

HIV/AIDS PREVALENCE AT THE ACCIDENT & EMERGENCY CENTRE OF A TERTIARY AND REFERRAL HEALTH INSTITUTION IN GHANA

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SUMMARY

Background: Ghana has an estimated HIV prevalence of 1.4%, but the HIV prevalence of patients presenting at emergency departments in Ghana is not well documented in published literature. This study evaluated the prevalence of HIV infection at the Accident & Emergency Department, Komfo Anokye Teaching Hospital (KATH A&E), Kumasi, Ghana.

Methods: A descriptive cross-sectional survey was carried out on patients aged 18 and above presenting to KATH A&E. An opt-in testing approach was used; consenting patients were screened for HIV using rapid HIV finger-stick testing with HIV 1-2 STAT-PAK. Sero-positivity was confirmed by OraQuick HIV 1-2 test. Data was analysed using multivariate logistic regression.

Results: 1125 patients presenting at the KATH A&E during the study period were offered the Rapid HIV test. 667 of these patients consented to have the test. HIV prevalence was 13.5% (90/667). 53 females (58.9%) were HIV positive compared to 37 males (41.1%). The age group 30-50 years had the highest risk of being HIV-positive. Other socio-demographic variables such as educational level and occupation were significantly associated with HIV-infection (P-value = 0.001 at 95% CI).

Conclusion: This study shows that emergency department HIV testing in Ghana is feasible. The prevalence of HIV sero-positive patients presenting at KATH A&E was tenfold higher than national estimates. We conclude that this study showed a high prevalence among patients seeking emergency care in our setting. Testing in the emergency department could lead to early detection of HIV-infected patients for linkage to care.

Keywords: HIV Infections; HIV Screening; Prevalence, Diagnosis, Emergency Department

INTRODUCTION

Globally, an estimated 34 million people are living with HIV and this disease is therefore of major public health concern. Sub-Saharan Africa remains one of the most severely affected with HIV, with nearly 1 in every 20 adults (4.9%) living with HIV, and has accounted for 69% of the people living with HIV worldwide.^{1,2}

Early diagnosis of HIV is critical to ensure that infected patients are linked to treatment. This reduces morbidity and mortality as well as decreases transmission to others. Risk behaviours that enhance HIV transmission is significantly reduced to 68% when individuals' HIV status is made known to them. This can reduce new sexual HIV infections by 30% annually.³

The Centers for Disease Control and Prevention (CDC) recommend routine HIV screening for patients in all populations where the prevalence of undiagnosed HIV infections is more than 0.1%.^{4,5} Emergency Departments (EDs) could play a strategic role in HIV screening because of access to large volumes of patients, vulnerable populations, and the wide utilization by a broad spectrum of society.^{5,10}

HIV prevalence in Ghana is currently estimated at 1.4%.¹¹ The HIV & AIDS National Strategic Plan 2011-2015 of the Ghana AIDS Commission includes, among others, the stated objective of increasing HIV Testing within all settings.¹²

The national policy approach to testing for HIV/AIDS is to make voluntary counselling and confidential testing (VCT) available to all who seek such services. Testing in Antenatal Clinics is established in the Kumasi Metropolis, and has a high uptake¹³ but this is not the case in the emergency care setting. The HIV prevalence in patients attending an emergency care facility in Ghana is not well documented in published literature. This gap contrasts with data from developed countries where HIV in emergency settings has been extensively studied.^{14,19}

The Komfo Anokye Teaching Hospital (KATH) Accident and Emergency (A&E) department was established in 2009 to handle emergencies in the Northern sector of the country, but the prevalence and proportions of medical and surgical emergencies co-morbid with HIV/AIDS are yet to be accurately characterised. This present study therefore sought to evaluate HIV prevalence among patients presenting at the KATH A&E department in order to generate baseline data for further detailed study.

METHODS

Study type

This study was a descriptive cross-sectional survey of patients presenting at the KATH A&E department who consented and were screened for HIV using a rapid HIV test.

