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Full Length Research Paper

Attitude and perception of cardiothoracic surgeons in Nigeria and Ghana to patients with human immunodeficiency virus infection

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Cardiothoracic operations are associated with increased exposure and risk of blood and blood borne diseases. This is true in the West African Subregion where HIV/AIDS is endemic. We aimed to survey the attitude and perception of cardiothoracic surgeons in Nigeria and Ghana to patients with HIV/AIDS who presented with common cardiothoracic and vascular pathologies that would otherwise normally have low mortality rate. Data collection was by a structured questionnaire which was sent to all consultants/specialists and senior registrars practising cardiothoracic surgery in Nigeria and Ghana. Survey response rate was 64 and 70% for consultants and senior registrars respectively. The majority of surgeons were more willing to operate on emergency cases than elective cases. Patients with HIV infection and those on antiretroviral drugs were also more likely to be operated upon than AIDS patients. Eighty-seven percent (87%) of surgeons supported preoperative screening for HIV antibodies. The majority of surgeons (92.9%) also supported preoperative screening in high risk patients. Some 21.4% of surgeons wrongly believed that cardiopulmonary bypass (CPB) has an adverse effect on HIV-positive patients and 42.9% of surgeons believe there is a difference in the cardiothoracic surgical outcome between HIV-positive patients and HIV-negative patients. Some 82.1% of surgeons reported having modified their surgical practice to reduce the risk of blood-borne infection, adopting the universal precautions. The surgeons that have refused to operate on HIV/AIDS patients did so mainly for the fear of contracting the infection and the absence of an insurance policy covering the surgeon in the event of acquiring the infection from HIV-positive patients. Despite the low risk of transmission of blood-borne infection when adequate measures are taken during surgery, denial of surgical intervention in HIV-positive patients has continued. It is also disturbing to know that some surgeons still believe that there is a difference in outcome after surgical intervention in HIV-positive patients compared with HIV-negative patients and that CPB has an adverse effect on HIV-positive patients. There is need to educate these surgeons and provide adequate insurance cover for them, to enable them take the risk of operating on HIV/AIDS patients.

Key words: Cardiothoracic surgeons, human immunodeficiency virus (HIV), acquired immunodeficiency syndrome (AIDS), highly active antiretroviral therapy (HAART).

INTRODUCTION

At the end of 2009, out of an estimated 33.3 million people living with HIV infection worldwide, an estimated 22.5 million people were living in sub-Saharan Africa (UNAIDS, 2010). An estimated 1.3 million people in sub-Saharan Africa died of this disease during that year (UNAIDS, 2010). Hence, sub-Saharan Africa still bears an inordinate share of the global HIV burden. An estimated 3.6% of Nigerians and 1.8% of Ghanaians

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were living with the disease at the end of 2009 (UNAIDS, 2010). With this high prevalence rate of HIV infection, surgeons working in this region stand a significant risk of being infected.

Glove penetration occurs in 20% of surgical procedures (Cole and Gault, 1989). The risk of parenteral exposure increases in operations lasting more than 3 h and with blood loss exceeding 300 ml (Gerberding et al., 1990). Parenteral exposure rate in cardiac surgery has been reported to be about 20% (Pate, 1990), significantly greater than in general surgery where the parenteral exposure rate is between 1.7% (Gerberding et al., 1990) and 5.6% (Pate, 1990). The cardiothoracic surgeon hence stands a greater risk.

Procedures performed by surgeons could either be emergency/urgent or elective. For the cardiothoracic surgeon, open heart surgery carries a higher risk of injury and exposure to blood than thoracic cases (Kjaergard et al., 1992). A survey undertaken to find out the incidence and common mechanism of accidental injuries and blood exposure in cardiothoracic surgical procedures reported an incidence of 70% glove penetrations, 18% skin punctures, 4% non-bleeding skin lesions and 8% lacerations with bleeding. Eye splashes occurred in 14% of the cases (Kjaergard et al., 1992). Surveys of surgeon's attitude towards HIV infection have shown fear of risk of infection with HIV, poor knowledge of actual risk, poor knowledge of guidelines for universal precautions, incomplete compliance with the guidelines, and unwillingness of a few surgeons to operate on HIV-positive patients (Shelly et al., 1992). Previous studies in Europe and America where the prevalence rate is relatively lower have shown reluctance among cardiothoracic surgeons to operate on HIV-positive patients (Roxburgh et al., 1992; Condit and Frater, 1989).

