.1% ($n=124$) were uncontrolled. At six months of follow-up, 69% ($n=306$) patients were seen, and 64.7% ($n=198$) were classified as controlled. The prevalence ratio (PR) compared with the baseline was 1.9 (95% confidence interval (CI) 1.6 - 2.2; $p=0.001$). At 12 months of follow-up, 303 (67%) patients were seen; 230 (75.9%) were classified as controlled (PR 2.9 95% CI 1.9 - 2.6; $p=0.001$).

Conclusion. A primary care-led asthma clinic model more than doubled the proportion of controlled asthma patients. Capacity development through medical education and training of primary health care providers on evidence-based diagnosis and management of asthma significantly resulted in the control of asthma among patients. These results suggest that the primary care provider-led

model on asthma control could be used to improve asthma outcomes in low resource settings.

A case series of minimally invasive lobectomy for inflammatory lung disease

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Introduction. Minimally invasive lung resection is the standard of care for the management of surgically resectable malignant lung disease. However, its role in inflammatory lung disease with significant adhesions is still debatable.

Objective. We present a case series of the use of multiport video-assisted thorascopic surgery (VATS) lung resection for patients presenting with various inflammatory lung pathologies, including recurrent haemoptysis due to mycetoma, destroyed lobe due to tuberculosis and infected bronchogenic cyst.

Methods. Surgical approach. Double lumen intubation and right lung isolation, left lateral decubitus position, anterior approach via 3 ports, including the camera port the right upper lobe is approached through the pleural space. However, initial finger extra-pleural dissection for port placement may be required if thick adhesions are encountered at commencement. Subsequently, the upper lobe is freed by extra-pleural dissection. Once the entire upper lobe is freed, the hilar structures are approached with arterial then venous and lobar bronchial division. The order is altered depending on the anatomical difficulty in isolation or divided and stapled in combination depending on the difficulty in separation. Suturing or stapling is used depending on the safety of passing the stapling device around the structures without avulsion. Vascular rubber tapes are used for traction and control. The lung is completely freed from the diaphragm to allow for adequate re-expansion.

Results. 1. 40-year-old female with right upper lobe mycetoma and recurrent massive haemoptysis 2. 20 year old female with right upper lobe mycetoma and recurrent minor haemoptysis 3. 54-year-old male with a destroyed right upper lobe due to recurrent tuberculosis. 4. 30-year-old male with a right-upper-lobe infected bronchogenic cyst.

Conclusion. The application of minimally invasive lobectomy for inflammatory lung disease requires a number of strategies to minimise blood loss and ease dissection. The use of a combination of extrapleural dissection, maintaining a lower limit of mean arterial blood pressure, diathermy, ligasure and blunt swab on stick dissection makes it a technically feasible approach.

Knowledge, attitude and practice of primary care physicians in Kenya, Nigeria and South Africa regarding obstructive sleep apnoea in children

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Introduction. Obstructive sleep apnoea (OSA) significantly impacts the morbidity of children globally, resulting in decreased quality of life and increased healthcare utilisation costs. Primary care physicians (PCPs) should be familiar and confident in their abilities to diagnose and manage OSA in children, for an effective impact on public health.

Objective. Our study aims to describe the knowledge, attitude and practice of PCPs in Kenya, Nigeria and South Africa (SA) regarding OSA in children.

Methods. Between April 2016 and July 2017, we conducted a multicentre cross-sectional survey in Cape Town (SA), Edo State (Nigeria) and Nairobi (Kenya). A minimum of 40 participants were randomly selected from a register of PCPs at each site. Following ethical approval, potential participants were contacted telephonically to obtain permission to email them the link to the online/paper-based validated OSA Knowledge and Attitudes in Children (OSAKA-KIDS) questionnaire. PCPs were excluded from the study if they had retired from medical practice, were not currently practicing in the study site regions, or declined to provide informed consent.

Results. The median OSAKA-KIDS knowledge score among 184 participants was 67% (interquartile range (IQR) 56 - 72) -58% (IQR 44 - 67) among 80 Nigerian physicians, 61% (IQR 50 - 72) among 41 South African physicians and 67% (IQR 56 - 72) among 63 Kenyan physicians. Importance of paediatric OSA and confidence in diagnosis and management were rated by PCPs as 4.5 (IQR 4 - 5) and 2.3 (IQR 1.8 - 3.0), respectively, on a 5 point Likert scale. The overall median OSAKA-KIDS attitude score comprising both importance and confidence parameters among PCPs was 3.2 (IQR 2.8 - 3.8). 161 (88%) PCPs referred children with suspected OSA to a sub-specialist, mainly otolaryngologists (87%). A residency training (46 of 184 participants) was associated with OSAKA-KIDS confidence scores independent of respondent age, sex, country and time since graduation (OR 2.39; 95% CI 1.14 - 5.00; $p=0.02$).

Conclusion. PCPs in Cape Town, Edo State and Nairobi have good knowledge and attitude regarding OSA in children; however their perceived confidence in the diagnosis and management is low. Increased emphasis on paediatric OSA management during undergraduate medical training, and through continuing professional development programmes, may be beneficial.

Complete CFTR gene mutation analysis in non-white patients with cystic fibrosis

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Introduction. There is currently a lack of data on cystic fibrosis (CF)-causing mutations in non-white African populations.

Objective. To identify mutations and characterise phenotypic presentations of non-white patients diagnosed with CF in whom a disease-causing mutation was not found on both CFTR (cystic fibrosis transmembrane conductance regulator) genes using the Elucigene 30-mutation panel screen.

Methods. The complete CFTR gene, including introns and flanking intergenic regions (including the promoter region), was sequenced with a highly parallel sequencing assay on blood extracted DNA from 5 non-white patients from KwaZulu-Natal, South Africa.

Results. DNA samples of 5 patients with a mean age of 121 months (range 68 - 181) were sequenced. Four were black African and 1 was of Black/Mauritian/Asian (mixed) ancestry. Four CF-causing mutations, including one novel mutation, were identified in 2 patients. S1255P/R709X (black African female) and L218X/c.2788G>5 (novel mutation; mixed ancestry male). The 3 remaining patients were found to have variants of unknown significance (VUS). Age at clinical diagnosis was lower in the subjects with CF-causing mutations compared with those with VUS: 54 months (range 48 - 60) v. 128 months (range 84 - 156; $p=0.08$), respectively. The subjects with CF-causing mutations had better nutritional status and higher mean sweat test concentrations than those with VUS: weight-for-age Z-scores were -1.71 (range 1.49 - 1.93) and -4.8 (range -4.2 - 5.8; $p=0.05$), respectively, and the mean sweat test concentrations were 127 mmol/L (range 104 - 151) and 75 mmol/L (range 65 - 83; $p=0.07$), respectively. All the subjects had severe lung disease with a mean FEV₁% of 41 (range 16 - 56). Commonly cultured organisms from sputum, were *Staphylococcus aureus* and *Haemophilus influenzae*.

Conclusion. A gene sequencing approach can inform phenotypically supported CF molecular data assisting in compilation of an African population specific registry and mutational panel.

Infant lung function and exposure to oxides of nitrogen in a South African birth cohort

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Introduction. The relationship between air pollution exposure and infant lung function is poorly understood. Exposure to oxides of nitrogen NO_x has been considered as an important determinant of lung growth both *in utero* and in childhood.

Objective. The aim of this study was to determine the relationship between antenatal and early postnatal exposure to NO_x and infant lung function (ILF).

Methods. Newborns of mothers in the 'Mother and Child in the Environment' birth cohort, had ILF tests performed at 6 weeks, 6 months, 12 months and 24 months of age. Women in their first trimester of pregnancy were selected from public sector antenatal clinics in both the industrialised south and less-polluted north, in

Durban, South Africa, and were followed to delivery. NO_x exposure was determined by land use regression (LUR) for the individual regional areas. ILF was conducted in unsexed sleeping infants, according to the ERS standards of ILF testing, with an ultrasonic flowmeter and 5% SF₆ tracer gas. Multiple breath washout techniques were used to measure functional residual capacity (FRC) and lung clearance index (LCI).

Results. The mean predicted antenatal exposures for NO_x, determined by LUR, was 35.3 µg/m³ (range 17.74 - 40.86). One-hundred-and-eight infants were tested (68% ($n=74$) valid ILF tests), with a mean gestational age of 38.95 weeks and mean birth weight of 3.2 kg. A mean FRC of 178.45 mL (range 57.65 - 435.93 mL) and LCI of 7.28 (range 5.71 - 9.73) was obtained. Tidal breathing and LCI were not associated with exposure. FRC showed a 2-unit (95% CI -4.10 - -0.04) decline with each unit increase in NO_x, after adjusting for birth weight, gestational age, current child age and weight.

Conclusion. The dose response in FRC decline with NO_x is promising to understand the determination of lung growth but needs to be viewed cautiously; given the limited sample size and percentage of acceptable tests.

Agricultural burning practice and acute respiratory symptoms among rural farmers in Cameroon: A three-point cohort study

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Introduction. Rural farmers in Cameroon practice controlled burning of agricultural fields and household gardens during the dry pre-planting season, exposing themselves to increased immediate ambient air pollution.

Objective. To measure ambient PM_{2.5} exposure and assess the change in acute respiratory symptoms in these farmers during the pre-burning, burning and post-burning periods.

Methods. We conducted a three-point cohort study in January (pre-burning), March (burning) and May (post-burning) 2016 among adult rural farmers in Central Yabassi, Cameroon. A one-stage random cluster sampling of 4 on 15 communities and consecutive sampling of all farmers in clusters literate to French and English was applied. Questionnaires regarding demography, burning practice, and acute respiratory symptoms were investigated on same participants all three periods. Two 24-hour ambient PM_{2.5} measurements were taken in burning areas with a Dylos DC1700 Air Quality Monitor, and a mean value was calculated per study period. The prevalence of symptoms over time was compared using the McNemar test.

Results. We studied 251 farmers with a mean (standard deviation (SD)) age of 47.79 (16.52) years; 64.5% ($n=162$) were exclusive farmers, while 70.1% ($n=176$) were permanent residents. The average (SD) number of burning days was 14.41 (5.29) with a mean (SD) burning time of 7.51 (2.41) hours per day. With a mean ambient PM_{2.5} exposure of 10.7 µm, 205.2 µm, and 7.0 µm for the pre-burning, burning and post-burning periods, respectively, the McNemar test revealed a

significant increase ($p=0.001$) in all symptoms investigated during burning compared with the pre-burning period, including sneezing (95% confidence interval (CI) 16.76 - 27.86), runny nose (95% CI 05.7 - 14.98), dry cough (95% CI 13.86 - 25.18), phlegm (95% CI 10.17 - 20.11), nasal congestion (95% CI 08.18 - 18.14), scratchy throat (95% CI 15.67 - 6.56), wheezing (95% CI 09.69 - 19.79), chest tightness (95% CI 14.94 - 25.70), shortness of breath (95% CI 11.71 - 23.35), and eye irritations (95% CI 24.57 - 36.78). With the exception of runny nose, nasal congestion and chest tightness, the post-burning period was characterised by a significant decrease ($p=0.001$) in symptoms.

Conclusion. Rural farmers in Cameroon who engage in agricultural burning suffer from acute respiratory symptoms and are exposed to high levels of PM_{2.5}. A general population survey involving lung functions will better evaluate health effects.

Women and girls in resource-poor countries experience much greater exposure to household air pollutants than men: Results from Uganda and Ethiopia

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Introduction. Household air pollution (HAP) generated from burning biomass fuels is a major cause of mortality and morbidity in low-income settings worldwide. Little is known about differences in exposure to HAP by age and gender in homes using biomass fuels.

Objective. This study examined personal exposure to HAP across six population groups defined by age and gender (infants, young males, young females, adult males, adult females, and elderly) in rural households in Uganda and Ethiopia.

Methods. Personal exposure to HAP in each group was assessed by measuring carbon monoxide (CO) and/or fine particulate matter (PM_{2.5}) concentrations in households using biomass fuels. Measurements were made for ~24 hours for each individual with some participants wearing more than one instrument to provide data on comparability. Demographics including household, kitchen characteristics, biomass fuel use assessment and socioeconomic status were recorded. PM_{2.5} concentrations were measured using a TSI Sidepak AM510 Aerosol Monitor, a Particle and Temperature Sensor (PATS+), as well as Dylos and RTI MicroPersonal Exposure monitors. CO concentrations were measured using EL USB CO Lascar loggers.

Results. Data were collected from 215 participants from 85 households. There was a difference in exposure to HAP between males and females ($p=0.001$). The 24 h PM_{2.5} exposures were highest among adult females with geometric mean (GM) and geometric standard deviation (GSD) 24 h concentrations of 194 µg/m³ (1.6) in Ethiopia and 156 µg/m³ (1.6) in Uganda. The lowest PM_{2.5} exposures were recorded among the 'young male' grouping with GM (GSD) of 25.2 µg/m³ (1.49) in Uganda and 26.4 µg/m³ (2.30) in Ethiopia. The 'young female' group had exposures about two-thirds the value of adult female group. Adult males and the elderly group experienced more moderate exposures.

Conclusion. There are substantial differences in personal exposure to air pollutants depending on age and gender in the rural households. Adult and young females were exposed to the highest concentrations

in both countries. We found a ~5-fold difference in PM_{2.5} exposure between adult males and adult females. Future research ought to consider differences in exposure to HAP across the life-course and characterise age and gender differences when implementing exposure reduction interventions.

Treatment outcomes in patients with extensively drug-resistant tuberculosis from South Africa who received bedaquiline

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Introduction. Optimal treatment regimens for patients with extensively drug-resistant TB (XDR-TB) remain unclear. Long-term prospective data comparing XDR-TB regimens, with and without bedaquiline (Bdq), from an endemic setting are lacking.

Objective. Our aim was to compare treatment outcomes between XDR-TB patients who received Bdq-based regimen and those who did not.

Methods. We prospectively followed up 272 patients with laboratory-confirmed XDR-TB (49.3% HIV-infected; median CD4 169 cells/ μ L) in a 24-month programmatic setting. All patients were admitted to Brooklyn Chest Hospital, Cape Town, which is the designated XDR-TB treatment centre in the Western Cape province of South Africa. A total of 204 patients received a non-Bdq-based anti-TB regimen, while 68 received a Bdq-based regimen. The background treatment regimen was prescribed following the Results of individual patient's drug susceptibility testing. XDR-TB patients in the non-Bdq group were treated with a backbone of clofazimine and para-aminosalicylic acid (PAS), while those in the Bdq group also received clofazimine, linezolid and levofloxacin as major components. Demographic and clinical information was obtained from the patients' records. Ethical approval was obtained from the University of Cape Town Human Research Ethics Committee.

Results. The overall favourable outcome rates were substantially better in the Bdq v. the non-Bdq group (66.2%; ($n=45/68$) v. 12.8% ($n=26/204$); $p<0.001$). Those in the Bdq group also had overall reduced rates of treatment failure (5.9% ($n=4/68$) v. 25.6% ($n=52/204$); $p=0.001$), default (1.5% ($n=1/68$) v. 15.7% ($n=32/204$); $p=0.003$) and mortality (14.7% ($n=10/68$) v. 33.8% ($n=69/204$); $p=0.004$). Admission weight >50 kg, an increasing number of anti-TB drugs, and Bdq were independent predictors of survival. Bdq remained significant in HIV-infected persons, irrespective of CD4 cell count. A negative sputum culture at 6-months of treatment had a sensitivity of 97.2% and 81.0% to predict survival in the BDQ and non-BDQ groups, respectively.

Conclusion. XDR-TB patients receiving a backbone of Bdq and linezolid had a substantial improvement in favourable outcome rates compared with those who were not using the drugs. These data inform

the selection of XDR-TB treatment regimens and roll-out of newer drugs in TB-endemic countries.

Very Brief Advice on smoking saves lives, but does it work in low- and middle-income countries?

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Introduction. The FRESH AIR project aims to improve the prevention, diagnosis and treatment of chronic lung diseases in low- and middle income countries (LMICs). Smoking is the single most preventable cause of death, resulting in an estimated 6 million premature deaths globally per year. Stopping smoking can reduce risk of premature death and improve current and future health. Very Brief Advice on smoking (VBA) is a proven clinical intervention, which identifies smokers, advises them on the best method of quitting and supports subsequent quit attempts. VBA comprises three elements, i.e. ASK, ADVISE and ACT, and is designed to be used opportunistically with patients by healthcare workers in almost any situation with a smoker.

Objectives. To determine whether the VBA intervention can be adapted to low- and middle-income countries (LMICs). To investigate whether training healthcare workers in delivering VBA results in a change to their clinical or professional practice.

Methods. Mixed-methods implementation science study. Stakeholders in Crete, Vietnam and Kyrgyzstan reviewed and adapted the standard UK model for the delivery of VBA, to ensure suitability to the local context. Training was provided for healthcare workers in the knowledge and skills needed to deliver VBA. Trainees' self-efficacy and self-reported practice behaviours related to VBA were assessed through questionnaires before, immediately after and one month following the training. Interviews were conducted.

Results. The original model for the delivery of VBA required minor local adaptation before implementation. Concern about effective delivery of VBA training by English speakers to healthcare workers via a translator as well as long-term sustainability, were addressed by adopting the train-the-trainer model. Local healthcare workers ($N=126$) were trained to deliver VBA training to other healthcare workers in the local language: $n=29$ in Crete; $n=60$ in Vietnam and $n=37$ Kyrgyzstan). Initial findings suggest that VBA training improved the skills of the majority of participants and they would recommend the training to others. Significant increases in self-efficacy in advising patients on the best methods of quitting and providing support to smokers were reported between the pre- and post-assessment periods.

Conclusion. VBA training is a low-resource training which is acceptable, practicable and feasible in LMICs.