Study setting

This study was carried out at the KATH A&E department; KATH is a tertiary referral hospital with an in-patient bed capacity of 1000 in Kumasi, Ghana. The A&E department handles all emergency services (Surgical, Trauma and Medical emergencies) and has three distinct zones: Red, Orange and Yellow areas based on patients' acuity using the South African Triage Scale. The Red area is for patients who require immediate medical attention. The Orange area is for patients who should be seen within ten (10) minutes of arrival at the facility; and the Yellow area is for patients requiring treatment within one (1) hour of arrival.

The Red, Orange and Yellow areas have seven (7), twelve (12) and eighteen (18) bed capacity respectively. There is also a 28 bed clinical decision unit. The A&E department has a dedicated Triage area where patients are first seen before being directed to the various colour-coded zones. The A&E department operates on a 24-hour basis. The department has other units such as Records, Pharmacy, Central Laboratory, and Radiology among others.

Recruitment Procedures

The Participants

The participants were patients presenting to the KATH A&E department between March and July 2013. A convenient sample of patients fitting the inclusion criteria was approached to participate in the study. Patients between 18 to 60 years reporting at the A&E department, who were conscious with no life threatening condition, were enrolled into the study. It did not matter whether they were already aware of their HIV status or not.

Patients were excluded from the study if they were unconscious trauma or non-trauma patients who could not give their consent and those who did not consent to be tested for their HIV status.

Confidentiality & Ethical issues

The study protocol was reviewed by the Institutional Scientific and Ethical Review Board (IRB) of the Komfo Anokye Teaching Hospital and the School of Medical Sciences of the Kwame Nkrumah University of Science and Technology (KNUST). Commencement of the study took effect following the approval from the IRB. To ensure confidentiality, specimens for HIV screening containers were labelled with study ID numbers without the names of patients. Anonymity of participating patients was ensured during their stay in the A&E department.

HIV screening procedures

After obtaining informed consent, trained study nurses screened patients for HIV using rapid HIV finger-stick testing with HIV 1-2 STAT-PAKTM (Chembio Diagnostic Systems Inc, USA) as part of Triage unit procedures. Non-reactive samples were reported as HIV negative. Patients who tested positive for HIV 1, HIV 2 or for both underwent further confirmatory tests with the OraQuick® ADVANCE Rapid HIV-1/2 Antibody Test. Samples that were reactive to both these tests were considered as true sero-positive for HIV.

After HIV testing had been performed and the patient had been admitted to the A&E department, research assistants interviewed the study participants using a structured questionnaire to gather data on socio-demographic and clinical information, and care seeking behaviours. Participating patients were informed of their test result. Patients testing HIV positive were counselled and linked to ART clinics within the Kumasi metropolis or the facility in the region nearest to their home. Patients who tested negative were given counselling in risk reduction behaviour.

Quality assurance

Weekly quality assurance meetings were held with triage nurses and the research team with the aim of assessing the nurses' HIV screening and testing skills and referral decisions. In instances where there were missed diagnoses of clinical relevance the patients involved were recalled. A ten percent seropositive sample was randomly selected each week and determined using Enzyme Linked Immunosorbent Assay (ELISA) at the Virology Department of KATH.

Statistical analysis

The data analysis was done using Stata (12.0; Stata Corp LP, College Station, TX, USA). Descriptive statistics were used to analyse the data and the results summarised and displayed in tables. Quantitative continuous variables without normal distribution were presented as median with their inter-quartile range. Multivariate logistic regression analysis at 95% confident interval (CI, 95%) was performed and used to determine the relationship between HIV infection and the socio-demographic and clinical variables of the study participants and triage code.

RESULTS

A total of 1125 patients were approached and offered Rapid HIV test. 667 patients accepted to be tested, and were screened for HIV after they voluntarily gave informed consent. Table 1 shows baseline socio-demographic and clinical characteristics of the study participants. The participants had a median age of 42 years (30-59 years), and 55.2% were males. Most patients were Christians (79.3%) while only 23.8% had secondary or higher level of education.

The majority of the patients were married (56.4%) at the time of the study; 26.4% of the patients reported that their primary occupation was petty trading while 19.9% were unemployed. 75% of the study participants had had at least one child, and 17.1% had previously lost a child. Only 8.3% of the patients lived in a rural area, while 31.6% of the patients either owned a house or owned some land.