However, a significant reduction in the morbidity and mortality has been documented among HIV infected patients with advanced immunodeficiency on highly active antiretroviral therapy (HAART) (Phillips et al., 2007), thus, increasing the population of clinically stable HIV infected patients seeking the services of surgeons. The use of protease inhibitors has also changed the outlook and natural history of HIV infected patients, increasing the number of patients requiring coronary artery bypass surgery (Rickerts et al., 2000; Friis-Moller et al., 2003).

We aimed to assess the attitudes and perception of cardiothoracic surgeons in Nigeria and Ghana to HIV infection/AIDS and surgical practice. We believe that our result will serve as an important plea for attention to be paid to the issue of surgery, in particular, cardiothoracic surgery and HIV patients.

METHODS

We used both closed- and open-ended questions to draw up a questionnaire which was based mainly on the attitude of surgeons to patients with HIV/AIDS who presented with common clinical scenarios in their practice. These scenarios were classified as either emergency/urgent cases or elective cases and covered the spectrum of cardiac, thoracic and vascular cases. The questionnaire also asked about demographic information and their perception about screening preoperative patients. It also tested the knowledge of surgeons about possible adverse effect of cardiopulmonary bypass (CPB) on patients' immunity, progression of disease and differences in surgical outcome between HIV-positive and HIV-negative patients. They were also asked about intraoperative precautions and reasons for not operating on these patients for surgeons that have refused to perform surgery on HIV/AIDS patients.

The questionnaires were sent to all surgeons (consultants/specialists and senior registrars) practising cardiothoracic surgery in Nigeria and Ghana. The list of cardiothoracic surgeons in both countries was obtained from the website of Cardiothoracic Surgery Network (CTSNet). A few surgeons whose names were not listed in the Cardiothoracic Surgery Network were identified and the questionnaire was sent to them. The study was carried out between November 2009 and October 2010. Out of 33 consultant/specialist surgeons and 10 residents (senior registrars) practising cardiothoracic surgery in Nigeria and Ghana, replies were received from 21 consultants/specialists (64%) and 7 senior registrars (70%).

The questionnaire was anonymous and it was not possible to detect nonresponders. No other follow-up questionnaire was sent. They were informed that their opinion would be analyzed and published.

RESULTS

All the cardiothoracic surgeons in Nigeria and Ghana practice thoracic, vascular and closed heart surgery but only 28% of Nigerian cardiothoracic surgeons practice open heart surgery while all the Ghanaian cardiothoracic surgeons perform open heart surgery. However, all the surgeons received some training in cardiac, thoracic and vascular surgery and they have previously worked or, are presently working in centers that offer these subspecialties at the time of this research.

The questions on the elective and emergency clinical scenarios were answered by all respondents. Only those that stated 'yes' categorically were classified under affirmative response.

All the surgeons were willing to relieve tension pneumothorax in HIV/AIDS patients. Some 89.3% of surgeons would operate on HIV-positive patients with massive pericardial effusion requiring pericardiostomy. However, only 78.6% of surgeons would operate on AIDS patients with similar disease. A higher percentage of surgeons (82.1%) would operate on HIV-positive patients with vascular disease requiring urgent vascular surgery compared with AIDS patients with similar disease. Only 21.4% of surgeons would perform emergency coronary artery bypass graft (CABG) for AIDS patients with three-vessel disease/myocardial infarction while more surgeons would operate on HIV-positive patients (53.6%) and those stable on HAART (50%), (Table 1).