A proteomic atlas of human pulmonary tuberculosis

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Introduction. Tuberculosis (TB) is a severe global health threat caused by *Mycobacterium tuberculosis* (Mtb) that forms granulomatous lesions in the lung. Host cells in these lesions vary in abundance, identity, activation status and the presence of detectable bacilli. The physiological and biochemical features of these lesions are poorly defined. Although animal models infected with Mtb have greatly expanded our understanding of TB, the paucity of TB human tissues for study has made it impossible to validate animal models. As a result, there is a scarcity of studies on fundamental mechanisms of human pulmonary TB. We tested the hypothesis that TB restructures the normal pulmonary architecture, forming heterogeneous granulomatous lesions that vary in cellular composition and arrangement, which is reflected in their proteomic composition.

Methods. We appraised the immunohistochemistry of TB granulomas and used proteomics to examine resected pulmonary tissue from 12 TB and 6 healthy (non-TB) patients. The cellular composition of the lung was characterised using flow cytometry. Global proteomic analyses of the lung tissue were examined using a Surveyor HPLC in-line with a Thermo-Orbitrap Velos Pro-hybrid mass spectrometer.

Results. MetaCore pathway analyses allowed us to identify statistically significant pathways, including: regulation of biological and developmental process ($4.6e^{-303}$); extracellular component biogenesis ($8.1e^{-281}$); cytoskeleton and cell junction organisation ($9.1e^{-267}$); phosphatidylinositol and fibroblast growth-factor signaling ($1.9e^{-246}$); response to $\text{tgf-}\beta$ and system development ($3.5e^{-195}$); apoptotic signaling via death receptors ($8.4e^{-79}$); regulation of fatty-acid metabolic process ($3.3e^{-65}$); morphogenesis of epithelium tissue development ($5.1e^{-61}$); response to wounding and stress signal transduction ($1.8e^{-40}$); and Fc-receptor signalling in phagocytosis ($2.6e^{-13}$). Ingenuity Pathway Analysis showed upregulation of pathways involved in: (i) mitochondrial dysfunction; (ii) production of reactive nitrogen and oxygen species; and (iii) glycolysis in the TB-diseased lungs compared with healthy samples. Moreover, our histology results demonstrate discrete zonation of metabolic markers and cell types within the granuloma, which may play a role in restricting Mtb growth and/or dissemination.

Conclusion. These pathology and proteomic data provide new insights into the mechanism of human pulmonary TB, which may lead to new paradigms of disease progression; especially how essential host bioenergetic pathways may be subverted by Mtb.

How well do the 2012 GLI multi-ethnic spirometry reference equations fit healthy South African school children?

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Introduction. Spirometry is the most widely used lung function test for the diagnosis and management of patients with chronic lung disease. Interpretation requires accurate, ethnically appropriate reference equations. The Global Lung Function Initiative reference equations published in 2012 (GLI₂₀₁₂) provide reference data for caucasian, black, southeast Asian, northeast Asian, and 'other'. However, the 'black' equation was derived from African-American population data and we hypothesise that this may not predict lung function well in black South Africans.

Objective. We analysed spirometry results from healthy black South African (SA) children using the GLI₂₀₁₂ 'black', 'caucasian' and 'other' reference equations.

Methods. We collected data from school-going children aged 5 - 16 years in KwaZulu-Natal, SA. A minimum of three spirometry measurements were performed to obtain values for FVC, FEV₁ and FEV₁/FVC. The GLI₂₀₁₂ online calculator was used to generate Z-scores for each prediction equation.

Results. From 443 children screened for the study, 99 were excluded and 344 included, of which 327 (95%) were of black African ethnicity and included in this analysis. Of the included children, 208 (63.1%) were female and 236 (72.2%) lived in a rural area. The mean (standard deviation (SD)) height-for-age Z-score was -0.46 (1.06) and the weight-for-age Z-score was 0.15 (1.63). Black SA children did not match the GLI₂₀₁₂ 'black' equations, with a mean (SD) Z-score of 1.04 (1.05) for FVC and 1.06 (1.10) for FEV₁. The GLI₂₀₁₂ 'other' and 'Caucasian' equations showed a closer fit, with a mean (SD) FVC Z-score of 0.45 (1.12) and -0.27 (0.99), and mean FEV₁ Z-score of 0.41 (1.10) and -0.20 (1.03) respectively. All reference equations were more accurate for FEV₁/FVC values, with a maximum mean Z-score of 0.11 (0.86) observed in the caucasian equation analysis.

Conclusion. Our initial data suggest that GLI₂₀₁₂ 'black' reference equations are not valid for estimating FEV₁ and FVC in black SA children. A new reference equation for black African populations is needed to aid the interpretation of pulmonary function testing in this group.

Impact of admission for RSV infection on lung function at one year of age: A case-control study

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Introduction. Respiratory syncytial virus (RSV) infection is the commonest cause of acute lower respiratory tract infection (aLRTI) in children <5 years of age. While RSV aLRTI mortality is relatively low, the global impact of RSV hospitalisation has shifted towards the long-term sequelae associated with RSV aLRTI in early life.

Methods. We performed tidal breathing flow-volume loops and SF6 multiple breath wash-out at one year of age in children who were previously hospitalised for RSV aLRTI ($n=83$) and compared them with healthy, non-hospitalised controls ($n=92$) during natural sleep as per ERS/ATS guidelines.

Results. There were no differences in the reported history of parental or sibling-diagnosed asthma, smoke exposure, method of infant feeding, overcrowding and creche attendance between cases and controls. Cases had more exposure to household pets ($p=0.046$). A larger proportion of cases reported any wheeze ($p=0.001$), nocturnal cough when well ($p=0.003$), hospitalisation for subsequent wheezing episodes ($p=0.001$) or recurrent aLRTI ($p=0.001$). Similarly, a larger proportion of cases had an increased respiratory rate ($p=0.004$), lower oxygen saturations ($p=0.03$) and lower tidal volumes ($p=0.002$). The lung clearance index was significantly increased in cases (7.7; interquartile range (IQR) 6.0 - 11.0) compared with controls (7.1; IQR 5.3 - 12.8; $p=0.007$).

Conclusion. Children hospitalised with RSV aLRTI in infancy had more respiratory sequelae at one year of age compared with controls. In addition, these infants had more ventilation inhomogeneity and an increased work of breathing. Longer follow-up of these cases is required to evaluate the impact of RSV aLRTI on respiratory trajectories.

A pilot study assessing knowledge of women about carbon monoxide (CO) and 24-hour CO levels in selected homes in Lagos, South West Nigeria

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Introduction. Indoor air pollution remains poorly studied and reported in Nigeria. There is poor power supply and large use of gasoline powered generators by the citizens.

Objective. To determine the knowledge of women in selected homes in Lagos about carbon monoxide (CO) as well as to measure the 24-hour CO level in their homes.

Methods. Convenience sampling of three local government areas was conducted in Lagos, South West Nigeria. A descriptive cross-sectional study was carried out within selected households involving women 18 years and above in charge of each household who were interviewed with an interviewer-administered questionnaire. A 17-item questions was used to assess their knowledge about CO. The 24-hour CO level was monitored using the Easy Log USB CO Monitor.

Results. The mean (standard deviation (SD)) age of respondents was 46.18 (14.6) years (range 21 - 80 years). A total of 62 (62%) were married, 68% had at least secondary education, more than 70% had lived at the address for >5 years, while 98% were non-smokers and only 58% of the household possessed a power-generating set (56% used petrol and 2% used diesel). Primary fuel use for cooking in household was kerosene in 65%, LPG in 32%. Generators were inappropriately placed in 27 (43.1%) households. The majority (69%) of the women had not heard of CO; 25 of the 31 heard about

it at school. The knowledge score was poor in 02 (6.5%), fair in 11 (35.5%) and good in 18 (58.1). Those who had heard about CO were much younger, with a mean (SD) age 41 (11.5) years compared with 48.66 (15.4) in those who had not ($t=-2.448$; $p=0.012$). The range of CO level 0 - 124.5 ppm, mean maximum CO of 19.81 (26.67). This is not affected by age. Only 53 households had safe CO levels, while values greater than 25 ppm were recorded in 26% of the households. None of the households had a CO detector or alarm.

Conclusion. Despite the large use of portable gasoline generators among Nigerians, the knowledge of the women regarding the hazards remain poor. There is need for massive education to increase awareness about CO and other pollutants.

Introduction of pentavalent, pneumococcal conjugate and inactivated polio vaccines into routine immunisation schedule: Caregivers' experiences in Edo State, Nigeria.

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Introduction. Pentavalent vaccine; pneumococcal conjugate vaccines (PCV) and inactivated polio vaccine (IPV) were recently introduced into the EPI schedule of routine immunisations in Nigeria.

Objective. To assess caregivers' awareness, sources of information, uptake and satisfaction with the new vaccines in the Etsako Central local government area of Edo State, Nigeria.

Methods. This descriptive cross-sectional study involved care-giver/baby pair, receiving immunisation services at the health facilities. The data collected using a combination of questionnaire and review of records were analysed using IBM SPSS version 21.

Results. Of the 110 mother-baby pairs, 50 (45.5%) babies were aged 10 - 19 weeks, and 42 (38.2%) caregivers were aged 35 - 44 years. Most (90.9%) caregivers were aware of new vaccines introduced into the routine immunisation schedule. The major source of information was from health workers, 91 (82.4%). Only 10% were able to correctly identify the three newly introduced vaccines. Pentavalent vaccine was the most frequently obtained antigen, 94 (85.5%), followed by PCV, 40 (36.4%) and IPV, 38 (34.5%). Most (90.9%) caregivers were satisfied with services received regarding the new vaccines. Adverse event following immunisation with the new vaccines was reported in only 28.6% of the babies. Caregivers' level of education ($p=0.021$) and satisfaction ($p=0.043$) with the new vaccines were significantly associated with up to date uptake of the vaccines

Conclusion. Caregivers' awareness about the newly introduced vaccines was generally high in this study, but in-depth knowledge of any of these vaccines was low. Only one third of the children had been immunised up to date with the new vaccines. The caregivers expressed a high level of satisfaction with the new vaccines.

Comparative evaluation of obstructive sleep apnoea between persons living with HIV and general out patients in Federal Teaching Hospital Abakaliki, Ebonyi State, South East Nigeria

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Introduction. Obstructive sleep apnoea (OSA) is under-recognised and under-diagnosed, with lots of negative consequences on patients' health. Undetected OSA can lead to hypertension, heart disease, depression, and death. OSA is also commonly encountered in the care of persons living with HIV (PLHIV).

Objective. To compare OSA experience between HIV negative patients and persons living with HIV and to determine the association between OSA and HIV status.

Methods. This cross-sectional comparative study was carried out among patients attending General outpatient clinic and HIV clinic of the Federal Teaching Hospital Abakaliki. The interviewer-administered Berlin Questionnaire (BQ) and Epworth Sleepiness Scale was used to assess the risk of OSA and EDS, respectively, among 151 PLHIV and 167 HIV-negative patients attending the GOP clinic. These were selected using a systematic random sampling technique after securing ethical clearance. Data was analysed using SPSS version 20. Frequencies and percentages were calculated and analytical components were compared at 95% level of significance.

Results. Of the 167 GOP respondents, most ($n=79$; 47.3%) were between 20 and 29 years of age, while among the 151 PLHIV, most 52 (34.4%) were between 30 - 39 years of age. There were 88 (52.7%) males and 79 (47.3%) females among the GOP, while among the PLHIV 58 (38.4%) were male and 93 (61.6%) were female. Mean BMI and standard deviation among GOP and PLHIV were 25 (5.5) and 23 (4.6) respectively. Positive snoring experience was significantly higher ($\chi^2=24.62$, $p=0.000$) in GOP 58 (34.7%) than in PLHIV 23 (15.2%). There was no significant difference ($\chi^2=3.645$, $p=0.07$) in positive daytime tiredness between GOP and PLHIV (58 (34.7%), 23 (15.2%)) respectively. Positive daytime sleepiness was significantly higher ($\chi^2=7.797$, $p=0.007$) among PLHIV than GOP (57(37.7%), 39(23.4%)) respectively. Significantly higher proportion ($\chi^2=24.629$, $p=0.000$) of GOP had high risk of experiencing sleep apnoea than PLHIV (43 (25.7%) and 8 (5.3%)).

Conclusion. General out patients experience OSA significantly more than PLHIV. However PLHIV experience more daytime sleepiness than GOPs.

Mortality and associated factors among patients with chronic obstructive pulmonary disease in Uganda

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Introduction. Chronic obstructive pulmonary disease (COPD) is the third leading cause of death globally, with 90% of its attributable deaths occurring in low- and middle-income countries like Uganda.

There is a lack of longitudinal data on the mortality and predictors of COPD among patients in Uganda.

Objective. We set up the Uganda Registry for Asthma and COPD (URAC) to fill this data gap.

Methods. COPD patients presenting at 6 tertiary hospitals in Uganda were enrolled into the URAC registry and followed up for 2 years to determine the incidence and predictors of mortality. The hospitals were Mulago National Referral, and five other regional referral Hospitals (Mbale, Mbarara, Hoima, Arua, and Gulu) located in different regions of Uganda.

Results. We recruited and evaluated a total of 296 COPD patients; 57.6% were male. A total of 33 (11.2%) died. Higher mortality was observed in males IR=116, compared to females IR=76, IRR=1.51 (95% CI 0.72 - 3.26). By age group, incidence rates were 59.9, 27.4, 137.7, 89.9 and 113.6 for age groups 35, 35 - 44, 45 - 54, 55 - 64 and 65+, respectively. COPD stage by FEV₁ was significantly associated with mortality, GOLD 4 compared to 1 IRR 12.7 (95% CI 2.71 - 119.2; $p=0.001$), GOLD 3 compared 1 IRR 5.8 (95% CI 1.3 - 54.1; $p=0.005$) and GOLD 2 compared 1 IRR 2.8 (95% CI 0.6 - 25.9; $p=0.090$). Smoking history was borderline significant IRR 1.7 (95% CI 0.8 - 3.7; $p=0.061$). Other non-significant factors were HIV positive IRR 1.9 (95% CI 0.6 - 4.7; $p=0.090$), biomass smoke exposure IRR 0.6 (95% CI 0.2 - 2.8; $p=0.172$), and exacerbation h/o IRR 1.2 (95% CI 0.6 - 3.0; $p=0.296$). Age groups, hypertension and obesity were also not significantly associated with mortality.

Conclusion. Among COPD patients in this Ugandan population, GOLD stage by FEV₁ was the only prognostic factor for mortality. Co-morbidities did not significantly affect mortality outcomes in this patient population.

Effects of open and closed endotracheal suctioning on oxygenation and ventilator-associated events incidences: A systematic review

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Introduction. To compare the effects of open and closed endotracheal suction systems on oxygenation and ventilator associated events incidences in adult patients on mechanical ventilation. Intubation is the placement of a flexible tube into a patient's trachea to maintain an open airway and assist with ventilation and oxygenation. Its presence causes increased secretions hence the need for suctioning to clear the airway. This is done through the endotracheal tube. Endotracheal suctioning is performed through use of open or closed system. These systems have various advantages and disadvantages as well as complications. Some of the complications are ventilator associated events (VAE), decreased oxygenation and hemodynamic disturbances.

Methods. A systematic literature search was done from PUBMED, MEDLINE, CINAHL, EMBASE and Cochrane library databases to identify randomised controlled trials comparing open and closed endotracheal suction systems. The search was from studies conducted from 2007 - 2017. The search aimed to identify the effects of open and closed endotracheal suction systems on oxygenation and VAE

incidences: search was also interested in the studies that had been done on adult patients. Was done manually by going through the studies and critically analysing the findings then making inferences in relation to the aim of the study.

Results. The search yielded 118 articles of which 36 articles were incorporated into this study. The results from these articles had the following findings. All the articles reviewed showed that there was a decrease in oxygen levels and saturation when the open suction was used compared to the closed system. On further analysis, the patients whom closed suction system was used there was either no changes in the oxygenation level or had an increase. This was from comparison of blood gas analysis done before and after suctioning. On VAE incidences, there was no difference between the two systems. The laboratory tests done on patients had the same incidence level despite the type of suction system used.

Conclusion. The closed endotracheal suction system is better than the open one in terms of oxygenation levels in that from the results there was either an increase or no change in oxygenation. Although there was no difference in the incidences of VAE, the closed suction system has various advantages over the open one.

Atopy, disease control and quality of life in asthma: A cross-sectional study of Nigerian asthmatics

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Introduction. Atopic sensitisation is one of the strongest risk factors for developing asthma, while quality of life and asthma control are the most common patients' reported outcome measures (PROM) in clinical practice and research. Asthma control remains the central focus of treatment regimens and individual care plans irrespective of disease severity or phenotype.

Objective. The relationship between atopy and these PROM is complex and not well established, we, therefore, investigated the relationship between these outcomes and sought role of atopy between these outcomes.

Methods. In a cross-sectional study, we consecutively recruited 82 stable asthmatics (mean (standard deviation) age 44.3 (16.3) years; 59 females) who were previously diagnosed according to the GINA criteria, attending pulmonology clinic of a tertiary hospital. We assessed atopy by skin prick test reactivity to 6 common inhalant allergens. The asthma control, quality of life and lung function were evaluated using the ACT (asthma control test), mini AQLQ (asthma-specific quality of life questionnaire), and spirometry. Correlations between asthma control and asthma specific quality of life were determined using Spearman's Rank correlation coefficient with line of best fit determined using the least-square linear regression. Mann-Whitney U test was used to test the difference between atopic and non-atopic asthmatics.

Results. The median (IQR) ACT score was 18.0 (13.0 - 22.0) and median (IQR) AQLQ score was 4.7 (3.7 - 5.9). The ACT scores correlated positively with total AQLQ scores ($\rho=0.57$; 95% CI 0.41 - 0.71; $p=0.001$) with a one-point increase in AQLQ associated with 2.12 (95% CI 1.40 - 2.85; $p=0.001$) increase in ACT. Fifty-

six of the 82 participants (68%) were classified as atopic based on sensitisation to at least one aeroallergen. There is no significant difference between atopic and non-atopic asthmatics in the % predicted forced expiratory volume in one second (77 v. 72; $p=0.70$), ACT score (18.5 v. 18.0; $p=0.91$) and total AQLQ score (4.9 v. 4.6; $p=0.22$). We concluded that better asthma control is associated with better quality of life, however, atopic status does not affect PROM such as asthma control or quality of life. We concluded that better asthma control is associated with better quality of life, however, atopic status does not affect PROM such as asthma control or quality of life.