In univariate analysis, HIV infection was found to be significantly associated with the following demographic characteristics: sex, educational status, occupation, having had at least one child (p-value = 0.00; 95% CI) and highest-value asset owned (p-value = 0.02; 95% CI).

The level of association between patients' socio-economic and clinical characteristics on the HIV screening test (95% CIs) was analyzed using multivariate regression. Being married, female, having had at least one child, and being aged 30-50 years were sig-

nificantly associated (p-value ≤ 0.05) with HIV infection. Having primary to secondary education, being a trader, and having no religious affiliation were also significantly associated with HIV infection.

A patient aged 30-50 years had 3.8 likelihoods of being HIV infected compared with a patient aged ≤ 30 years and this was statistically significant (p-value = 0.001; 95% CI); while the risk of a patient aged between 51 and 60 years being HIV infected was 2.4 higher than patient aged ≤ 30 years (p-value = 0.11; 95% CI). A female patient had 1.9 risk of being infected with HIV compared with a male study participant (p-value = 0.001; 95% CI).

The risk of being HIV infected decreased with increasing level of education, 4.4, 2.8, 2.2 and 0.6 for patients with Primary, Junior, Secondary and tertiary levels of education respectively. The risk of being HIV infected was higher for patients in the Red triage category compared with Orange (p-value = 0.001; 95% CI) and Yellow triage categories (p-value = 0.004; 95% CI).

HIV status, clinical and type of emergencies

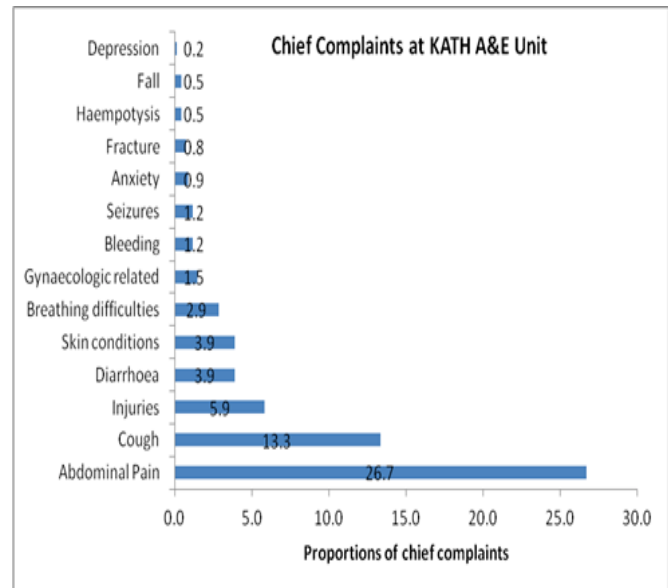
A total of 1125 patients were offered Rapid HIV test. 667 (59%) accepted the offer and were screened for their HIV status. 90 (13.5%) of the study participants tested were HIV seropositive. 557 (76.5%) of the study participants were HIV negative. Majority of the study participants (83%), were classified as medical emergencies, while the main types of emergencies included respiratory, neurological and musculoskeletal; 12.0%, 6.8% and 19.5% respectively.

Clinical characteristics of patients presenting at the A&E department were varied; 18.4% of the patients presented with trauma, 13.8% required surgical intervention, while 5.3% required both medical and surgical interventions. A total of 130 patients were reclassified into a final triage category different from the initial triage score; of these patients 60% were triaged to Orange, 36.9% were triaged to Yellow, and 3.1% were triaged to Red. The most frequently reported chief complaints included abdominal pains (26.7%), cough (13.3%), and injuries (5.9%) (Figure 1).

Patients presenting with complaints of abdominal pain, cough, and diarrhoea were significantly associated with having HIV infection. Patients diagnosed with a medical condition and presenting with a neurological emergency were found to be significantly associated with HIV infection.