Almost all the surgeons would perform simple closed tube thoracostomy drainage for HIV- positive patients and

Table 1. Affirmative response to emergency cases/procedures.

Clinical scenarios(emergency /urgent operations)	Affirmative response		
	All	Consultant/specialist	Senior registrar
A patient presents with tension pneumothorax and requires closed tube thoracostomy drainage			
The patient is HIV +ve. Will you operate?	28(100%)	21(100%)	7(100%)
The patient is HIV +ve and on HAART. Will you operate?	28(100%)	21(100%)	7(100%)
The patient has AIDS. Will you operate?	28(100%)	21(100%)	7(100%)
A patient presents with massive pericardial effusion and requires pericardiostomy			
The patient is HIV +ve. Will you operate?	25(89.3%)	18(85.7%)	7(100%)
The patient is HIV +ve and on HAART. Will you operate?	25(89.3%)	18(85.7%)	7(100%)
The patient has AIDS. Will you operate?	22(78.6%)	18(85.7%)	4(57.1%)
A patient presents with Vascular injury and requires urgent vascular operation			
The patient is HIV +ve. Will you operate?	23(82.1%)	18(85.7%)	5(71.4%)
The patient is HIV +ve and on HAART .Will you operate?	23(82.1%)	18(85.7%)	5(71.4%)
The patient has AIDS. Will you operate?	19(67.9%)	16(76.2%)	3(42.9%)
A patient has three vessel disease and requires CABG			
The patient is HIV +ve. Will you operate?	15(53.6%)	12(57.1%)	3(42.9%)
The patient is HIV +ve and on HAART. Will you operate?	14(50.0%)	12(57.1%)	2(28.6%)
The patient has AIDS. Will you operate?	6(21.4%)	5(23.8%)	1(14.3%)

patients with full blown AIDS. Only 32.1% surgeons would decorticate AIDS patients with chronic empyema thoracis compared to 60.7% of surgeons that would decorticate HIV-positive patients with empyema. Some 53.6% of surgeons would perform an oesophageal bypass using colon or stomach for HIV-positive patients. More surgeons (57.1%) would perform the same procedure on HIV-positive patients stable on HAART while a lesser number (21.4%) would accept to perform the procedure on AIDS patients. Lesser percentage of thoracic surgeons were willing to perform pericardiectomy for constrictive pericarditis in patients with AIDS compared with HIV-positive patients stable on HAART (28.6 vs. 67.9%). About 46.4% of surgeons would perform valve replacement on HIV-positive patients with rheumatic valvular heart disease. More surgeons (50%) would operate on HIV-positive patients stable on HAART while only 17.9% of surgeons would operate on AIDS patients with the disease (Table 2).

Some 85.7% of surgeons supported preoperative HIV screening for all patients being worked up for a cardiothoracic operation. More surgeons (92.9%) supported screening high risk patients.

About 42.8% of surgeons did not know if CPB has an adverse effect on HIV-positive patients by causing a progression of their clinical status to AIDS and 21.4% of surgeons wrongly believed that CBP has an adverse effect.

Some 42.9% of surgeons believed that there is a difference in surgical outcome in HIV-positive patients compared with HIV-negative cases.

The majority of surgeons (82.1%) have modified their surgical practice, adopting the universal precautions during surgery. They have ensured that double gloves, plastic aprons, boots, eye goggles and masks are worn during all surgical procedures.

The surgeons that would not operate on HIV/AIDS patients did so for fear of contacting the virus and the absence of an insurance policy that will protect them in case of accidental exposure and subsequent infection.