Conclusion. We concluded that better asthma control is associated with better quality of life; however, atopic status does not affect PROM, such as asthma control or quality of life.

Environmental risk factors for current or severe asthma in 13 - 14-year-old African children participating in ISAAC III

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Introduction. Asthma prevalence in Africa is as high as the global average and increasing. There are environmental factors associated with the increase. Comparison of findings across African countries is complicated by lack of consistency in methods. Environmental risk factors for current or severe asthma in 13 - 14-year-old children using data obtained from ISAAC III African sites is yet to be estimated.

Methods. We conducted a population-based cross-sectional study where children aged 13 - 14 years from 10 African centres who completed both core written questionnaire (WQ) and environmental questionnaires (EQ) of ISAAC III were randomly selected from school clusters. Appropriate ethical clearance was obtained. The dependent variables were current asthma (wheeze in last 12 months) and severe asthma (presence of any 3 defining questions for severity). The independent exposure outcomes were: engaging in physical exercise 3 or more times in a week, television watching 5 or more hours in a day, biomass and ETS exposure, consumption of paracetamol at least once a month, large family sizes and having pets in the home. Univariate and multivariate analyses were done adjusting for centre variation. Odds ratio and respective 95% confidence intervals were calculated. Significant $p>0.05$ was used.

Results. There were 28 490 adolescents in 10 African centres with 4 middle-income and 6 low-income centres. There was a fairly equal M:F distribution. There were 7 groups of factors studied after exclusion of factors with much variability among centres. Maternal smoking was strongly associated with current asthma and severe asthma in adolescents. Exposure to biomass fuels, particularly cooking in the home with firewood predisposed to current asthma. Having a large family protected from current asthma and engaging in heavy exercise is associated with both current and severe asthma. There was a positive association between both current and severe asthma and the use of paracetamol.

Conclusion. The study results demonstrated a number of strong and consistent environmental associations, some of which confirm some fairly established or plausible associations with asthma in children.

Pulmonary capillary hemangiomas presenting without pulmonary hypertension: A case report

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Introduction. Pulmonary capillary haemangiomas (PCH) is a rare disorder of unknown aetiology and is often misdiagnosed as primary pulmonary hypertension or pulmonary veno-occlusive disease. It is a locally aggressive benign vascular neoplasm of the lung characterised by proliferation of benign thin-walled capillary sized blood vessels in the lung parenchyma with alveolar capillary proliferation. It usually affects children and young adults with symptoms typically overlapping those of primary pulmonary hypertension. Prognosis is poor and strongly related to associated hypertension.

Case report. We present a rare case of a three-year-old girl referred with a history of cough followed by episodes of haemoptysis with clotted blood and melena stools (four bouts in one day), with haemoglobin levels dropping from 12.7 to 10.5 g/dL. Her reticulocyte count was 1% and her platelet count was 123 000/ μ L. There was no personal or family history of bleeding disorders. She had no clinical or echocardiography signs of pulmonary hypertension nor of portal hypertension. Chest radiography findings were consistent with chronic interstitial lung changes while chest CT showed ground glass opacification, right middle lobe nodular opacities with tree-in-bud appearance areas of pleural fibrosis at lung biopsy site and an absent right pulmonary artery. Cardiac catheterisation is awaited. Investigations for infections including tuberculosis and autoimmune conditions were negative. Broncho-alveolar lavage yielded >50% iron laden macrophages. A diagnosis of Pulmonary capillary haemangiomas (PCH), was made on histology of the lung biopsy. She had intermittent bouts of small quantity haemoptysis, a troublesome cough, worsening opacification on chest x-ray and had developed mild tachypnoea at rest with desaturation on six-minute walk exercise. Consequently she was started on the mTOR inhibitor, Rapamycin, for its anti-proliferative properties. We continue to monitor her for evidence of pulmonary hypertension.

Conclusion. This case highlights the need for extensive investigation, which may include lung biopsy, and follow-up of children who present with haemoptysis of undetermined origin. Prompt and thorough investigation may allow treatment that improves outcome.

Clinical profile and outcome of pulmonary embolism in Douala, Cameroon

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Introduction. Pulmonary embolism (PE) is one of the manifestations of venous thromboembolism. A limited number of studies report on PE in sub-Saharan Africa.

Objective. To determine the clinical profile, and outcome of pulmonary embolism in 3 hospitals in Douala, Cameroon.

Methods. A descriptive study carried out at the intensive care unit and the internal medicine department of the Douala general Hospital, at the medical service of the Douala Military hospital and at the Centre des Maladies Respiratoires de Douala. Patients admitted for PE between January 2009 and May 2017. The diagnosis of PE was confirmed by a thoracic CT angiography. Sociodemographic characteristics, clinical data, the results of the work-up and the outcome of patients were collected. Statistical analyses were done using SPSS 20.0. The study was approved by the institutional review board of the University of Douala.

Results. In total, 103 patients were included in the study, with a male predominance. The median age was 52 years. Among the risk factors, the most common was obesity with 49.5% followed by hypertension with 35% (36 patients). Dyspnoea was present in 86 patients (83.3%) followed by chest pain in 81 patients (78.6%) and respiratory distress in 58 patients (57.3%). Chest X-ray showed a pleural effusion in 33 patients (47.15%). Cardiac ultrasonography showed an enlargement of the right heart cavities in 61 patients (61%). Sinus tachycardia was present in 64 patients (63.36%). The initial treatment consisted of heparin therapy followed by antivitamin K. The complications during hospitalisation were pulmonary infection in 31 patients (30.1%) while the mortality rate was 18.4%.

Conclusion. PE mostly affects young subjects in Douala. The most frequent risk factor was obesity. Dyspnoea and chest pain are the main symptoms and the complication rate is high.

Mediastinal cystic teratoma revealed by pleural effusion. Clinico-pathologic characteristics and outcomes after surgery: Report of a case from a low-income setting and a review of 63 cases in the literature

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Introduction. Mediastinal cystic teratoma is a rare diagnosis in adolescence, especially in low-income settings. Pleural effusion as symptom can often lead to the diagnosis of respiratory infections and delay the resection.

Objective. We report a case from a low-income setting and analyse data from the literature.

Methods. Clinical record of one adolescent patient from the Democratic Republic of Congo reported here and 63 records from other institutions identified via Medline between May and November 2017 analysed. We excluded three patients from analysis for missing of clinical data. We described, from full-text articles, demographic, clinico-pathologic characteristics, and surgery outcomes and follow-up of patients.

Results. Of the 64 reported cases, 59% were females and the mean (standard deviation) age was 26 (12) years. Most of them were from high-income countries (Japan 28%, France 25%, USA 18% following by India 7%). Cough, shortness of breath, fever and chest pain were mostly reported. Majority of cases were misdiagnosed with time to first clinical symptoms ranged from one week to two years. Further, our case was first treated twice as tuberculosis (different regimens). About 91% showed an immature form whilst 16% were malignant. Ovarian and pancreatic tissues were mostly retrieved as content. Duration of hospitalisation varied from four days to six months and septic as well neurologic complications were mostly reported. With a follow-up period (of half of cases) ranged from one week to two years, 5% of patients died after surgery and 26% relapsed.

Conclusion. Mediastinal teratoma can be misdiagnosed for a long period and revealed by a fatal pleural effusion. The present report expands the spectrum of our knowledge showing the scarcity of reported mediastinal cystic teratoma from low-income countries although a high frequency of pleural effusion in this region and therefore highlight the need of its integration for differential diagnosis of pleural effusion.

Interruption of anti-tuberculosis drugs among adolescent and young adults aged 10 - 30 years at Kapkatet County Hospital, Kenya

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Introduction. Adolescents and young people represent a growing share of tuberculosis (TB) worldwide. Adolescents account for over 40% of the total population in Kenya. The UNAIDS report of 2017 flagged Kenya's population of school-going teenagers of ages between 15 - 19 years as the most likely to stop treatment.

Objective. To highlight the interruption of anti-TB treatment among adolescent and young people at Kapkatet County Hospital.

Methods. A retrospective study was done on adolescent and young adults aged 10 - 30 years old, who had been diagnosed with TB and started anti-TB treatment at Kapkatet County Hospital between between January 2015 and December 2017. Ministry of Health TB registers were used as source documents. Data were extracted and analysed using SPSS version 21. Relationship-associated factors and drug interruption was established. *P*-values <0.05 were considered significant.

Results. A total of 300 adolescents and young adults were assessed during the review period; 63% (*n*=190) were male and 37% (*n*=110) were female. Out of 300 adolescents who were on anti-TB drugs, 94% (*n*=282) were school-going. At the end of the review period, only 60%

(*n*=180) completed treatment successfully; 60% were female and 40% were male. On anti-TB drug interruption, 40% (*n*=120) missed drugs and clinic appointments; 70% (*n*=84) were male. There was a positive correlation between male and female and drug interruption (*p*=0.002).

Conclusion. Treatment failure was generally high and more focus should be put on males adolescent and young adults. Adolescents and young adults are likely to interrupt treatment both at intensive phase and at continuation phase of treatment related to stigma, bill burden, and duration of treatment, social support and school linkage. There should be structured friendly adolescence and young adult package of care and treatment to improve on anti-TB adherence.

TB/HIV services reduce resistance of drugs among co-infected patients at Kapkatet County Hospital

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Introduction. TB/HIV co-infection among TB patients tested for HIV stand at 41% in Kenya. At Kapkatet District Hospital is at 26% co-infection rate as at 2016. TB/HIV services at Kapkatet hospital started in 2005 and was supported by PEPFAR Project. TB clinic was approximately 100 m away from HIV clinic. Despite existence of referral mechanism patient got loss in the process due to distance, time and stigma. This contributed to low uptake of ARVS at 9.5% (2014) and increase in number of defaulters while treatment success was at 62% which contributed to resistance of ARVs. In order to address the challenges faced; the hospital management had to set up integrated TB/HIV services under one roof.

Methods. TB/HIV collaboration committee was formed in 2014 comprising of TB/HIV stakeholders and hospital management. In 2015, committee identified the challenges and solutions by review of clinic data. One of the major challenge was separation of TB and HIV clinic. TB/HIV drugs was integrated as comprehensive services including OIs management in the same room

Results. ART uptake increased from 9.5% in 2013 to 96% in 2014, adherence to anti-TBs was at 70% in 2013 to 94% in 2016. Out of the 51 co-infected patients treatment success was at 98% and viral load suppression was at 90% thus this results was attributed to integration of service and regular follow up of the patients

Conclusion. Integration of TB/HIV at public hospital improve treatment success of TB co-infected patients. Setting up a functional mechanism of collaboration facilitate out the integrated services. The integration of this do not necessarily require additional health care workforce but ensure continuation of care to patient by building confidence on existing healthcare providers this reduce stigma thus improving drug adherence for the patient.

Nutrition status among TB/HIV co-infected patients attending Kapkatet County Hospital, Kericho County, Kenya

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Introduction. Despite national progress on increased access to care and treatment of patients with tuberculosis, malnutrition remains a challenge and TB/HIV still remain a major cause of mortality in undernourished patients. At Kapkatet County Hospital, 60% of patients with TB/HIV co-infection are undernourished. Nutrition is a core component of care and treatment in Kenya today. Undernutrition lowers immunity, which leads to more complications. Currently, nutrition supplements supporting TB/HIV patients target only severe acute malnutrition (SAM) with body mass indices (BMI) <16 kg/m², which excludes others. All the relapse TB cases were undernourished and 50% missed admission criteria for nutrition supplementation.

Objective. To evaluate the nutrition status of TB/HIV co-infected patients attending Kapkatet county hospital.

Methods. Prospective study of patients who attended TB/HIV co-infected clinic for care and treatment from January 2015 - December 2016 were assessed for nutritional status. Two nutritionists were assigned to assess all co-infected patients seeking care and treatments and document in the nutrition daily activity register. BMI was the main anthropometric assessment used. Nutrition status and gender was established using STATA.

Results. Undernutrition with BMI 18.5 was 60% ($n=112$); 80% of the patients were male. A total of 15% had a BMI of 25. There was a positive correlation between nutrition status and gender ($p=0.05$) all severe acute malnutrition cases were males while all over nutrition cases were females.

Conclusion. Structured nutrition assessment and counselling is critical in addressing malnutrition in TB/HIV co-infected patients. There is need to continuously support all undernourished (BMI 18.5 kg/m²) more emphasis should be put on male clients in terms of supplementation. Regular and timely supply of nutrition supplements is recommended.

Sleep study: An audit

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Introduction. Obstructive sleep apnoea is a common condition associated with increased cardiovascular risk. The condition is diagnosed using nocturnal polysomnography in a sleep laboratory. Data from the public health care sector in South Africa is lacking.

Methods. The study takes the form of a retrospective review of folders of patients attending the Sleep Clinic at Groote Schuur Hospital, Cape Town, who underwent nocturnal polysomnography studies between 2013 and June 2016.

Results. 175 sleep studies were included in this review. 116 (60%) participants are male and 78 (40%) are female. The mean age of participants is 49.2 (13.1; range 16.9 - 85) years. The most commonly occurring co-morbid condition in this cohort is hypertension (115). The symptoms most frequently reported by the participants are snoring (153), poor quality sleep (129), excessive somnolence (126), apnoea and gasping (109). The mean Epworth Sleep Score is 14 (5.8; range 0 - 24). 94 patients are obese. 137 patients were diagnosed with OSA. 82 (48.2%) participants have severe sleep apnoea associated with apnoea/

hypoapnoea index greater than 30. Males in this cohort are 3 times more likely to have obstructive sleep apnoea than females (OR 2.9; 95% CI 1.3 - 6.6; $p=0.05$). In addition, males are also more likely to have severe sleep apnoea when compared with females in this cohort; 53 males (71%) had severe sleep apnoea. Patients with severe sleep apnoea tended to be younger with 49 patients aged between 30 - 59 years.

Conclusion. Obstructive sleep apnoea was common in this cohort. Males were at a greater risk of sleep apnoea independent of other comorbid conditions. Patients with severe sleep apnoea tended to be younger. Further analysis is required.

Lung hydatid cyst in children: Our experience at Nelson Mandela Academic Hospital

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Introduction. Hydatid infestation of the lung can be primary or secondary. Cystic echinococcosis is regarded as endemic in Sub-Saharan Africa, available evidence suggests that several species or strains within the *Echinococcus granulosus* complex are prevalent in sub-Saharan Africa; however, very little data are available in most countries.

Methods. We did a retrospective study of all children suffering from lung hydatid cyst admitted in our paediatric surgery ward, from September 2015 to September 2017. A total of 11 children were included in the study and we collected and analysed different variables, e.g. age, sex, lung affected, unilateral or bilateral cyst, size of the cysts, treatment and complications, these variables were interrelated each other's, were created tables for its statistic study

Results. From those 11 children suffering from lung hydatid cysts, 8 were females and 3 males; the 6 - 10 years age group was most affected with 5 patients for a 45.5%, followed by the groups of 5 - 6 years and >10 years with 3 children (27.25%) each. The left lung was the most affected in 6 patients by 54.5%, the right lung and bilateral lungs were affected only in 3 patients each (27.25%). The PAIR (puncture-aspiration-injection-reaspiration) procedure was performed in 8 children (72.7%). The bronco-pleural fistula as a complication occurred in 7 patients and a cyst ruptured in 1 patient. We did not have any deaths in our group of patients.

Conclusion. Lung hydatid cysts in our patients were observed more frequently in the left side. The surgical treatment performed was PAIR mostly in cysts more than 6 cm or with complications. Conservative treatment is an option in some cases.

Leukocyte count and its diagnostic value in newly diagnosed tuberculosis

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Introduction. The diagnosis of tuberculosis (TB) is frequently challenging given that the clinical and radiographic features of TB are

often nonspecific. Microscopic examination for acid fast bacilli-the most accessible in resource-limited facilities is of low sensitivity (50 - 60%). Recent studies show that a high or low monocyte lymphocyte count ratio (MLR) is predictive of active TB.

Objective. To determine the blood leukocyte cell counts and the diagnostic value of the monocyte/lymphocyte (MLR), the neutrophil/lymphocyte (NLR) count ratios in newly diagnosed TB patients.

Methods. This was a cross-sectional study. A total of 204 consecutive case files of newly diagnosed TB patients were recruited over 2 years from registers of the TB treatment centre of the Douala general Hospital. Controls were 204 healthy volunteers age and sex matched, recruited at the blood bank of the hospital. Demographic, clinical and haematological data were collected. The diagnostic value of leukocyte counts was determined using receiver operating characteristics curve analysis. Sensitivity, specificity, negative (NPV) and positive (PPV) predictive values were also calculated. The areas under the curves were determined.

Results. Lymphopenia (22.1%), neutrophilia (14.2%) and monocytosis (23.5%) were the most common abnormalities among newly diagnosed TB patients. The monocyte-lymphocyte count ratio (MLR) and neutrophil-lymphocyte count ratio (NLR) were significantly higher in the patient group compared to control group. $NLR > 1.79$ and $MLR > 0.29$ were identified as optimal cut-off values for discriminating TB patients from healthy subjects. The areas under the curves were 0.77 and 0.84 for the MLR and NLR respectively. The MLR showed 67.2% sensitivity, 83.3% specificity, a PPV of 80.12% and a NPV of 71.73%, while NLR showed 70.6% sensitivity, 87.3% specificity, a PPV of 84.7% and NPV of 74.79%

Conclusion. Lymphopenia, neutrophilia and monocytosis were the most common abnormalities among newly diagnosed tuberculosis patients. The monocyte/lymphocyte and neutrophil/lymphocyte ratios were raised in TB patients and were fairly predictive of active TB. A $NLR > 1.79$ and $MLR > 0.29$ were the cut-off values for discriminating TB patients from healthy subjects. Similar studies with larger sample sizes are needed to confirm or infirm these findings.