Table 1 Baseline characteristics of study participants

Predictive variables (N=667)	Current HIV status				p-value
	Positive		Negative		
	n	(%)	n	(%)	
Sex					0.00
Male	37	41.1	331	57.4	
Female	53	58.9	246	42.6	
Educational Status					0.00
None	8	8.9	118	20.5	
Primary	16	17.8	54	9.4	
Middle/JHS	49	54.4	261	45.2	
Secondary/SHS	14	15.6	94	16.3	
Tertiary	2	2.2	49	8.5	
Other	1	1.1	1	0.2	
Religion					0.28
Islam	13	14.4	85	14.7	
Christianity	68	75.6	461	79.9	
Traditional Religion	1	1.1	7	1.2	
Other	8	8.9	24	4.2	
Marital Status					0.92
Single	19	21.1	128	22.2	
Have a partner/co-habit	4	4.4	37	6.4	
Married	53	58.9	323	56.0	
Divorced	5	5.6	26	4.5	
Widowed	9	10.0	59	10.2	
Separated	0	0.0	4	0.7	
Occupation					0.00
Farming	13	14.4	88	15.2	
Trading	29	32.2	147	25.5	
Artisan	12	13.3	51	8.8	
Driver	8	8.9	32	5.6	
Unemployment	21	23.3	112	19.4	
Others	7	7.8	147	25.5	
Ever had Children					0.00
Yes	79	87.8	421	73.0	
No	11	12.2	156	27.04	
Children alive					0.25
Yes	69	87.3	362	82.1	
No	10	12.7	79	17.9	
Residency type					0.81
Residential area	19	21.1	124	21.5	
Peri-urban	62	68.9	406	70.5	
Rural	9	10.0	46	8.0	
Highest-value asset owned					0.02
Factory/Company	0	0.0	1	0.2	
Car/Machine	3	3.3	13	2.3	
House/Land	17	18.9	194	33.6	
Room accessories	49	54.4	216	37.4	
Computer/accessories	1	1.1	14	2.4	
Nothing	19	21.1	110	19.1	
Others	1	1.1	29	5.0	

**Figure 1.** Chief complaints of patients participating in the study

DISCUSSION

The A&E Centre at KATH in Kumasi was established in 2009 to provide prompt emergency care and serve as a training institution for emergency medicine in Ghana.²⁰ Prior to this, most emergency care at KATH was provided by “casualty” staff with no formal training in emergency medicine, and patients presenting at the casualty department were not triaged.

The A&E department attends to a number of emergencies including communicable diseases, trauma, natural disasters, medical emergencies, surgical emergencies, and obstetric emergencies. The A&E department uses the South African Triage Scoring System to determine illness acuity; patients with a final triage score of Red, Orange, or Yellow are seen and treated in the A&E department, and those who score Green are referred the KATH Polyclinic for further management.²¹

In this study, we found a prevalence of HIV seropositivity of 13.5% in patients who consented to be tested whilst being attended to at the KATH A&E department. This prevalence of HIV was tenfold higher than the current national HIV prevalence rate of 1.4%.¹¹ Sub Saharan Africa is more heavily affected by HIV and AIDS than any other region of the world.^{1,2} In West Africa relatively low rates have been reported ranging from 5.3% in Cameroon, 5.2% in Gabon and 3.6% in Nigeria.²² Ghana, however, is among the countries in West Africa with one of the lowest HIV/AIDS prevalence rates. In related studies, Ogbuagu²² reported a prevalence of HIV sero-positivity of 23.5% among patients at an Accident & Emergency unit in Nigeria.

Sero-prevalence rates in similar studies performed in emergency departments in the USA in 2009 (0.92%)¹⁸ and 2011 (0.6%)¹⁷ were much lower than in our study. The higher prevalence rates in sub-Saharan emergency units possibly reflect the prevalence rates in the general population and differences in health seeking behaviour.

Knowing that there is higher prevalence of HIV infection in low-resource emergency department settings may offer opportunities to make earlier diagnosis in affected patients and enhance linkage to care. Higher prevalence rates of HIV should also inform stricter adherence to infection control measures and other relevant interventions (to protect both patients and health care staff) in the emergency department setting.