Severe asthma in children: Experience in a tertiary health facility in Nigeria

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Introduction. Severe asthma is a heterogeneous disease characterised by sustained asthma symptoms, despite treatment with high doses of corticosteroids. Achieving control in this group of patients can be difficult.

Objective. Three cases are presented to highlight the management challenges in Nigeria.

Methods. Patient information on initial diagnosis of asthma, frequency of flare ups, medications used and current status were obtained from the case notes.

Results. Case 1. A 6-year-old girl diagnosed with asthma at age 3 years. Known triggers were aeroallergens, house dust mite from rug, fumes from generators and a nearby paint industry and these were controlled for. She had recurrent (2 to 3 months) asthma exacerbation despite incremental doses of inhaled corticosteroids, and long-acting beta agonist (ICS/LABA), and leukotriene receptor antagonist (LTRA). Her asthma

control test score (ACT) remained on the average 19 or below. She had frequent emergency hospital visits for life-threatening exacerbations.

Case 2. A 16-year-old adolescent female diagnosed with asthma 5 years ago with an average of 6 hospital admissions per year; also has exercise-induced bronchospasms (EIB). She was on low dose ICS/LABA but monitoring was difficult as she defaulted to appointments. She had several medical visits to the private sector for severe exacerbations. Emotional upset was a notable trigger. Her ACT score remained below 19 on most clinic visits despite incremental doses of ICS/LABA, and LTRA.

Case 3. A 12-year-old male with asthma symptoms in the last 4 years who had twice-weekly flare-ups which increased to daily attacks. Risk and trigger factors were BMI of 30, biofuel smoke exposure and exercise. He was on low dose ICS/LABA. His ACT score remained below 19 on most clinic visits. He received incremental doses of ICS/LABA; and LTRA. Adequate inhaler technique and weight reduction plan were instituted. Need for medication adherence was emphasised. He is currently on a medication step-down process.

Conclusion. Severe asthma is common in children as demonstrated in our case reports. There is need to ensure proper diagnoses, eliminate co-morbidities and institute targeted therapy in children with difficult asthma.

Prevalence and predictors of tuberculosis treatment default in Abakaliki, Nigeria: Policy implication on its elimination goal

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Introduction. Tuberculosis (TB) treatment is the most effective strategy for preventing the spread of the disease. Default in tuberculosis treatment remains an important contributor to treatment failure, resurgence of multidrug resistance (MDR-TB), prolonged infectiousness, relapse and death. Patients' adherence is an important link between medical process and good treatment prognosis. TB treatment default is a threat to its elimination goal and increases the burden of TB. Nigeria ranked fourth among the 22 high-burden countries for TB in the world and first in Africa.

Objective. To determine the prevalence and predictors of tuberculosis treatment default in Abakaliki

Methods. Data from the TB treatment register (686 patients) of the Federal Teaching Hospital Abakaliki for the period of 2012 - 2016 were analysed. Key informant interviews with nurses were conducted to determine the factors associated with default. Approval was obtained from the hospital management and permission was also sought from nurses. Treatment outcome was grouped as 'defaulters' and 'non-defaulters.' Data analysis was done using SPSS statistical software version 20. The χ^2 test of statistical significance was used in the analysis and level of significance was determined by a p -value < 0.05 .

Results. The mean (standard deviation) age of the respondents was 34.9 (5.7) years. Of the 686 clients, 72 (10.59%) defaulted within the five years and out of 98 currently on treatment 11 defaulted giving a prevalence rate of 10.7%. Majority (73.1%) defaulted within the intensive phase of treatment. Reasons for default were feeling of well

within the first month of commencement of drug, distance to health facility and pill burden. Among the defaulters, 25% were ≤ 29 years, 52.8% males and 68.1% lived in rural area. Predictors of TB treatment default were male gender (aOR 2.1; 95% CI 1.4 - 7.5), rural residence (aOR 1.8; 95% CI 1.3 - 5.7).

Conclusion. Default rate was high among clients. Therefore this rate of default needs to be further reduced by repeated counselling, reminder system, effective contact tracing, support group and referral. High default rate is a huge threat to TB elimination goal especially now that there is increase in the incidence of MDR-TB. Further decentralisation of treatment centres closer to rural areas would improve adherence to TB treatment.

Assessment of prevalence, knowledge of preventive and control measures of pulmonary tuberculosis among inmates and staff of Abakaliki prisons, Nigeria: An implication for policy implementation

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Introduction. Pulmonary Tuberculosis (PTB) is one of the major diseases of public health importance especially in prisons where case finding rate has been low. The WHO established five facts of prisons PTB spread include. Prisons receive TB, Prisons concentrate TB, Prisons disseminate TB, Prisons make TB worse, and Prisons export TB. Poor TB case finding result in annual TB transmission risks of 90%.

Objective. To assess the prevalence, knowledge of preventive and control measures of pulmonary tuberculosis among inmates and staff of Nigerian Prisons, Abakaliki.

Methods. A prison-based cross-sectional descriptive study was undertaken among 307 inmates and staff selected using a systematic sampling technique. Informed consent was obtained from the staff and inmates. The respondents were interviewed using a pre-tested interviewer administered semi-structured questionnaire. Good knowledge of pulmonary tuberculosis was assessed by the proportion of respondents who correctly answered 50% of the knowledge questions, and sputum test was done for respondents with cough of two weeks or more. Data analysis was done using SPSS statistical software version 20. The χ^2 test of statistical significance was used in the analysis and the level of significance was determined by a p -value < 0.05 . Results were treated with strict confidentiality.

Results. The mean (standard deviation (SD)) age of inmates was 34.96 (5.7) years, while the mean (SD) age of the staff was 38.43 (3.5) years. The majority of the participants had secondary education. All the staff and 89% of inmate were aware of pulmonary tuberculosis while 63% and 77% of inmates and staff respectively had good knowledge of pulmonary tuberculosis. Knowledge was significantly associated with educational and employment status of inmates but only educational attainment by staff. This study found 2.1% prevalence of PTB by sputum test.

Conclusion. Knowledge of presentation, preventive and control measures of PTB was high among respondents. However, this level of knowledge especially by the inmates needs to be improved upon

by awareness creation. High PTB burden and poor control policies within prisons potentiate high attributable risk. Implementation of current national or international cell occupancy recommendations would reduce TB transmission by 50% and 94% respectively especially now that there is increase in the incidence of MDR-TB.

Detection and molecular characterisation of enterovirus D68 in Senegal between July and December 2014

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Introduction. Since it was first isolated from hospitalised children with pneumonia and bronchiolitis in California in 1962, human enterovirus D68 (EV-D68) has been recognised as an emerging respiratory pathogen in the last decade when it caused outbreaks in several countries. The most recent and largest epidemic of EV-D68 associated with severe respiratory disease began in North America and spread everywhere in the worldwide between August 2014 and January 2015. However, in African countries the epidemiology of EV-D68 remains largely unexplored.

Objective. To investigate the circulation and molecular characterisation of EV-D68 in Senegal between July and December 2014.

Methods. A total of 435 swab samples collected through routine influenza-like infection (ILI) or acute respiratory infection (ARI) surveillance activities between August and December 2014. Collected samples were tested using the EVD68-specific real-time RT-PCR. Molecular characterisation was made by amplification of the VP1 regions, followed by nucleotide sequencing.

Results. Real time (RT-PCR) was used to confirm EV-D68 infection in 3.45% of the samples ($n=15/435$). The majority ($n=12/15$; 80.0%) of the EV-D68 cases were detected in October. Children under 5 years of age were more vulnerable to EV-D68 infection with a frequency of 60%. Phylogenetic analysis of the VP1 sequences of 14 EV-D68 cases, revealed that all sequences belonged to the A2 variant of clade A viruses. The VP1 sequence of these strains displayed sequence similarities between 99 - 98% with strains A2 found in Germany (KP657740.1) and French (LN6813392) in the same period.

Conclusion. These results showed the real circulation of EV-D68 in Senegal during this period. However, it is necessary to carry on more investigation to better understand the epidemiology and the impact of EV-D68 in the population.

Comparison of Xpert MTB/RIF assay and the acid-fast bacilli in detecting tuberculosis in Gusau, North West Nigeria

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Introduction. Nigeria is among the countries with highest burden of Tuberculosis (TB) in the world. Diagnosis of TB in developing countries is mostly clinical, often relying on chest X-ray without sputum smears. Diagnosing extra pulmonary TB is more difficult due to low number of bacteria in clinical specimens. The GeneXpert MTB/RIF assay is a real-time PCR assay for the rapid diagnosis of *Mycobacterium tuberculosis* (MTB) and detection of rifampicin (RIF) resistance.

Objective. To compare GeneXpert MTB/RIF assay with microscopy (Ziehl-Neelsen staining) in the diagnosis of TB in our hospital.

Methods. A retrospective review of patients managed at the DOTS clinic of ASYBSH, Gusau, Nigeria following acquisition of the GeneXpert assay machine. Relevant information of patients managed from October 2016 to June 2017 was reviewed including smear microscopy and GeneXpert MTB RIF assay.

Results. Of the 138 patients followed up at the DOTS clinic during the study period, males were 85 (61.6%), with a M:F ratio of 1.6:1. There were 27 (19.6%) children and 111 (80.4%) adults. The majority ($n=118$; 85.5%) had pulmonary TB and 136 (98.6%) were new cases. Only 38 (27.5%) were smear-positive while GeneXpert MTB/RIF detected MTB in 54 (39.2%); of which 3 (2.2%) were MTB/RIF resistant, while MTB was not detected in 39 (28.3%). There was no significance between gender and AFB detection ($p=0.187$) nor with MTB detection ($p=0.734$). MTB was detected in 37 (26.8%) patients with smear-positive TB, and in 16 (11.6%) with smear-negative TB, this was significant ($p=0.001$). GeneXpert MTB/Rif had a sensitivity of 97.4% and specificity of 69.2%.

Conclusion. Our study showed GeneXpert assay had a good sensitivity but poor specificity in detecting MTB in our centre. This test was found to be helpful in the diagnosis of TB, especially in patients who had smear-negative sputum.

Asthma exacerbations and related risk factors among patients seen in chest clinic at Tikur Anbessa Specialised Hospital in Addis Ababa, Ethiopia

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Introduction. Asthma exacerbations are associated with increased disease morbidity and increased utilisation of healthcare resources that are often limited in low-resource countries. Identification of asthmatics at greatest risk for future exacerbations may allow a more focused cost-effective approach to care for these patients.

Objective. To identify risk factors for asthma exacerbations in chest clinic patients seen at the largest public hospital in Addis Ababa, Ethiopia.

Methods. In this cross-sectional study, 182 consecutive patients with physician-diagnosis of asthma seen in chest clinic at Tikur

Anbessa Specialised Hospital between July and December 2015 were studied. Demographics, asthma symptoms, medication use, and asthma exacerbation in the past 12 months were obtained from the clinic records. Asthma exacerbation was defined as the self-report of worsening respiratory symptoms for greater than 48 hours. Lung function was measured using a Diagnostic EasyOne Plus model 2001 SN spirometer. The institutional review board approved the study protocol.

Results. Among the 182 asthma patients in the study, the mean (standard deviation) age was 52 (12) years; 124 (68%) were female and 93 (51.1%) had at least one asthma exacerbation in the past 12 months. Patients with asthma exacerbations were more likely to be female (11.05; 95% CI 6.54 - 15.55; $p=0.001$), use biomass fuel (9.59; 95% CI 5.21 - 13.97; $p=0.002$), and have incorrect inhaler technique (6.96; 95% CI 2.59 - 11.33; $p=0.008$) than those without exacerbations. In the multiple logistic regression, female gender (7.93; 95% CI 2.93 - 12.94; $p=0.005$) and incorrect inhaler technique (6.32; 95% CI 1.55 - 11.05; $p=0.012$) were found to be significant. Age, comorbidities, controller medication use, and FEV1 were not found to be significant.

Conclusion. More aggressive management of asthmatics that have characteristics of female gender, use of biomass fuel, and incorrect inhaler technique may lessen asthmatic exacerbations. Further prospective studies are needed to confirm these findings.

Factors associated with mortality among TB patients in Meru County, Kenya

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Introduction. Tuberculosis (TB) continues to be a major cause of death in Sub-Saharan Africa despite the concerted efforts between the various players in the region to control the disease. Some of the risk factors identified include malnutrition, TB/HIV co-infection among others. Meru County is ranked 5th among the high-TB burden counties in Kenya and it's also among the high burden counties for drug-resistant TB in Kenya.

Objective. To determine some of the factors associated with mortality among TB patients in Meru County.

Methods. Retrospective cohort data of TB patients who started treatment in 2016 were retrieved and analysed to determine factors associated with mortality among the TB patients and draw comparisons between the various categories of patients.

Results. A total of 3 201 were started on treatment during this period, 2 307 (72%) were males, while 894 (27%) were females. Overall mortality was 4% ($n=127/3 201$). Mortality among the HIV co-infected patients was 8.8% ($n=49/569$) and 2.93% (76/2 599) among HIV-negative patients. Mortality was markedly high among the HIV co-infected patients who were not on ART when compared with those who were on ART at 18.8% v. 8.1%, respectively. Among the extra pulmonary cases, mortality was 8.3% (37/446). Mortality among the severely malnourished patients was extremely high at 23% ($n=44/181$)

Conclusion. Mortality was found to be significantly high (8.8%) among the HIV co-infected patients as compared to HIV negative

patients. Mortality was extremely high (18.8%) among HIV-positive patients who were not on ART and among the severely malnourished patients. Special attention should be given to TB/HIV co-infected patients and the malnourished. There is urgent need to ensure that all TB/HIV co-infected patients are started on ART.

Respiratory health effects of sulphur dioxide air pollution from the Nyiragongo and Nyamulagira volcanoes in the Democratic Republic of Congo: A time series analysis

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Introduction. Nyamulagira and Nyiragongo volcanoes are located in the east of the Democratic Republic of Congo. Nyiragongo volcano last erupted in 2002, impacting mainly the infrastructures with large lava flows. Regularly erupting, Nyamulagira volcano is during these periods, among the biggest emitters of volcanic sulphur dioxide (SO₂) on earth.

Objective. We investigated the possible temporal and spatial relationship between eruptive emissions of SO₂ and acute respiratory illnesses (ARI) in surrounding populations.

Methods. The total flux of SO₂ emitted during eruptions since 2000 and the average spatial distribution of SO₂ concentrations in the plume (2004 - 2008) were based on publicly available remote sensing data. The monthly numbers of diseases recorded as ARI among adults and children were extracted from health data collected routinely over 10 years (2000 - 2010). The monthly numbers of ARI recorded during or after eruptions were compared with those recorded before eruptions; spatial distribution was investigated according to altitude and distance from the volcanoes.

Results. Seven eruptions occurred between 2000 and 2011 with discharges ranging from 0.093 - 4.5 kT SO₂. Of 150 health centres, 78 provided reliable data. ARI were the second most frequently diagnosed conditions, after malaria, and their frequency appeared to increase over the years. Peaks of ARI were observed during the rainy season. No consistent temporal associations between the incidence of ARI and the occurrence or intensity of volcanic eruptions was observed, neither when the whole area was considered, nor when areas at different distances from the eruption site were considered.

Conclusion. Our investigation did not allow us to link volcanic emissions of SO₂ with ARI in the surrounding area. This may be due to the methodological limitations of a retrospective study that relied

on routinely collected health data, to insufficient knowledge of the size of the exposed populations and to the absence of information on ground level concentrations of SO₂, which may not be high enough to affect human health. Nevertheless, Kivu volcanoes are still active, thus justifying the need for measuring the exposure of the population to SO₂ and for evaluating the possible adverse respiratory effects of eruptive and continuous exposure to SO₂.

Ambient air pollution in sub-Saharan Africa: A neglected risk factor for morbidity and mortality?

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Introduction. Human development index does not accompany the massive urbanisation in Sub-Saharan Africa (SSA). Biomass fuel combustion, industrialisation and traffic lead to increased exposure to ambient air pollution (AAP). Despite a growing body of epidemiological studies linking AAP's with deleterious effects to human health, data from SSA are still scarce.

Objective. We conducted a systematic review of the literature to map the effects of AAP on the health of SSA's population.

Methods. We comprehensively searched literature in PubMed, Medline-OVID, EMBASE and Scopus databases as well as the grey literature to identify eligible studies from the inception of the electronic databases to February 7, 2017. We excluded studies assessing indoor air pollution or workplace exposures. Two reviewers independently selected studies, extracted data, and appraised studies.

Results. Of the 20 studies included, data covered locations in only seven countries (out of more than 40) across SSA and more than half conducted in South Africa (SA). Most studies were community-based cross-sectional surveys (15/20). Overall, the studies included the general population but 7 studies focused on children, 2 on elderly people, and 1 on mother-child pairs. Urban/industrialised suburbs were compared with rural/non-industrialised suburbs. Residences in close proximity to roads/mine dumps/refineries were compared to residences far away from these pollution sources. Only five studies assessed the 'criteria air pollutants' as defined by the USEPA. Exposure was measured via questionnaire or estimated via aggregated data and rarely personalised or measured continuously using monitoring stations. No studies, except from SA, were based on reliable morbidity or mortality statistics at the level of the region or the country. Self-reported respiratory symptoms were mostly reported. Children and the elderly were found to be more susceptible to the deleterious effect of AAP. Only half of the studies clearly defined group comparability.

Conclusion. Rapid urbanisation in SSA is associated with rising levels of AAP, the exposure to which is detrimental to the health of people

living in the region. Our review indicates that we know little about AAP related-diseases in SSA outside SA. International and national efforts are necessary to address this neglected risk factor to improve quality of life in this region.

Epidemiology of tuberculosis in three prison health facilities in Kenya

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Introduction. Kenya is ranked 13th among 22 high-burden tuberculosis (TB) countries in the world. Prisoners form a group of society with a high risk of tuberculosis. In Kenya, there was an estimate of 55 000 prisoners in 2016 with a TB morbidity rate of 10%.