We found in this study that female patients were more predisposed to HIV infections than their male counterparts (p -value = 0.001), while patients with educational level of between primary to secondary have higher risk of HIV infection and were significantly ($p < 0.05$) associated with HIV infection, consistent with national HIV infections prevalence.¹¹ Primary level of education had the highest risk of being HIV infected, followed by Junior and Secondary levels respectively, while patients with Tertiary education were less likely to be HIV infected.

These findings support other studies^{2,3} that higher education reduces the risk of HIV infection. Females are thought to be biologically prone to HIV infections,²³ while people ignorant of HIV/AIDS and other sexual transmitted diseases (STDs) as a result of a low educational level could indulge in a more risky lifestyle that predisposes them to a higher risk of HIV infection. This study found that patients, who were traders, or those who have had at least one child, were significantly more predisposed to HIV infection ($p < 0.05$).

A study in Kenya²⁴ demonstrated a significant association between mobility and HIV infection among married couples in a fishing community. Trading activity often involves increased geographic mobility which may expose some people to multiple or casual sexual partners, the route to HIV infection. Having at least one child implies a history of having had unprotected sex. This study also found household room accessories to be significantly associated with HIV infection.

The most frequently reported complaints at the A&E centre were abdominal pains, 26.7%, cough 13.3% and injuries, 5.9% similar to previous reports.^{20,25} In this study, patients with abdominal pain, cough and diarrhoeal symptoms were significantly associated with HIV infection and this agrees with published literature as the main symptoms of HIV/AIDS disease.²⁵

Nearly 19% of the patients presented with trauma-related emergencies. 13.8% of the patients had a surgical emergency. In this study, the risk of patients being HIV infected was higher for patients triaged to Red category than for patients triaged to the Orange or Yellow. Thus, patients with a higher illness acuity score as determined with the South African Triage score were more likely to be HIV positive.

In the present study as many as 41% of the patients refused the Rapid HIV testing and therefore their HIV status were not determined. In our study, nearly all the patients (99.9%) who accepted and participated in the Rapid HIV testing had previously been tested for HIV. In contrast Ogbuagu et al.²² excluded patients who verbally acknowledged their HIV status. We did not collect questionnaire data on the patients who refused to be tested. It is not possible to know whether the HIV prevalence rate would be different for the group that refused the test, or indeed whether the socio-demographic characteristics were different.

Hutchinson et al.²⁶ reported that the reasons given by patients for declining Rapid HIV testing in an emergency care setting included excruciating pain of the present illness, fear of stigma or rejection particularly by health care staff if one is HIV-infected, and other complex factors. Pisculli et al.²⁷ have associated patients with large household annual income to be more likely to refuse testing, as well as those who reported no HIV risk behaviours, those previously tested for HIV, and those who did not perceive a need for testing.

In the present study, however, nearly all (99.9%) the patients who consented to participate had previously been tested for HIV contrary to Pisculli's observation that patients previously tested for HIV were more likely to decline the test in an emergency setting. The significance of high numbers of previously tested patients agreeing to test again in our study was not explored, and it is therefore unclear how it may have affected our results.

While in this study we did not specifically ask patients about a self-perceived need for a test and why they refused Rapid HIV testing, we nonetheless observed that fear of stigmatization or rejection was the overriding reason for the refusal.

Those patients who declined to participate in the study may have done so because they feared they might be HIV positive and did not want to know their test results. This view is plausible given the high degree of stigma still attached to a diagnosis of HIV in the community from which the patients are drawn.

There may be other factors, apart from those mentioned by Hutchinson²⁶ and Pisculli²⁷, that may be potentially associated with refusal of HIV testing which were not assessed in this study; but it is not possible to comment on these factors from our data. Nonetheless, our data on refusal rate may still be a useful contribution in defining trends in uptake of HIV testing and counselling within Ghana.²³

Increased educational efforts to convey the rationale and benefits of universal screening may improve testing uptake among the populace. Making routine testing more available may help reduce the spread of infection.⁴ One important benefit of scaled-up testing is the opportunity to identify people with HIV at an earlier stage so that they can be put on ART reducing the rate of mortality.³

Widespread testing and making routine testing more available could reduce the stigma associated with HIV testing particularly if it is accompanied by widespread access to HIV treatment.^{25,28} If HIV is perceived and treated as a chronic but treatable condition the fear of contagion and inevitable death would be lessened. Emergency departments with trained staff can play important roles by providing accurate information and educational resources to all patients about the positive benefits of knowing one's HIV status, by engaging in advocacy to reduce the social stigma of being HIV positive, and by confidentially linking those who test HIV positive to further care.

According to WHO²⁹ estimates, only about 10% of persons living with HIV/AIDS in low and middle-income countries know their HIV status. We found a prevalence rate much lower than the 23.5% HIV seropositivity among emergency patients with undiagnosed HIV/AIDS reported by Ogbuagu.²²

In our study a large percentage of participants who agreed to be tested for HIV infection already knew their HIV status. We postulate that the 13.5% of this group of patients who tested positive were persons who already knew their HIV status, and these patients may represent the 10% of persons estimated by the WHO to be living with HIV/AIDS who know their HIV status.

LIMITATIONS

This study has several limitations. The study was carried out at the KATH A&E department, a single site, and the results may not reflect what pertains in other emergency or urgent care settings in Ghana. Nearly all the patients who accepted the Rapid HIV testing had previously been tested for HIV, and may not represent the general population.

There may be factors associated with patients declining an offer of point-of-care HIV testing which were not assessed in this study.

CONCLUSION

The prevalence of HIV/AIDS related emergencies presenting at KATH A&E department during the study was found to be tenfold higher than that in the general population given in national HIV reports. Testing in emergency departments could lead to early detection of HIV-infected patients so that these patients could be channeled to appropriate care. Emergency departments are well placed to play an important role in the Ghana national effort to widen access to HIV testing because of the large volumes of patients who attend.

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REFERENCES

1. WHO | HIV/AIDS. WHO. Available at: <http://www.who.int/gho/hiv/en/>. Accessed November 4, 2014.
2. Minichiello V, Rahman S, Hussain R. Epidemiology of sexually transmitted infections in global indigenous populations: data availability and gaps. *Int J STD AIDS*. 2013;24(10):759–768. doi:10.1177/0956462413481526.
3. Marks G, Crepaz N, Janssen RS. Estimating sexual transmission of HIV from persons aware and unaware that they are infected with the virus in the USA. *AIDS* 2006; 20(10):1447–1450.
4. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR Recomm Reports* 2006; 55(RR-14):1–17.
5. Centres for Disease Control and Prevention, testing initiative - Rapid HIV Testing in Emergency Departments - Three U.S. Sites, January 2005-March 2006. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5624a2.htm?s_cid=mm5624a2_e. Accessed November 4, 2014.
6. Haukoos JS, Lyons MS. Idealized models or incremental program evaluation: translating emergency department HIV testing into practice. *Acad Emerg Med* 2009; 16(11):1044–1048.
7. Rothman RE, Lyons MS, Haukoos JS. Uncovering HIV infection in the emergency department: a