Objective. We analysed surveillance data to describe TB cases, assess the trends, determine the TB/HIV co-infection and treatment outcomes among patients in Kenyan prison health facilities.

Methods. Tuberculosis data from prison health facilities, between January 2012 and December 2015 and collected data on patient sociodemographics, treatment information and outcomes. A case of TB was defined as bacteriologically confirmed smear-positive. Data were downloaded from the TB online register and entered into EPI Info 7 for analysis. Descriptive analysis was done where means were calculated for continuous variables and proportions for categorical variables.

Results. A total of 4 474 cases were analysed of which male were 3 557 (80%). The mean age was 33 (12.7) years, 1 549 (30%) were in the age group 20 - 30 years and 1 019 (23%) were from Nairobi county. Most had Pulmonary TB cases ($n=3\ 782$, 82%). Smear-positive cases were 1 536 (34%) in 2012, 1 397 (31%) in 2013 and 1 493 (33%) in 2014. Out of 2 039 smear-positive cases at month 0, 452 (22%) tested positive for HIV. Overall treatment success rate was 81%, 153 (3%) died, 9 (0.2%) had treatment failure and 475 (11%) transferred to other clinics. Out of the 9 cases with treatment failure, 3 (33%) were diagnosed with multidrug-resistant TB.

Conclusion. The TB burden was high in males, there was minimal change in the trend over the three years and most cases were from Nairobi County. Our findings indicated lower treatment success rate than the WHO targets so there is a need to scale up the patient treatment follow ups.

Deploying spirometry for characterising non-communicable chronic respiratory diseases at a National TB Hospital in Tanzania: Patterns and associated factors

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Introduction. Spirometry is an important tool for assessing pulmonary function in people presumed with respiratory pathology, however the test is not widely available in resource-limited settings.

Objective. To describe the pulmonary function of the presumed cases of respiratory diseases after integrating spirometry in the diagnostic algorithm of respiratory diseases at Kibong'oto Infectious Diseases Hospital.

Methods. Cross-sectional study in which the medical charts of patients attending the Kibong'oto National TB hospital from March to December 2017 were reviewed from. Those undergoing spirometry at the outpatient department were included, after excluding the pulmonary tuberculosis (PTB) diagnosis.

Results. Baseline spirometry tests were performed in 69 patients who had a mean (SD) age of 41 (16) years. A total of 40 (58%) were male, whereas 14 (20%) had co-infection with HIV. Additional co-morbidities were severe and moderate malnutrition in 9 (13%) and 5 (7%) patients, respectively. Pastoralists, peasants and small-scale miners were 36 (52%), 23 (33%) and 4 (6%), respectively. Patients with respiratory symptoms such as cough, chest pain, difficult in breathing were 44 (64%), 39(56%) and 22 (32%), respectively. Thirty-eight had a previous history of PTB; 15 (22%) had one episode of TB treatment while 24 (35%) had twice or more episodes. Patients with normal pre-bronchodilator FEV₁/FVC were 49 (71%) while 19 (28%) had abnormal values. Abnormal radiographic findings for available films were in 58 (84%) patients; interstitial lung diseases, lung collapse, lung infection were found in 14 (20%), 6 (9%) and 14 (20%) patients, respectively. Only occupation in particular peasants and age >65 years were significantly associated with FEV₁/FVC 70%; p values were 0.04 each.

Conclusion. Comprehensive lung management in the primary health care in countries like Tanzania is urgently required as majority of communities are peasants.

Risk factors for pulmonary tuberculosis treatment failure in rural settings in Benin, West Africa: A cohort study

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Introduction. Tuberculosis (TB) remains a public health issue particularly in north-east Benin, with a high frequency of TB treatment failure.

Objective. To identify the risks factors of TB treatment failure in rural north-east settings in Bembèrèkè, Benin (West Africa).

Methods. This was a retrospective cohort study. We included smear-positive pulmonary TB patients who began TB treatment between 1 January 2007 and 31 January 2011 and extracted data from the TB registry. The outcomes of TB treatment were defined according to the 2007 WHO guidelines. Failure was defined as remaining smear-positive at month 5 or later during TB treatment for smear-positive pulmonary TB cases. Treatment successes were defined as being either smear-negative (cured) at month 5 (or later) of treatment or

having completed TB treatment in situations where sputum smear microscopy was not done. The deceased cases were those who died for any reason during TB treatment. For analysis we also defined composite outcomes (failure or death). After univariate analysis, multivariate analysis with 0.05 as the level of significance was done and focused on sociodemographic variables, HIV status, acid fast bacilli score at baseline.

Results. A total of 264 of 270 pulmonary TB patients were included in the final analysis. The median (interquartile range (IQR)) age was 35 (28 - 46) years. Twenty-three failed on TB treatment with a frequency of 8.6% (IQR 5.5 - 12.6%). In multivariate model, positive HIV status (OR 10.38; 95% CI 1.77 - 60.91; $p=0.01$) and male gender (OR 4.34; 95% CI 1.03 - 18.28; $p=0.046$) were each significantly associated with an increased risk of TB treatment failure. Only positive HIV status (OR 12.86; 95% CI 4.27 - 38.27; $p=0.0001$) remained significantly associated to composite outcome.

Conclusion. Positive HIV status and male gender are the potential risks factors of TB treatment failure. The association between positive HIV status and composite outcome confirmed the deadly association of TB and HIV. We need to really integrate HIV and TB activities at all levels of healthcare.

Hypersensitivity pneumonitis in an 11-year-old girl presenting to a tertiary hospital in Cape Town, South Africa

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Introduction. Hypersensitivity pneumonitis (HP), is an immune-mediated inflammatory lung disease caused by inhalation of various antigenic organic particles. HP is a rare interstitial lung disease and is uncommon in children. Repeated exposure provokes an exaggerated immune response of the small airway and lung parenchyma among susceptible individuals.

Methods. We present an 11-year-old girl referred to the Red Cross War Memorial Children's Hospital, with a two-month history of cough, dyspnoea on exertion, weight loss and prolonged exposure to pigeons bred at home. Significant findings on physical examination were digital clubbing and bilateral crepitations. She had a restrictive pattern on spirometry with a vital capacity of 1.12 litres, LLN 1.50 and Z-score -3.3 SD, moderately impaired diffusion capacity of the lungs (8.7 mL/min/mmHg), LLN 13.5 and desaturated (SaO₂) to 86% on exercise testing. A chest radiograph revealed a diffuse interstitial pattern, while high resolution chest tomography (HRCT) showed extensive bilateral centrilobular opacities, honeycomb cysts and emphysematous changes of both upper lobes, as well as fibrosis with traction bronchiolectasis and localised airspace opacification of the right lower lobe. Bronchoalveolar lavage showed a mixed cellular profile and positive Gene Xpert.

Lung biopsy confirmed HP and immunoglobulin G (IgG) antibody to pigeon mix was also markedly elevated (>200 mg/l; range 0.02 - 21).

Results. She was commenced on oral cortocosteroids, hydroxychloroquine, antigen avoidance and anti TB medications with marked improvement in lung function and symptoms.

Conclusion. This case highlights the importance of a comprehensive history, high index of suspicion and thorough investigation in diagnosing interstitial lung diseases in childhood amenable to treatment.

Case management of active tuberculosis at the Chest Clinic of Connaught Hospital in Freetown, Sierra Leone

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Introduction. Sierra Leone is among the top thirty high-TB-burden countries in the world. Major factors that contribute to this high TB burden are TB/HIV co-infection, loss to follow-up and late presentation to health facilities.

Objective. To assess TB treatment outcomes and HIV co-infection at the chest clinic of Connaught Hospital in Freetown, Sierra Leone.

Methods. A retrospective study design was used to collate data from treatment cards of TB patients registered at Chest Clinic in 2016. Information from 1 127 treatment cards were entered into an excel sheet, stored and analysed using SPSS version 21. Variables were summarised using mean, standard deviation, frequencies and proportion. Associations between age, sex, type of TB and HIV status were tested with treatment outcomes using χ^2 and the level of significance was at 5%.

Results. The predominant age group of patients treated at the centre was 25 - 34 years. Approximately 2.7% ($n=31$) were children below 15 years of age. Most ($n=778$; 69%) patients were male and public facilities were the most common ($n=572$; 50.8%) source of referral. Acid fast bacilli (AFB) smears were done prior to anti-TB therapy in 91.1% ($n=1 027$) of patients and 53.0% ($n=544$) of these were AFB smear-positive. Nearly two-thirds ($n=340$; 62.4%) showed a degree of 1+ positivity on microscopy. A significant proportion ($n=993$; 88.1%) of the patients were new and predominantly ($n=1 024$; 90.9%) in category I. Pulmonary TB accounts for 96.8% ($n=1 091$) of patients treated in this centre. With a treatment success rate of 57.3%, about a quarter ($n=279$; 25%) of the patients was lost to follow-up. Nearly all (1 105; 98%) registered active TB patients were tested for HIV. About 31.9% (352) of the patients were HIV-positive. Only 14.2% ($n=50$) and 35.2% ($n=124$) of HIV-infected patients had documentation showing commencement of co-trimoxazole preventive therapy and antiretroviral drugs, respectively. Age, sex, type of TB, type of patient and HIV status have significant associations with treatment outcomes of TB patients.

Conclusion. With a high proportion of patients lost to follow-up, especially those who were co-infected with HIV, we recommend increasing efforts in TB case management and strengthening TB/HIV collaboration at the Sierra Leone's largest DOTS centre.

Sleep-disordered breathing in stroke patients in a sub-Saharan African setting

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Introduction. Sleep-disordered breathing (SDB) describes a group of disorders characterised by abnormalities in the frequency and/or depth of breathing while asleep. The most common type is the obstructive sleep apnoea/hypopnoea syndrome. Stroke is a risk factor for SDB and can also be a complication.

Objective. To determine the prevalence and risk factors for SDB among patients with a past history of stroke at the Douala General Hospital (DGH).

Methods. This was a cross-sectional study of stroke patients who were monitored at Douala General Hospital Neurology Unit for at least 3 months. We included patients aged 15 years and above with a past history of stroke diagnosed by brain imaging. Patients with other chronic respiratory diseases, cerebral venous thrombosis, subarachnoid haemorrhage and those who were bedridden were excluded. Sociodemographic and clinical data, as well as oximetric parameters and Mallampati's score were collected. Epworth sleepiness scale and Stopbang questionnaires were also administered. SDB was diagnosed with continuous arterial oximetry over one sleep night. SDB was defined by an oxygen desaturation index ≥ 5 per hour. The χ^2 test was used to investigate the risk factors of SDB. Factors with a p -value < 0.005 were then integrated into a multivariate logistic regression model to identify the independent factors associated with SDB.

Results. A total of 110 patients were recruited. Among them, 72 (65%) were male, giving a sex ratio of 1.8. The median age was 58.50 years (interquartile range 52 - 63). The prevalence of SDB was 71.8%. Factors associated with SDB were android obesity ($p=0.001$), high Mallampati score ($p=0.003$) and high score for the Stopbang questionnaire ($p=0.017$). After multivariate analysis, only android obesity (OR 3.75; 95% CI 1.41 - 9.99; $p=0.008$) and a high score of Mallampati (OR 4.37; 95% CI 1.15 - 16.61; $p=0.030$) appeared as independent associated factors for SDB.

Conclusion. Three patients out of four stroke victims had an SDB. Screening and management of android obesity could reduce the burden of post-stroke sleep disordered breathing.

Clinical aspects and outcomes of haemoptysis in the respiratory unit of the Douala General Hospital, Cameroon

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Introduction. Haemoptysis is the coughing up of blood coming from the lower respiratory tract. Its unpredictable nature requires

an aetiological approach and adequate therapeutic management.

Objective. To describe the clinical aspects and the outcome of patients with haemoptysis in the respiratory unit of the Douala General Hospital.

Methods. The study was carried out in the pneumology unit of the Douala General Hospital. It was a descriptive study including records of patients with haemoptysis, aged 15 years and above who were admitted in the unit between January 2009 to December 2016. Socio-demographical data, clinical characteristics, causes of haemoptysis and outcome were collected using a structured data collection sheet. Data were analysed using SPSS version 20 software. Ethics approval was obtained from the ethical review board of the University of Douala.

Results. A total of 183 records of patients were included during the study period. The male to female sex ratio was 1.65. The mean (standard deviation) age of patients was 43.43 (16.58) years. The 25 - 34 age group was the most affected. The majority of our patients (72.7%) were living in Douala. Haemoptysis was mild in 84.2% of cases, moderate in 9.8% of cases, and massive in 6.0%. Mild anaemia was found in 50 patients (35.97%). Sputum smear for acid fast bacilli was performed in 121 patients and 44 (36.4%) had positive smears. Chest X-ray was performed in all patients and was abnormal in 94.5% of cases. Bronchoscopy was performed in 63 patients (34.4%) - it was normal in 35 patients (55.6%). The main aetiologies were pulmonary tuberculosis (33.88%), sequelae of tuberculosis (27.87%), acute bacterial pneumonia (15.85%), and lung cancers (13.93%). The outcome was marked by death in 6.01% of cases.

Conclusion. Our study showed that haemoptysis affects men more than women. The 25 - 34 age group was most affected. Mild haemoptysis was predominant and accompanied mostly by mild anaemia. Pulmonary tuberculosis (active or sequelae) was the most frequent cause followed by bacterial pneumonia.

A case series report of tuberculosis patients with vitamin D deficiency in Zambia

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Introduction. An association of vitamin D deficiency with tuberculosis remains a valid assumption. It has been observed that TB is highly prevalent in certain ethnic groupings and regions of the world. Populations with darker skins are prone to vitamin D deficiency. The regions inhabited by people with darker skin coincides with high TB burden settings. Vitamin D has a key role in immune modulation of the host response to *Mycobacterium tuberculosis*. Studies have demonstrated early sputum culture conversion to negative, clinical recovery and radiological improvement with vitamin D supplementation. However, there is currently no consensus on the advantages of its supplementation in TB treatment. We present the first case series report of pulmonary TB patients with severe deficiency of vitamin D in Zambia.

Method. We enrolled 3 participants who were selected randomly from the TB patients in admission. A questionnaire was administered

to collect information on clinical characteristics, diet and outcome at two months. A blood sample was collected for vitamin D level assessment.

Results. Serum vitamin D levels for patients 1, 2 and 3 were 20.5 ng/mL (deficient), 14.6 ng/mL (insufficient) and 13.4 ng/mL. Patient 2 and 3 had prolonged hospital stays. The outcome at 2 months for patient 3 was mortality.

Conclusion. The evidence so far links vitamin D deficiency with increased susceptibility to TB infection and reactivation. Severe vitamin D deficiency could be associated with poor outcome. Longitudinal studies are needed to demonstrate association, efficacy and safety of its supplementation.

Multidrug-resistant tuberculosis patients presenting with bronchiectasis and usefulness of the six-minute walk test: A case series report and literature review

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Introduction. Multi-drug resistant Tuberculosis (MDR-TB) is associated with extensive lung damage which impinges on the quality of life during and post-treatment. The six-minute walk test (6-MWT) demonstrates significance in predicting the cardiopulmonary functional status in tuberculosis patients with bronchiectasis. We present a case series of MDR-TB patients with the multifarious manifestation of bronchiectasis and response to the 6-MWT.

Methods. The study population were MDR-TB patients in the intensive phase of treatment admitted at the University Teaching Hospital, Zambia at that time. A questionnaire was administered to establish the presence of symptoms and physical examination was done to elicit signs like finger clubbing, crepitations and crackles. All patients had a high-resolution computed tomography (HRCT) of the chest done. 6-MWT was done as outlined by the American Thoracic Society guidelines. Respiratory and heart rates were monitored. A pulse oximeter was used to monitor the pulse and oxygen saturation.

Results. We found bronchiectasis can occur in primary MDR-TB, which is attributed to overwhelming inflammatory response and delay in diagnosis. Mycetoma was a common complication.

Conclusion. The 6-MWT was found to be useful as a bedside tool for predicting functional status. MDR-TB should be promptly diagnosed to prevent life-limiting sequelae. The findings in this case series challenge the assumption that MDR-TB is less virulent and calls for more studies to understand its pathogenesis.

Impact of Xpert MTB/RIF assay on MDR-TB treatment success rates in a health District in South Africa

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Introduction. The Xpert MTB/RIF assay rapidly diagnoses rifampicin resistance, which enables early initiation of second line TB treatment. However, the impact of an earlier MDR-TB diagnosis on treatment outcomes is unknown.

Objective. To compare MDR-TB treatment outcomes in cases diagnosed with smear/culture and Xpert®.

Methods. A retrospective cohort study with cohorts defined by the diagnostic assay used in presumptive TB cases. Data were extracted from DR-TB registers including cases from January 2012 - April 2014. Treatment outcomes were assessed at recorded clinical end-points or after two-years for those completing treatment.

Results. 718 patients were enrolled into study. Cure rate ($n=148$) 43.4% in smear/culture group and ($n=118$) 33.5% in Xpert group ($p=0.01$). There were no significant differences between the two groups in terms of gender; age and referral facility. The smear/culture group had a higher proportion of previously-treated TB cases ($p<0.01$). In the smear/culture cohort 272 of 354 (76.3%) were HIV-positive, while 271 of 345 (78%) in the Xpert cohort were HIV-positive. Treatment success rates were 54.0% ($n=195$) and 45.2% ($n=159$) for the smear/culture and Xpert cohorts, respectively ($p=0.01$). Xpert reduced median time to MDR-TB treatment initiation to 18.7 days from 75 days in the smear/culture group ($p=0.01$). Xpert diagnosis (adjusted odds ratio (aOR) 0.38; $p<0.01$) and male gender (aOR 0.57; $p=0.02$) were associated with treatment success. Xpert increased the risk of being lost to follow-up (aOR 2.55; $p<0.01$) and time to sputum culture conversion from 4 to 5 months (log rank test $p=0.01$). Time to treatment initiation was not associated with treatment success in logistic regression analysis.

Conclusion. Despite rapid treatment initiation, MDR-TB treatment success rates were poorer in those diagnosed with Xpert MTB/RIF assay and in males. Additional studies are required to assess possible factors influencing DR TB outcomes.

Contribution of community health volunteers in referral of tuberculosis patients in Kenya: A validation

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Introduction. Studies have shown that incorporating the services of Community Health Volunteers (CHVs) in TB control programmes can lead to early detection of TB cases, minimises the number of missed cases and ultimately helps in achieving desired health outcomes. In Kenya, all Presumptive TB cases referred by CHVs, if confirmed with TB should be recorded in the facility TB register as having been referred by a CHV. However, the proportion of TB patients referred by CHVs has remained constantly very low at 4% for the last five years despite the intensive investment under the support of Global Fund.

Objective. To determine the actual proportion of notified TB patients that are referrals by CHVs and identify the factors that may be contributing to their incorrect recording and reporting in Kenya.

Methods. This was a cross-sectional study of patients who were in the intensive phase of treatment for drug sensitive TB in Kenya conducted between January and April 2017. Data were collected using a pre-designed mobile phone electronic based questionnaire in KOBO collect. Data were analysed using SPSS and descriptive analysis was conducted to get the proportion of patients referred by CHVs. Inferential statistics were also conducted to determine the factors contributing to incorrect documentation of patient referrals, while multivariate analysis was used to control for confounders.

Results. The proportion of TB patients referred by CHVs was 18%. The first point of entry at the health facility was found to be a factor for correct or incorrect recording and reporting. At every entry point of the health facility, the proportion of incorrect recording was higher than correct recording with an overall incorrect recording of 72%. The odds of being recorded correctly if the TB clinic was the first entry was (1.859; 95% CI 1.003 - 3.446). Out of the 355 patients who said they were referred by a CHV, only 24.8% ($n=88$) were notified to the national TB program as referral by CHVs.

Conclusion. The proportion of TB patients referred by CHVs in Kenya is higher than what is usually reported. Incorrect reporting is associated to health system related problems contributing to poor documentation at all levels. However, TB clinic being the first point of patient entry when referred by a CHV has emerged to be more beneficial in ensuring correct reporting. The greatest loss of documenting CHV referrals is during notification to the national TB programme.

Predictors of IPT non-completion in HIV-infected patients in two high-volume faith-based health facilities in Kenya

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Introduction. Tuberculosis (TB) is the leading cause of death among people living with HIV (PLHIV). Administration of isoniazid preventive therapy (IPT) reduces the risk of developing active TB among PLHIV in Kenya, which is a high-TB-burden country. In line with the WHO guidelines, Kenya rolled-out the administration of 6-month IPT to all eligible PLHIV in 2014. Completion rates have been sub-optimal, with paucity of studies to ascertain why. CHAP Uzima is a CDC funded HIV care and treatment program working in faith-based and affiliated health facilities in Kenya.

Objective. To assess the patient level predictors of IPT non-completion among PLHIV.

Methods. This was a retrospective cohort analysis of routinely collected programme data in two high volume CHAP Uzima supported health facilities. We included all TB-free HIV infected adults and children aged above 2 years who were initiated on IPT between July 2015 and July 2017. Data were extracted from an electronic medical records system. Multivariate analysis was carried out to determine predictors of IPT non-completion.

Results. Of the 3 563 patients initiated, 756 (21%) did not complete IPT. Median time to non-completion was 3 months (IQR 3 - 4). Predictors of non-completion were age below 25 years (OR 1.5; 95%CI 1.157 - 1.907; $p=0.002$), having detectable viral load (OR 3.5; CI 2.33 - 5.17; $p=0.005$), and currently being on second-line antiretroviral therapy (OR 1.2; CI 1.01 - 1.30; $p=0.04$). Patients aged 15 - 19 years had the highest non-completion rate (31%). There was no statistical difference by baseline CD4 cell count for patients with IPT non-completion (OR 0.951; CI 0.802 - 1.127; $p=0.563$).

Conclusion. Among PLHIV initiating IPT in Uzima CHAP-supported health facilities, non-completion is more likely in patients who are younger and more so adolescents, patients on second line therapy and those classified as virally unsuppressed. Programs initiating IPT should consider paying closer attention to these patient groups including enactment of patient treatment preparation and enhanced adherence counselling prior to IPT initiation. More studies on the specific reasons for non-completion are recommended.

Peripheral arterial disease among patients with chronic obstructive pulmonary disease attending the chest clinic at a tertiary hospital in Nairobi, Kenya

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Introduction. Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality worldwide. Cardiovascular disease (CVD) has been shown to be the leading causes of death among COPD patients. Peripheral arterial disease (PAD) is an atherosclerotic process that is characterised by an increased risk of coronary and cerebrovascular ischaemic events. PAD has been shown to occur with greater frequency among COPD patients compared to the general population. There are no data on the burden of PAD among COPD patients in Kenya.

Objective. To determine the prevalence of PAD and the prevalence of some associated cardiovascular risk factors among COPD patients at a tertiary urban hospital in Nairobi, Kenya.

Methods. Patients with a spirometry diagnosis of COPD attending the chest clinic in KNH were consecutively recruited until the minimum desired sample size of 78 patients was achieved. Ankle-brachial index (ABI) was measured using a handheld Doppler device, and blood samples were drawn to analyse for fasting lipid profile, fasting blood sugar and high-sensitivity C-reactive protein (hsCRP).

Results. The overall prevalence of PAD was 7.5%. Hyperlipidaemia was the most common cardiovascular risk factor at 47.5%, followed by hypertension at 46.3% and diabetes at 8.8%. Twenty-one percent of the patients were obese, and 96.3% of the patients had hsCRP levels >3 mg/L. Only two patients had symptomatic PAD.

Conclusion. The study demonstrated a low prevalence of PAD and a high prevalence of PAD-associated cardiovascular risk factors among our COPD patients. Of the patients who had PAD, only two were found to be symptomatic.

Prevalence and associations of non-smoking chronic obstructive pulmonary disease at a tertiary hospital in Nairobi, Kenya

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Introduction. Non-smokers comprise a substantial proportion of patients with chronic obstructive pulmonary disease (COPD). Its pathogenesis is poorly understood and documented. No previous studies have been conducted to evaluate its prevalence and associated risk factors in Kenya.

Objective. To establish the prevalence of non-smoking COPD among patients on follow-up for COPD at a tertiary level hospital in Kenya.

Methods. We conducted a cross-sectional study among patients followed up with a diagnosis of COPD at a chest clinic at a tertiary level facility. Spirometry was performed on consecutive participants with a diagnosis of COPD. Those meeting the criteria for fixed airway disease (FEV₁/FVC 70% predicted) completed an interviewer-administered questionnaire to identify selected risk factors for COPD on the basis of previous studies. We defined non-smoking COPD as a post-bronchodilator FEV₁/FVC) 70% in a person who had not smoked tobacco.

Results. Between February and May 2016, 84 patients satisfied the inclusion criteria and consented to participate in this study. Males accounted for 72.6% of the participants. The prevalence of non-smoking COPD was 39.3%. The main risk factors in these participants were poorly controlled asthma (66.7%), exposure to biomass fuel (81.8%), history of childhood respiratory tract disease (40.6%) and history of tuberculosis (36.4%).

Conclusion. Non-smoking COPD is common and is associated with low socioeconomic background with a strong history of biomass fuel exposure (from poor ventilation in the cooking area), recurrent childhood pulmonary infections, past tuberculosis, and poorly controlled or chronic asthma.

Diagnostic value of a lateral flow-urine lipoarabinomannan assay in adults with suspected pulmonary tuberculosis at two urban hospitals in Nairobi, Kenya

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Introduction. Tuberculosis (TB) remains a leading cause of morbidity and mortality globally, with low and middle-income countries being disproportionately affected.

Objective. To determine the diagnostic value of the lateral flow urinary lipoarabinomannan (LAM) assay as a point-of-care diagnosis among adult patients with active pulmonary TB.

Methods. The study population consisted of ambulatory and hospitalised patients being investigated for active pulmonary TB at two urban hospitals in Nairobi, Kenya. A total of 241 consecutively sampled adults presenting with features of pulmonary tuberculosis were included. Urine samples were obtained for the ULAM assay and sputum samples for Ziehl-Nielsen (ZN) microscopy, Xpert MTB/Rif test and liquid TB culture. All participants received counselling and testing for HIV infection. CD4+ cell counts were determined for HIV positive patients. Sensitivity, specificity, positive and negative predictive values of the TB diagnostic tests were computed; the liquid culture was used as the gold standard.

Results. Sensitivity of the urine LAM assay was low when applied to a heterogeneous population, 28.6% (95% CI 20.6 - 38.3%). The sensitivity in the HIV-negative patients was, 12.7% (95% CI 6.4 - 23.5%) compared with 58.8% (95% CI 42.2 - 73.6%) in HIV infection. When combined with sputum ZN microscopy, then with sputum XpertMTB/Rif test, the sensitivity increased to 70.6% and 96.2%, respectively. In HI-infected cases, sensitivity of the urinary LAM assay increased as the CD4+ count decreased being 76.5%, (95% CI 52.1 - 90.8%); 65.4% (95% CI 46.1 - 80.6%) and 33.3% (95% CI 6.2 - 79.5%) at CD4 cell counts of 50 and 200 cells/ μ L respectively. Specificity of the urine LAM assay was lower when applied to the HIV-positive patients compared with the HIV-negative population (85.1%; 95% CI 74.4 - 91.8% v. 93.6%; 95% CI 86.4 - 97.3%, respectively).

Conclusion. The lateral flow urine LAM assay, as an easy to perform, point-of-care test, can contribute to improvement in case detection of pulmonary TB especially in TB/HIV co-infected cases with severe immunosuppression (CD4+ counts of \leq 200 cells/ μ L).

Assessment of sputum smear-positive but culture-negative results among newly diagnosed pulmonary tuberculosis patients in Tanzania

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Introduction. Diagnosis of pulmonary tuberculosis (TB) in technology-limited countries is widely achieved by smear microscopy, which has limited sensitivity and specificity. The frequency and clinical implication of smear-positive but culture-negative among presumptive TB patients remain unclear.

Methods. A cross-sectional study was conducted to identify the proportion of nontuberculous mycobacteria (NTM) infections among 94 smear-positive culture-negative patients diagnosed between

January 2013 and June 2016 in selected health facilities in Tanzania. **Results.** Out of 94 sputa, 25 (26.60%) were GeneXpert TB-positive and 11.70% ($n=11/94$) were repeat-culture positive; 5 were Capilia TB-Neo positive and confirmed by GenoType MTBC to be *Mycobacterium tuberculosis/Mycobacterium canettii*. The remaining 6 Capilia TB-Neo negative samples were genotyped by GenoType CM/AS, identifying 3 (3.19%) NTM, 2 Gram-positive bacteria, and 1 isolate testing negative, which produced a total of 6/94 (6.38%) confirmed false smear-positives. Twenty-eight (29.79%) were confirmed TB cases, while 60 (63.83%) remained unconfirmed cases. Out of 6 (6.38%) patients who were HIV-positive, 2 patients were co-infected with mycobacteria. **Conclusion.** The isolation of NTM and other bacteria among smear-positive culture-negative samples and the presence of over two-thirds of unconfirmed TB cases emphasise the need of both advanced differential TB diagnostic techniques and good clinical laboratory practices to avoid unnecessary administration of anti-TB drugs.

Management of bronchiolitis in an HIV endemic area: Are Standard Treatment Guidelines being followed?

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Introduction. Bronchiolitis is a common cause of lower respiratory tract infection in children. Standard Treatment Guidelines (STG) have been developed to optimise bronchiolitis care at hospital level. The extent of its use and factors influencing guideline adherence is not known in South Africa.

Objective. To determine whether the STG for the bronchiolitis management were utilised in the management of children admitted with bronchiolitis at King Edward VIII Hospital, Durban, KwaZulu-Natal.

Methods. This study was a retrospective chart audit of children admitted between 1 January 2015 and 31 December 2015. Data including demographics and treatment modalities were collected. Guideline adherence assessment was based on the protocolled management of bronchiolitis as stipulated by STG 2013. For categorical variables (HIV exposure, nutritional status), subgroup comparisons according to adherence were made using χ^2 and Fisher's exact tests. The Wilcoxon Rank Sum test was used for testing associations between length of hospital stay and protocol adherence.

Results. A total of 192 infants were enrolled in the study. Of these, 66% were HIV-exposed. The majority (92%) were well-nourished. Full adherence to STG was found in 24% of participants. There was no association between adherence to STG and HIV-exposed/unexposed status or nutritional status respectively ($p>0.05$). The mean length of hospital stay was not significantly different depending on adherence or non-adherence 5.1 versus 4.3 days, respectively. One death was reported in the non-adherent group.

Conclusion. There is poor adherence to the STG for bronchiolitis, though this did not impact morbidity and mortality. Future multi-centre studies with the recently published bronchiolitis recommendations assessing adherence to protocols with pre- and

post-intervention studies after training of personnel, may provide more evidence of the implications of lack of guideline adherence.

A case of haemoptysis in a girl with Noonan syndrome

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Introduction. Haemoptysis is the expectoration of blood originating from the lower respiratory tract. It is uncommon in children, but can be life threatening. The most common causes are respiratory tract infections, aspirated foreign bodies and bronchiectasis. Noonan syndrome (NS) is an autosomal dominant condition characterised by distinctive facial features, congenital heart disease and multiple comorbidities including haematological abnormalities. Bleeding disorders have been reported in up to 65% of patients with NS. Perfusion of the lower respiratory system arises from the pulmonary arterial circulation and the bronchial circulation, and bleeding may arise from either.

Methods. Case report. We describe a 7-year-old girl with NS who presented with recurrent episodes of haemoptysis from 6 years of age. She was known to have pulmonary stenosis, with transannular patch repair, and post-operative severe pulmonary regurgitation. Initial work-up suggested a diagnosis of Von Willebrand disease, as her Von Willebrand factor activity was 37%, with an acute pneumonia as the cause of haemoptysis. Chest X-ray and a computed tomography scan showed a right lower lobe (RLL) dense consolidation. Flexible bronchoscopy revealed an inflammatory polyp with 75% obstruction of the orifice of the RLL. The inflammatory polyp and lobar pneumonia were then thought to be the cause of the haemoptysis, which was exacerbated by her underlying haematological abnormality. She was treated with antibiotics, however the haemoptysis persisted. She underwent cardiac catheterisation and an angiogram showed a tortuous right bronchial artery forming a confluence with an abnormal vessel arising from the right common carotid artery with extravasation of blood into the RLL. She had a successful right bronchial artery embolisation and was stable post-procedure. After a further rigid bronchoscopy the patient had another episode of haemoptysis. Ultimately a lobectomy was performed and no further bleeding reported.

Conclusion. Although this patient had NS with an increased risk of bleeding, the cause of her haemoptysis was an abnormal bronchial artery supplying blood to the right lower lobe. This case illustrates the importance of being systematic when investigating any patient with haemoptysis, as the cause may be unrelated to the underlying diagnosis.

Prevalence of respiratory symptoms among small-scale wood furniture workers in the Zimbabwe informal sector industry

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Introduction. Occupational exposure to wood dust has been implicated in respiratory health problems ranging from impaired lung function, chronic bronchitis and asthma. In Zimbabwe, there are numerous small-scale wood furniture workers operating under poor working conditions due to economic hardships. These workers are exposed to multiple occupational hazards such as wood dust, cotton dust and environmental pollution. There is no morbidity and mortality data on respiratory health of wood furniture workers in Zimbabwe.

Objective. To determine the most common respiratory symptoms among small scale wood workers and also estimate exposure levels.

Methods. A descriptive cross-sectional survey was conducted among small-scale wood furniture workers at Glenview Home Industry. A modified British Medical Research Council interviewer administered questionnaire on respiratory symptoms (cough, phlegm, wheezing and breathlessness), employment history and smoking habits was used for data collection. Total inhalable wood dust samples were collected using 3-piece dust collectors with 37 mm glass fibre filters. Five area (static) samples and 5 personal samples were collected at strategic points over a minimum period of 4 hours and analysed by gravimetric methods. Results were analysed using Stata version 13.

Results. A total of 161 participants were recruited with median (interquartile range) age of 25.4 (22.5 - 31.4) years. The prevalence of respiratory symptoms was 77.6% (95% confidence interval (CI) 71.1 - 84.1). The prevalence by individual symptom was: cough 52.2% (95% CI 44.4 - 60.0); phlegm 49.7% (95% CI 41.9 - 57.5), wheezing 41.6% (95% CI 33.9 - 49.3), and breathlessness 21.7% (95% CI 15.3 - 28.2). Comparatively, personal wood dusts samples were higher than area wood samples. Out of the 5 personal samples, the minimum total dust concentration was 0.6 mg/m³ and the maximum was 26.2 mg/m³. For the 5 area samples, the total dust concentration ranged from 0.6 - 11.7 mg/m³.

Conclusion. Prevalence of respiratory symptoms among small-scale wood furniture workers is very high. Majority of findings from exposure samples (both area and personal) showed levels above the set American Conference of Government Industrial Hygienists Occupational Exposure Limits (2014) for soft wood dust. Results suggest the need for targeted interventions that focus on the reduction of wood dust exposure among wood furniture workers.

Health-seeking behaviour among individuals with cough symptoms at regional referral hospitals in Uganda: Missed opportunity for early tuberculosis diagnosis

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Introduction. Studies on delays in the diagnosis of tuberculosis (TB) in Africa have revealed important patient-related factors, as well as health system inefficiencies.

Objective. To assess the health-seeking behaviour among individuals who were presumptive TB cases presenting with a cough at regional referral hospitals.

Methods. A cross-sectional study of adult presumptive TB patients conducted from October 2015 - December 2016 at five regional referral hospitals in Uganda. All study participants were interviewed about TB symptoms, health-seeking behaviour following cough symptoms, and had a GeneXpert test done.