- broader perspective. *Acad Emerg Med* 2007; 14(7):653–657.
8. Torres GW, Heffelfinger JD, Pollack HA, Barrera SG, Rothman RE. HIV screening programs in US emergency departments: a cross-site comparison of structure, process, and outcomes. *Ann Emerg Med*. 2011;58(1 Suppl 1):S104–113.
 9. Kecojevic A, Lindsell CJ, Lyons MS, et al. Public health and clinical impact of increasing emergency department-based HIV testing: perspectives from the 2007 conference of the National Emergency Department HIV Testing Consortium. *Ann Emerg Med*. 2011; 58(1 Suppl 1):S151–159.
 10. Haukoos JS, Hopkins E, Conroy AA, Silverman M, Byyny RL, Eisert S et al. Routine opt-out rapid HIV screening and detection of HIV infection in emergency department patients *JAMA* 2010; 304(3):284-292.
 11. El Adas A. (Director General , Ghana Health Service) Ghana's HIV Prevalence Stabilizes - Available at: <http://www.ghana.gov.gh/index.php/2012-02-08-08-32-47/general-news/1443-ghana-s-hiv-prevalence-stabilizes-el-adas>. Accessed November 4, 2014.
 12. Ghana AIDS Commission. National HIV & AIDS Strategic Plan 2011-2015, Towards Achieving Universal Access to Comprehensive HIV Services. 2010.
 13. Ghana Health Service. Directorate ARH. Annual Health Report. Ghana Health Service: Kumasi; 2012.
 14. Brown J, Shesser R, Simon G, Bahn M, Czarnogorski M, Kuo I et al. Routine HIV screening in the emergency department using the new US Centers for Disease Control and Prevention Guidelines: results from a high-prevalence area. *J Acquir Immune Defic Syndr* 2007; 46(4):395–401.
 15. d'Almeida KW, Kierzek G, de Truchis P, Le VS, Pateron D, Renaud B et al. Modest public health impact of nontargeted human immunodeficiency virus screening in 29 emergency departments. *Arch Intern Med*. 2012; 172(1):12–20.
 16. Freeman AE, Sattin RW, Miller KM, Dias JK, Wilde JA. Acceptance of rapid HIV screening in a southeastern emergency department. *Acad Emerg Med* 2009; 16(11):1156–1164.
 17. Lubelchek RJ, Kroc KA, Levine DL, Beavis KG, Roberts RR. Routine, rapid HIV testing of medicine service admissions in the emergency department. *Ann Emerg Med*. 2011; 58(1 Suppl 1):S65–70.
 18. Calderon Y, Leider J, Hailpern S, Chin R, Ghosh R, Fetting J et al. High-volume rapid HIV testing in an urban emergency department. *AIDS Patient Care STDS*. 2009; 23(9):749–755.
 19. Silva A, Glick NR, Lyss SB, Hutchinson AB, Gift TL, Pealer LN et al. Implementing an HIV and sexually transmitted disease screening program in an emergency department. *Ann Emerg Med*. 2007; 49(5):564–572.
 20. Directorates of Accident and Emergency Unit, Komfo Anokye Teaching Hospital, Kumasi-Ghana. Available at: <http://www.kathhsp.org/ane.php>. Accessed November 4, 2014.
 21. Osei-Ampofo M, Oduro G, Oteng R, Zakariah A, Jacquet G Donkor P ;The evolution and current state of emergency care in Ghana: *African Journal of Emergency Medicine* (2013) 3, 52–58.
 22. Ogbuagu C.N, Emejulu J.K.C, Ofiaeli R.O, Ogbuagu E.N, Onyenekwe O.N, Oguoma V.M. Undiagnosed HIV cases in accident and emergency unit of a tertiary health institution in south East Nigeria; *RIF* 2010;1(5):239-242.
 23. UNAIDS report on the global AIDS epidemic. 2010.
 24. Kwena ZA, Camlin CS, Shisanya CA, Mwanzo I, Bukusi EA. Short-term mobility and the risk of HIV infection among married couples in the fishing communities along Lake Victoria, Kenya. *PLoS One* [2013 8(1):[e54523]
 25. Ghana Health Service. 2009 GHS annual report. Ghana Health Service [2009 [accessed November 4 2014]; Available from: http://www.ghanhealthservice.org/Includes/upload/publications/FINAL_DRAFT_2009_GHS_Annual_Report%20final%20final.pdf
 26. Hutchinson AB, Corbie-Smith G, Thomas SB, Mohanan S, del RC. Understanding the patient's perspective on rapid and routine HIV testing in an inner-city urgent care center. *AIDS Educ Prev* 2004; 16(2):101-114.
 27. Pisculli ML, Reichmann WM, Losina E, Donnell-Fink LA, Arbelaez C, Katz JN et al. Factors associated with refusal of rapid HIV testing in an emergency department. *AIDS Behav* 2011; 15(4):734-742.
 28. WHO, UNAIDS, UNICEF. Towards universal access: Scaling up priority HIV/AIDS interventions in the health sector: progress report. 2007. Geneva, WHO.
 29. UNAIDS. World AIDS Day Report 2011. ☛