Results. Of the 1 862 participants interviewed, the majority ($n=1\ 795$; 99.9%) reported cough as a symptom, followed by fever ($n=1\ 223$; 68%), weight loss ($n=1\ 192$; 66.4%), night sweats ($n=1\ 161$; 64.6%) and haemoptysis ($n=235$; 13.1%). Of the respondents, 75% ($n=1\ 352$) had sought care for their cough and this was mainly at public health facilities (60%), followed by private health facilities (21.4%), and drug stores/pharmacies (13.5%). Of those that sought care at public health facilities, only 27.5% were asked to provide a sputum sample. Only 13.5% of those that sought care from a private health facility were asked to provide a sputum sample. The estimated crude odds ratio of the association between seeking care at a private health facility and positivity on GeneXpert was 1.5 (95% confidence interval 1.1 - 1.9; $p=0.011$)

Conclusion. Cough is the main symptom for presumptive TB patients at regional referral hospitals. The study revealed there are still health system inefficiencies for patients who make an attempt at seeking care that could result in delayed diagnosis especially in instances where patients are not asked to provide a sputum sample for testing. Improved TB diagnosis at first contact with the healthcare system has the potential to increase TB case finding and break the cycle of transmission in the community.

Early outcomes of minimally invasive video-assisted thoracoscopic decortication: A single-centre initial experience

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Introduction. The role of video-assisted thoracic surgery (VATS) approach in inflammatory thoracic conditions has not been widely accepted. The adoption of this approach by sporadic units has shown its' effectiveness in the management of advanced stages of empyema.

Objective. To show that the aetiology and stage of empyema does not significantly alter the outcomes of minimally invasive decortication.

Methods. We retrospectively reviewed 34 patients who underwent minimally invasive clear-out and decortication for empyema at the Klerksdorp/Tshepong Hospital cardiothoracic unit between October 2015 and November 2017.

Results. We performed a total of 37 VATS decortications on 34 patients; the male:female ratio was 3.1. Of the cases, 67% were due to trauma, 32% were non-traumatic (66% were due to TB and the rest were post-pneumonic) and there was a case of complicated liver abscess. Of the two aetiologic subgroups, 66% of the non-trauma and 28% of trauma group were HIV-positive. In the non-trauma group, 33% had active TB and 33% had a previous history of TB. The early post mortality rate for the entire cohort was 0%. There was

no statistically significant difference between the trauma and non-trauma groups in the operative time (131 (51) min v. 135 (5) min; $p=0.44$), mean blood loss (732 mL v. 894 mL; $p=0.26$), conversion rate (8% v. 8.3%), reoperation rate (16% v. 0%; $p=0.28$) and hospital stay (15 (14) days v. 15 (12) days; $p=0.49$), respectively. The majority of conversions were in those needing reoperation. All the reoperations were in the trauma group and a subgroup analysis showed that the reoperation rate was not significantly different ($p=0.55$) in those with stage II empyema (16%) v. stage III (0%).

Conclusion. Minimally invasive clear-out of the pleural space and decortication of the lung is a technically feasible operation regardless of the aetiology or stage of empyema. Our sample size constitutes a small cohort and an early experience and we therefore plan to conduct a prospective study to further evaluate this surgical approach.

Health workers' practices in assessment and management of children with respiratory symptoms in primary care facilities in Jinja district Uganda: A descriptive study

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Introduction. Asthma is the most common chronic childhood condition worldwide, with increasing prevalence in middle- and low-income countries. However, asthma is largely under-diagnosed, particularly in children younger than 5 years of age. Diagnosis of childhood asthma is largely reliant on good history and physical examination.

Objective. To describe the health workers' practices in diagnosis and management of respiratory illnesses among children, with emphasis on asthma, in rural primary care centres in Uganda.

Methods. Health workers' clinical practices were observed during consultations with children under 5 years of age, who presented with cough and/or difficult breathing. A short interview with the caregiver, as well as a short health facility survey, was conducted following the consultation. Data were analysed using descriptive statistics.

Results. Fifty health workers were observed during 220 consultations at six different health centres. The average consultation time was 4 minutes (interquartile range 3 - 5). The key symptoms of asthma, recurrent cough, difficult breathing and wheezing, were elicited in only 5% of the consultations. The respiratory rate and chest-in-drawing were assessed in only 10% of consultations. Pneumonia and asthma were diagnosed in 16.5% ($n=36$) and asthma in 0.5% ($n=1$) of the consultations. Antibiotics were prescribed to 32% of all the children but to only 39% of the children diagnosed with pneumonia. In the majority (95%) of consultations, health workers did not explain the diagnosis and management plan to the caregivers.

Conclusion. Clinical practices among Ugandan health workers in primary care are insufficient to aid correct identification of asthma and other respiratory diseases in young children. Irrational use of antibiotics is widespread. Interventions to improve the health workers' awareness, knowledge and skills for diagnosis and management of asthma are urgently needed.

Whole-genome sequencing of *Mycobacterium tuberculosis* directly from sputum identifies more minority variant mutations than sequencing from culture

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Introduction. *Mycobacterium tuberculosis* high-throughput whole-genome sequencing (WGS) reveals the presence of minority genetic variant (MGV) single nucleotide polymorphisms (SNPs) representing mycobacterial subpopulations within individual patients. WGS is usually performed on cultured isolates, even though this can alter the original population structure, because WGS directly from sputum without enrichment yields insufficient DNA for deep genome coverage. SureSelect oligonucleotide enrichment technology (Agilent, USA) can obtain purified *M. tuberculosis* DNA directly from sputum. Here, we compare MGVs identified after sequencing from enriched sputum and culture.

Methods. Paired sputum samples from 36 patients (22 with drug-sensitive tuberculosis (DS-TB) and 24 with rifampicin-resistant (RR) TB) were analysed. DNA was extracted directly from one sample, with the other inoculated into MGIT (mycobacterial growth indicator tube) until it flagged positive. DNA from sputum samples underwent SureSelect enrichment. All samples were sequenced on a NextSeq.

Bioinformatics analysis was performed using CLC Genomics Workbench v10. Mapping was performed to H37Rv and MGVs called when more than one nucleotide was reported at a genetic location, each with minimum 10 supporting reads including one in each direction. Variants in or near PE/PPE regions were excluded.

Results. More than twice as many MGVs were identified in directly sequenced sputum samples than in MGIT samples (1 547 v. 632). Direct sputum samples contained 684 intergenic, 370 synonymous and 493 non-synonymous MGVs, while MGIT samples contained 204, 188 and 240, respectively. The mean coverage was similar between MGIT and sputum samples (191.1 v. 184.3; $p=0.89$). Sequencing directly from sputum identified median 24 MGVs per sample compared with 10 in MGIT ($p<0.001$), and more than twice as many MGVs across the dataset.

Conclusion. Sequencing directly from sputum identifies more MGVs compared with the MGIT. This contradicts the findings of one other study that has sequenced directly from sputum, which may be due to greater coverage depth and patient numbers in our study. Our findings support data from other studies, which suggest that subculture leads to a loss of MGVs. Direct sputum sequencing may better represent true mycobacterial genetic diversity within patients and have a role in investigating heteroresistance.

Metastatic thyroid carcinoma of the lung – a case report

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Introduction. Thyroid carcinoma is rare in children and accounts for only 0.5 - 3.0% of childhood malignancies. It commonly presents as a painless neck nodule. The clinical behaviour is aggressive in children with regional nodal metastasis occurring in 60 - 80% and 20% of cases, respectively, at presentation.

Methods and results. We discuss a 9 year-old-girl who presented with severe respiratory distress and hypoxia, with 3 months' history of weight loss and chronic cough. On examination, she was cachexic with proptosis. There was bilateral hard-matted cervical lymphadenopathy. Chest X-ray showed a diffuse reticulonodular infiltrate pattern without lymphadenopathy. Presumptive diagnosis of disseminated tuberculosis was made before lymph-node histology confirmed papillary thyroid carcinoma. Unfortunately, she succumbed after 6 days of admission and mechanical ventilation. Post mortem tru-cut biopsy of both lungs confirmed metastatic thyroid carcinoma of the lung.

Conclusion. Lung metastatic disease, although rare, should be considered in the differential diagnosis of a child who presents with a reticulonodular pattern infiltrate on chest radiograph as prognosis will be poor without early diagnosis and treatment.

Effect of wood smoke on the respiratory health of workers in a semi-urban community in Niger Delta, Nigeria

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Introduction. The process of charcoal production directly exposes workers to wood smoke. Persistent inhalation of wood smoke causes irritation of the respiratory tract, precipitates respiratory diseases and exacerbates symptoms of pre-existing conditions.

Objective. To assess the effect of wood smoke on the respiratory health of charcoal workers in a semi-urban community in Niger Delta, Nigeria.

Methods. This cross-sectional comparative study involved an equal number of traders who were matched with charcoal workers for age, height and sex with charcoal workers. A modified version of the British MRC questionnaire on chronic work-related respiratory symptoms among workers was employed to assess respiratory symptoms. Indices of lung function capacity were measured with a hand-held spirometer. SPSS was used for analysis. Odds ratio, McNemar's, paired-*t*, and χ^2 tests were performed to test the significance between exposure and outcome. Logistic regression was used to adjust for smoking, domestic biomass use and age.

Results. Charcoal workers had a higher prevalence of respiratory symptoms than controls: chronic cough (9.5% v. 0.0%), productive cough (13.5% v. 3.6%), breathlessness (19.6% v. 13.5%), nasal discharge (34.9% v. 16.2%), chest tightness (8.8% v. 0.0%) and wheeze (8.8% v. 5.4%), respectively. There was no significant association between work duration and job description, and respiratory symptoms ($p > 0.05$), although workers were more likely to have chronic cough,

productive cough, wheeze, breathlessness, chest tightness and nasal discharge. Only wheeze was significant after adjusting for age, biomass use and cigarette smoking (odds ratio 4.22; 95% confidence interval 1.37 - 12.99). More charcoal workers had COPD (9.5%) than occupational asthma (6.7%); no control had these conditions. Predicted values of FVC, FEV₁, FEV₁/FVC ratio and PEF were higher among controls than charcoal workers; however, the difference was not significant ($p > 0.05$). The mean values of FEV₁ and FVC were considerably lower for workers, whereas FEV₁/FVC ratio and PEF were higher among workers ($p = 0.05$).

Conclusion. Respiratory symptoms and diseases were more prevalent among charcoal workers who also had reduced lung function capacity. Instituting interventions to reduce workers' exposure would be an all-important course to pursue if they are to remain healthy and in business.

Air quality at charcoal kiln sites in a developing nation in sub-Saharan Africa

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Introduction. In Nigeria, at least 1 in 10 000 people die from diseases caused or worsened by air pollution each year. Charcoal production is majorly fraught with emission of wood smoke, which significantly pollutes air; even fine particles in the smoke can be persistently suspended in air and be inhaled by unsuspecting persons in the environment. Such pollutants are known to instigate and complicate respiratory diseases culminating in deaths in those affected in Niger Delta.

Objective. To estimate the concentration of air pollutants at charcoal production sites in a community in Niger Delta, Nigeria to highlight how far they deviate from WHO air quality standards.

Methods. This was a cross-sectional study in which air quality was assessed at charcoal kiln sites with a hand-held air tester (model CW-HAT 200) to measure particulate matter concentration; and gases were measured with environmental sensor kits (Z-1300(SO₂), Z-900(H₂S), Z-1200(O₃), Z-700(NO), and Z-1500(NH₃)). Analysis was done with SPSS and ANOVA compared mean differences in air pollutants. Air quality index was calculated using PM_{2.5} because it is a pollutant majorly derived from combustion of wood.

Results. The maximal PM_{2.5} and PM₁₀ values at the kiln sites ranged from 20 - 1 064 $\mu\text{g}/\text{m}^3$, and 23 - 507 $\mu\text{g}/\text{m}^3$ respectively. At the majority (83.3%) of the sites, PM_{2.5} and PM₁₀ were higher than WHO standards. The mean concentrations of PM_{2.5} and PM₁₀ were 146.58 $\mu\text{g}/\text{m}^3$ and 359.33 $\mu\text{g}/\text{m}^3$, respectively, and were 5 times more than WHO standards. The air quality at one third (33.3%) of all the sites was very unhealthy but highly hazardous at a site; only two sites had moderately healthy air quality. Average concentrations of ozone, hydrogen sulphide and ammonia at charcoal production sites were significantly higher than within 100 m of the sites and 500 m away. However, nitric oxide was highest within a 100 m of the sites. The average concentration of sulphur dioxide was higher than WHO standard.

Conclusion. The concentrations of air pollutants from charcoal

production are enormous and deviate from acceptable limits. Charcoal workers would need to use improved devices which emit lesser amounts of toxic substances for their long-term health benefit.

Outcomes of bullectomy in a South African patient cohort

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Introduction. Bullous lung disease is not uncommon in the South African population and commonly presents as a spontaneous pneumothorax (SP).

Objective. To ascertain the indications for bullectomy and short-term outcomes of the procedure.

Methods. An ongoing retrospective study of patients who underwent bullectomy between 2011 and 2017 at Groote Schuur Hospital. Preoperative data (demographics and symptomatology), intraoperative and postoperative data were collected.

Results. Records of 54 patients have been reviewed thus far. The male to female ratio was 2:1 with a mean (standard deviation (SD)) age and mean (SD) body mass index of 44 (13.4) years and 21.8 (4.5) kg/m², respectively. Previous pulmonary tuberculosis (TB) and chronic obstructive pulmonary disease were seen in 44.4% and 33.3%, respectively. Most of the patients (57.4%) had a Modified Medical Research Council Scale of 1, while 46.3% were current smokers. Most patients (65%) presented with a bronchopleural fistula (air leaks) with a mean (SD) duration of 10.2 (13.4) days and the most common preoperative diagnosis was secondary SP (50%). Operative approach was by video-assisted surgery ($n=32$; 59.3%) or thoracotomy ($n=22$; 40.7%), with 6 patients being converted to thoracotomy (18.7%). Operative finding was stage IV bullae (> 2cm) in 70% of patients. Pleurectomy accompanied bullectomy in 78% of patients. The mean (SD) duration of the operation was 95.6 (39.8) minutes; 121 minutes for thoracotomy and 77.8 minutes for VATS. There was a high complication rate of 50% with air leaks in 92.5% ($n=25/27$) of patients and a mean (SD) chest tube duration of 7.5 (5) days. The mean duration of intensive care unit stay was 22 hours and this was mainly for postoperative epidural analgesia. None of the patients required postoperative mechanical ventilation. The mean (SD) postoperative hospital stay was 9.7 (6.6) days. There were no postoperative deaths. The mean (SD) follow-up duration was 1.65 (1.68) months.

Conclusion. Bullectomy/pleurectomy is a safe and effective treatment for SP secondary to bullous lung disease, with a low recurrence rate.

Prescription costs in two tertiary hospitals in mid-Western Nigeria

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Introduction. Prescription costs account for a significant proportion of the healthcare budget in developing countries with implications for affordability and access to healthcare. Routine analysis of medicine costs (using the World Health Organization (WHO) complementary drug use indicator) is necessary to generate data for planning.

Objective. To assesses the prevailing cost of medicines in tertiary institutions in Mid-Western Nigeria.

Methods. In a cross-sectional study, 1 800 prescription orders from January to December 2014 in two tertiary hospitals were analysed using the WHO complementary drug use indicator tool. Data obtained from prescription orders, including medicines prescribed, cost assigned to each medicine and aggregate cost for each prescription were analysed according to the WHO recommended guideline for complementary indicators. All costs were based on the current price list of each hospital.

Results. A total of NGN3 667 548 (USD11 461) was spent on the 1 800 patient encounters (USD1 = NGN 200 as at 2014). The cost per prescription ranged from NGN0 to NGN43 950 (USD0 - USD219.75). The average cost per prescription was NGN2 037.53 (2 515.72) (USD10.19). The percentage of total drug cost spent on antibiotics was 16.2%. Injections and antimalarials accounts for 8.2% and 8.1%, respectively, while 75.7% of the total cost was spent on all other therapeutic categories of drugs.

Conclusion. Prescription costs remain a major consideration in the Nigerian healthcare system when considering the high poverty level (minimum wage NGN18 000; i.e. USD90 per month). The findings are a reflection of the situation in most other healthcare facilities in the country and calls for determination of the causative factors and institution of a pricing mechanism.

Knowledge and attitude about obstructive sleep apnoea among resident doctors in Ebonyi State, South-East Nigeria

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Introduction. The majority of obstructive sleep apnoea (OSA) patients in Nigeria remain undiagnosed and untreated, which speaks to the need for increased awareness and suspicion among clinicians so that patients can receive optimal management. The knowledge and attitude of resident doctors in Nigeria towards obstructive sleep apnoea is not well documented.

Objective. To assess the knowledge and attitudes about OSA among resident doctors in Nigeria.

Methods. A cross-sectional study surveyed 148 resident doctors selected by systematic random sampling from specialties at the Federal Teaching Hospital, Ebonyi state, South-East Nigeria. Information was collected using a validated self-administered OSA Knowledge and Attitudes (OSAKA) questionnaire. Data were analysed using SPSS version 20 with the significance level set at 95%.

Results. Of the 148 respondents (100% response rate), 107 (72.3%) were male and 41 (27.7%) were female. The majority (75%) were aged 30 - 39 years and 64.5% were in the medical specialities. The mean knowledge score score was 9.03 (3.16); 59.5% had above-average

knowledge. Ever having managed a patient with OSA symptoms was significantly associated with good knowledge of OSA ($p=0.000$), but there was no difference by speciality-, gender- or undergraduate training-related differences. The mean positive attitude score was 3.23 (1.16), with 92% and 95% considering OSA and its identification important, respectively, while 63 - 70% were confident in their ability to identify and manage OSA patients. Postgraduate training on OSA, good OSA knowledge and having managed an OSA patient were associated with a confident attitude ($p=0.000$, $p=0.0012$, and $p=0.001$, respectively). On logistic regression, having managed an OSA patient before was a determinant of good knowledge (odds ratio (OR) 4.38; 95% confidence interval (CI) 1.92 - 9.98). Determinants of confidence in identifying and managing high risk patients were postgraduate training (OR 3.17; 95% CI 1.42 - 7.14 and OR 3.48; 95% CI 1.56 - 7.75, respectively) and ever having managed a patient with OSA (OR 2.51; 95% CI 1.05 - 5.99 and OR 2.56; 95% CI 1.18 - 5.55, respectively)

Conclusion. There was good knowledge and attitude about OSA among the surveyed resident doctors. Inclusion of training on OSA during residency across all specialties is advocated.

Caregivers' knowledge of antibiotic use in children with upper respiratory tract infections and their willingness to learn proper antibiotic use from child educators in Enugu State

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Introduction. Antimicrobial resistance (AMR) is a major public health problem. Incorrect use of antibiotics in upper respiratory tract infection (URTI) in children contributes to AMR. An objective of the Nigerian AMR action plan is to improve awareness and understanding of AMR through effective communication, education and training.

Objective. This study, the first of a two-part study, aims to determine the knowledge and practice of caregivers in the use of antibiotics for upper respiratory tract infection and their willingness to learn proper antibiotic use from child educators.

Methods. Cross-sectional descriptive study conducted between April and May, 2017 among caregivers who came to immunise children at four primary, secondary and tertiary health facilities in Enugu metropolis. Ethical approval was obtained from the University of Nigeria Teaching Hospital Health Research and Ethics Committee. Data were collected by an interviewer administered questionnaire and were analysed using IBM SPSS version 20. Discrete variables are presented as proportions and continuous variables as mean (standard deviation (SD)). χ^2 tests and Fisher's exact tests were performed on categorical variables. A p -value of 0.05 was considered significant. Knowledge scores of >80%, 60 - 80% and <60% were considered good, fair and poor knowledge, respectively.

Results. There were 292 respondents with a mean (SD) age of 31.5 (9.2) years; 65.4% were mothers, 13% were guardians, 10.6% were fathers and 6.5% were grandparents. The level of knowledge was good, fair and poor among 1.4%, 32.9% and 65.8% of participants, respectively. The majority of the respondents (60%) believed that antibiotics should

always be prescribed in URTI and 53.1% knew that antibiotics are used in the treatment of bacterial infections. Over half 54.5% had received information on proper use of antibiotics with 45.5% having heard about antimicrobial resistance. A high proportion (74.7%) had ever asked doctor to prescribe antibiotics for URTI for the child. The majority of the respondents (66.1%) were willing to learn proper use of antibiotics from their children if taught at school.

Conclusion. There is poor knowledge of antibiotic use in URTI in children and a high demand for doctor's prescription of antibiotics. Caregivers were willing to learn proper antibiotic use from their children if they are taught in school, which indicates that an opportunity exists for using children as educators in Enugu state contributing to the fight against antibiotic resistance.

Effectiveness and safety of long-term v. short-term treatment regimens of multidrug-resistant pulmonary tuberculosis in Burkina Faso

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Introduction. The emergence of anti-tuberculosis drug resistance is of big concern in several countries and impede the effectiveness of tuberculosis control worldwide. The treatment protocol in Burkina Faso was a 21-month long-term regimen (LR) and it was costly and burdensome, both for patients and health staff. Following the promising results of a 2010 study in Bangladesh, Burkina Faso decided, in 2013, to be part of a clinical trial aimed at experimenting the effects of a nine-month short-term regimen (SR), under the aegis of the International Union Against Tuberculosis and Lung Disease.

Objective. To compare the efficacy and tolerance of the LR v. the SR multidrug-resistant tuberculosis (MDR-TB) treatment in Burkina Faso.

Methods. We retrospectively compared two cohorts of patients who were followed for MDR-TB, from 1 January 2013 until 31 December 2015, in the Pulmonology Services of the University Hospitals Yalgado Ouédraogo and Souro Sanou in Burkina Faso. The first cohort was on the LR, which was based on the following drugs: pyrazinamide, kanamycin, levofloxacin, ethionamide and cycloserine. The second cohort was on the SR, based on kanamycin, moxifloxacin, prothionamide, isoniazid, clofazimine, ethambutol and pyrazinamide.

Results. A total of 80 patients were included in the study; 47 patients were on the LR and 33 were on the SR. There were more retreatment failures in patients on the LR than in those on the SR ($p=0.00$). Also, during follow-up, patients under SR had a higher mean weight than those under LR ($p=0.01$). Patients with side effects under the SR (51.5%) were not significantly more numerous than those under the LR (51.1%). All SR patients had a smear negative during control of the last three months treatment. There was significantly more therapeutic success in patients on the SR (87.9%) than in those on the LR (51.1%; $p=0.00$). More deaths were observed in patients on the LR than in those on the SR ($p=0.00$).

Conclusion. The nine-month SR was well tolerated and more effective than the 21-month LR. The SR protocol was endorsed by the WHO in 2016. Nevertheless, we must look at the matter with the wisdom of hindsight to fully appreciate its benefits.

Potential risk factors for pneumonia among children under 5 years. Findings from the Pakistan Demographic Health Survey 2012 - 2013

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Introduction. About 13 million children under 5 years of age die every year in the world; out of which 95% of these deaths occur in developing nations and one-third of total deaths are due to ARIs. Findings from the Pakistan Demographic Health Survey (PDHS) showed that ~91 000 children die from pneumonia each year. Hence, identifying potential risk factors associated with acute respiratory infections among children is an important research domain to establish evidence-based interventions.

Objective. To identify potential risk factors associated with pneumonia among children under 5 years of age from a secondary data analysis of the PDHS 2012 - 13.

Methods. The PDHS 2012 - 13 is a nationally representative population-based random cluster survey. A total of 2 429 children under 5 years of age preceding the survey were included in the analysis. Demographic characteristics, potential environmental and socioeconomic risk factors were assessed and association were seen for pneumonia. A cough accompanied by short, rapid breathing that is chest-related was used as the operational definition of pneumonia.

Results. In the multivariate logistic regression analysis, it was seen that the risk of having pneumonia increases among children residing in rural areas (adjusted odds ratio (aOR) 1.91; 95% CI 1.31 - 2.77), in KPK (aOR 2.50; 95% CI 1.29 - 4.83) and Gilgit-Baltistan (aOR 4.17; 95% CI 1.86 - 9.35), belong to poorest wealth quintile (aOR 10.84 95% CI 5.60 - 20.99), more among children less than 2 months of age (aOR 2.86; 95% CI 1.21 - 6.74), among males (aOR 1.48; 95% CI 1.11 - 2.01), having low birth weight ((aOR 2.83; 95% CI 1.14 - 7.01), had diarrhea (aOR 1.62; 95% CI 1.20 - 2.20), had mother's smoking exposure (aOR 1.55; 95% CI 1.02 - 2.36), using biomass fuel for cooking (aOR 2.41; 95% CI 1.62 - 3.55). children were at less risk who ever had vaccination (aOR 0.73; 95% CI 0.51 - 0.99).

Conclusion. We identified potential risk factors emphasizing focus on behavioural interventions which target vaccination uptake, hygienic practices and the use of safe cooking fuel.

Household expenditure for tuberculosis care, its determinants and coping strategies among adults 18 years and above in Karachi, Pakistan

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Introduction. Tuberculosis (TB) remains a major public health burden around the globe. In developing countries, the total cost of TB care often constitutes >50% of the yearly income of patients which leads the poor into catastrophic situations.

Objective. To estimate the average household expenditure of TB care,

including pre-diagnostic and diagnostic costs among adults attending a government health facility in Karachi, Pakistan.

Methods. A cross-sectional study was conducted in four government hospitals located in an urban setting in Karachi. Non-probability consecutive sampling was used to select the participants who have completed at least 1 month of treatment for the intensive phase. One standardised questionnaire named, tool to estimate patient's costs was modified and used for getting costs related information. We defined direct medical and non-medical (food and transport) costs as out-of-pocket payment and indirect costs as loss of productivity. Pre-diagnostic and diagnostic costs were asked and estimates were calculated.

Results. Out of 375 participants, 52.1% were female with a mean (standard deviation) age of 32 (13.7) years. Patients spent ~USD70.6 on the pre-diagnostic and diagnostic costs of TB care. More than half (51.2%) of the patients opted for private healthcare as the first place of consultation when they fell ill, followed by a government facility (44.2%), pharmacy or drug store (3.2%) and dispensary (1.6%). Only 43.4% of participants were employed, either formally or informally, and 95.5% of participants had arranged or borrowed money for TB treatment.

Conclusion. Patients and households often bear the very high costs of TB care despite the fact that free services are available. There is an urgent need to implement strategies for TB care that are affordable for the poor.

Primary cooking fuel choice and respiratory symptoms among women in charge of household cooking in Ouagadougou, Burkina Faso

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Introduction. In developing countries, solid fuels, including biomass fuels, remain the main sources of energy. Approximately 2.5 billion people rely primarily on biomass for cooking or heating. Many studies have highlighted the link between indoor air pollution and the occurrence of various health problems including cardiovascular and respiratory diseases, in the short-, medium- and long-term. As they are often in charge of the household cooking, women are exposed to sometimes high concentrations of pollutants contained in the smoke.

Objective. To estimate the prevalence of respiratory symptoms in a subset of women in charge of household cooking and assess the association with the type of fuel used for cooking.

Methods. A cross-sectional study was conducted in 3 neighbourhoods of Ouagadougou, involving 1 702 women who were responsible for cooking in their households. Univariate and multivariate logistic regression analyses were performed.

Results. Acute dry cough, breathing difficulties, sneeze, nose tingling and throat irritation are the acute symptoms that are statistically associated with biomass fuel use if compared with butane gas use, respectively with *p*-value of 0.000, 0.002, 0.011, 0.031 and 0.000. It is also the case of some chronic respiratory symptoms such as sputum

production ($p=0.001$), shortness of breath ($p=0.035$) and wheezing ($p=0.005$). While self-reported asthma ($p=0.140$) and chronic cough ($p=0.097$) are not significantly associated with biomass use as cooking fuel, as it is the case of stuffy nose, runny nose and coughing during effort. When adjusted with age, socioeconomic status and education, dry cough, breathing difficulties, sneeze, throat irritation sputum production and wheezing remain associated with biomass fuel use.

Conclusion. This study confirms that exposure to biomass smoke is associated with respiratory symptoms in women in Ouagadougou. The use of clean fuels, improving the efficiency of current fuel stoves and energy user behaviours, e.g. fuel drying, avoiding smoke exposure as much as possible during cooking, improved kitchen ventilation, properly used and maintained stoves and promoting outdoor cooking can reduce smoke emission and exposure. These measures should decrease respiratory health outcomes of these women.

Traffic air pollution and respiratory health effects: A cross-sectional study among bus drivers in Dakar, Senegal

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Introduction. Traffic-related air pollution is well-documented to be associated with increased risks of airway diseases. Bus drivers are exposed to hazards resulting from the inhalation of pollutants from traffic.

Objective. To describe the frequency of chronic respiratory symptoms and illnesses as well as its related factors and to assess lung functions among bus drivers.

Methods. This was a cross-sectional study conducted among the bus drivers in HLM, Medina and Petersen districts, Dakar, Senegal. A total of 178 adult men were assessed using a questionnaire inquiring about sociodemographic factors, respiratory symptoms, toxicological medical evaluation and lung function tests. Logistic regression analysis was done to determine the relationship between various sociodemographic, occupational factors, respiratory symptoms and respiratory illnesses (chronic obstructive pulmonary disease (COPD) and asthma).

Results. The results of the study showed that 57.9% of bus drivers had a chronic cough, 65.7% had the common cold and 53.4% had recurrent headaches. A predominance of these abnormal symptoms was noted in bus drivers located in the HLM district. Lung function tests showed that 38.8% of bus drivers had asthma, while 30.3% had COPD. Multivariate analysis found that frequent colds increased the risk of having asthma (odds ratio (OR) 6.3; 95% CI 1.12 - 35.79; $p=0.03$) and COPD (OR 7.7; 95% CI 1.14 - 52.8; $p=0.03$). The respiratory health status of bus drivers was dependent on the work area (OR 3.2; 95% CI 1.13 - 9.31; $p=0.02$).

Conclusion. Chronic exposure to air pollution from traffic is associated with respiratory symptoms and illnesses, as well as reduced lung function indices among bus drivers.

Improving TB treatment outcomes through active tracing by facility-based health volunteers in Meru County, Imenti South subcounty, Kenya

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Introduction. Kenya is ranked among the high-tuberculosis (TB), HIV- and drug-resistant TB burden countries. Non-adherence to anti-TB treatment adversely affects treatment success rate, contributes significantly to the development of TB drug resistance, increases disease morbidity and mortality. Previous research reported travel expenses, travelling to treatment centres, male sex, poor patient information and communication, alcoholism and homelessness as the major determinants of adherence to anti-TB treatment. According to the National Leprosy and Tuberculosis Program (2010), the TB treatment interruption rate was 9%, which put Kenya among countries with highest treatment interruption rate in the region.

Methods. Community health volunteers (CHVs) were recruited and trained on defaulter tracing. The CHVs were assigned to specific villages/units to trace defaulters. Sensitisation of TB clinic staff on defaulters tracing and the need to keep an up-to-date defaulters list was done to ensure support for CHVs at the clinic level. Frequent meetings with the CHVs were carried out to ensure efforts were on track. The defaulters list was introduced and updated on a weekly basis. Monthly defaulters tracing reports were submitted by the CHVs. CHVs were given a moderate allowance based on the number of patients traced and were provided with airtime to call defaulters.

Results. A total of 20 CHVs were recruited, trained and assigned different zones in which to carry out defaulter tracing. There was a reduction in the loss to follow-up rate (LTFU) from 7% ($n=39/570$) in 2013 to 1.2% in 2014, 2.4% in 2015 and 1.8% ($n=10/557$) in 2016. The treatment success rate increased from 88% in 2013 to 94% in 2014, and up to 93% in 2016.

Conclusion. Active defaulter tracing reduced the LTFU from 7% to as low as 1.2%, and led to an increase in treatment success rate of up to 94%. Facility-based CHVs have the capacity to effectively carry out defaulter tracing with minimal support and basic training.

Autologous blood patch for the management of persistent air leak in inoperable patients: A case series

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Introduction. Persistent air leak (PAL) after intercostal drain insertion delays lung re-expansion, increases complications, and results in longer hospital stay and higher treatment costs. A proportion of patients with PAL will be inoperable due to severe medical comorbidities and underlying lung disease – a safe alternative therapy should be

sought. It is proposed that the instillation of blood into the pleural space irritates the pleural surface, causing obliteration of the fistula by fibrogenic activity and the patch effect, allowing re-expansion of the lung. We present a case series of five inoperable patients with PAL who were successfully treated with autologous blood patch.

Methods. Five inoperable patients with PAL were treated with autologous blood patch between October 2017 and January 2018. A total of 80 - 120 mL of the patient's own unheparinised blood was injected into the pleural cavity via a 50 mL bladder syringe which was attached to the intercostal drain. This was clamped for one hour, followed by chest radiography and if bubbling ceased the intercostal drain was removed.

Results. All five patients were successfully treated. The causes of most of the PALs included secondary spontaneous pneumothoraces ($n=4$) and iatrogenic ($n=1$). The mean duration of the PAL before pleurodesis was 26 days and a mean time to resolution and removal of the intercostal drain was 26 hours. Four patients were discharged within a week of the procedure. One had a prolonged hospital stay owing to medical and social complications unrelated to the procedure.

Conclusion. Autologous blood patch was a viable, safe and cheap intervention for PAL in inoperable cases.

Adverse respiratory health in the fibreglass reinforcement industry

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Introduction. Fibreglass reinforcement industry employees are exposed to both fibreglass and the agents used in the reinforcing process, particularly resins and styrene. They are also implicated with adverse respiratory outcomes.

Objective. To determine the adverse respiratory outcomes among employees in the reinforced plastic industry.

Methods. A cross-sectional study was conducted in the fibreglass reinforcement industry based in KwaZulu-Natal, South Africa. The

254 employees were interviewed by answering a questionnaire based on respiratory health and occupational exposures. Lung function tests were conducted for all employees according to SATS standards. Environmental monitoring was conducted for styrene and respirable dust. Total cumulative exposure was calculated for each participant's lifetime of employment in the company.

Results. The sample consisted of 76.38% males, with an average age of 39.5 years. The majority of the sample were never smokers (68.90%), while 25.59% were current smokers. The median styrene exposure levels were 42.81 (range 18.03 - 202.92) and 20.68 (range 5.2 - 47.28) for the general laminating department and fitting department, respectively. The respirable dust exposure level median was 3.28 (range 1.18 - 8.43). The mean exposure duration of employees in the fibreglass industry was 8.06 (range 1 - 39) years. The prevalence of respiratory symptoms was: chronic cough (15.35%), phlegm (14.17%), breathlessness (6.30%) and wheezing (14.96%). The prevalence of doctor-diagnosed respiratory diseases was low: pneumonia, 1.57%; chronic bronchitis, 1.57%; asthma, 2.36%; and pulmonary tuberculosis, 7.87%. The mean forced expiratory volume in one second (FEV_1) and forced vital capacity (FVC) of 3.52 L/min and 4.39 L, respectively, among the males and 2.79 L/min and 3.54 L, respectively, among females were adjusted for age, height and sex. There was an increase in the adjusted odds ratio for symptoms for increase in total cumulative exposure to the pollutants with chronic cough, wheeze and breathlessness odds ratios of 1.02, (95% CI 1.00 - 1.04), 1.01 (95% CI 1.00 - 1.02) and 1.03 (95% CI 1.02 - 1.04), respectively. A statistically significant association ($p<0.05$) between cumulative exposure for styrene and respiratory outcomes such as chronic cough and breathlessness. Similarly, there was a reduction in lung function parameters with exposure. The FEV_1 /FVC ratio $<70\%$ showed a deficit in the pulmonary lung function of 15.35%. However, these were either marginal or not statistically significant, probably due to sample size.

Conclusion. This study provides evidence that exposure in the fibreglass industry increases the prevalence of respiratory symptoms and is associated with reduced lung function. Greater control of environmental exposure is warranted.