DISCUSSION

This study still reveals an unwillingness of cardiothoracic surgeons to operate on HIV/AIDS patients, a common finding in most surveys on surgeon's attitude and practice towards HIV/AIDS patients (Shelly et al., 1992; Obi et al., 2005). More surgeons were willing to operate on HIV patients or patients stable on HAART rather than patients with AIDS. This may be due to the fact that the risk of transmission from HIV infected patients on HAART may be lower than the risk of those not receiving therapy because of lower viral load. This is supported by a research finding that the risk of transmission of HIV infection within discordant couples is highly correlated with the viral load (Gray et al., 2001). Evidence suggests that improved access to antiretroviral therapy is helping to drive a decline in HIV related mortality both in the high income countries and developing world (Phillips et al., 2007;

Table 2. Affirmative response to elective cases/procedures.

Clinical scenarios(elective operations)	Affirmative response		
	All	Consultants/ specialist	Senior registrar
A patient presents with simple pleural collection that requires closed tube thoracostomy drainage			
The patient is HIV +ve. Will you operate?	28(100%)	21(100%)	7(100%)
The patient is HIV +ve and on HAART. Will you operate?	28(100%)	21(100%)	7(100%)
The patient has AIDS. Will you operate?	27(96.4%)	20(95.2%)	7(100%)
A patient presents with chronic empyema and requires decortication			
The patient is HIV +ve. Will you operate?	17(60.7%)	14(66.7%)	3(42.9%)
The patient is HIV +ve and on HAART. Will you operate?	16(57.1%)	13(61.9%)	3(42.9%)
The patient has AIDS. Will you operate?	9(32.1%)	7(33.3%)	2(28.6%)
A patient presents with esophageal carcinoma and requires Esophageal bypass			
The patient is HIV +ve. Will you operate?	15(53.6%)	12(57.1%)	3(42.9%)
The patient is HIV +ve and on HAART. Will you operate?	16(57.1%)	13(61.9%)	3(42.9%)
The patient has AIDS. Will you operate?	6(21.4%)	4(19.0%)	2(28.6%)
A patient presents with constrictive pericarditis and requires pericardiectomy			
The patient is HIV +ve. Will you operate?	19(67.9%)	14(66.7%)	5(71.4%)
The patient is HIV +ve and on HAART. Will you operate?	19(67.9%)	14(66.7%)	5(71.4%)
The patient has AIDS. Will you operate?	8(28.6%)	6(28.6%)	2(28.6%)
A patient presents with rheumatic valvular disease and requires valvular replacement			
The patient is HIV +ve. Will you operate?	13(46.4%)	10(47.6%)	3(42.9%)
The patient is HIV +ve and on HAART. Will you operate?	14(50.0%)	11(52.4%)	3(42.9%)
The patient has AIDS. Will you operate?	5(17.9%)	4(19.0%)	1(14.3%)

Jahn et al., 2008), hence, more of these patients will be presenting for surgery in the near future. This is especially true for cardiac surgery due to effects of the metabolic complications of HAART (lipodystrophy, hyperlipidaemia, glucose intolerance) with resultant increase in coronary artery disease (Martzanez et al., 2001).

Mandatory screening of all patients especially high risk patients was supported by most of respondents. Mandatory screening has also been encouraged by many national surgical societies. In a study conducted in West Australia, 39% of surgeons supported the fact that HIV screening before surgery should be mandatory for all patients while 53% believed it should be mandatory for high risk groups (Grove and Mulligan, 1990). A study done in a Caucasian population revealed that patients also supported mandatory preoperative HIV screening (Meadows et al., 1995). Routine surgical screening may not only be important for the risk of intraoperative contamination, but also in anticipation of postoperative complications. Doumgba et al. (2006) proved in their study that, postoperative wound infection, shock and a higher mortality were more frequent in HIV-positive patients than HIV-negative patients. Even in an emergency setting, opt-out screening programme and testing has been shown to be extremely important as most HIV infected patients were totally unsuspected of having the disease (Minz et al., 2010). However, while practitioners have widely regarded preoperative mandatory HIV screening as a valuable cost saving innovation for obviating intraoperative transmission, some public health workers have seen it as an unacceptable violation of patient autonomy (Sheikh and Porter, 2009). In a study done in an African population, the preoperative HIV testing was opposed by many because of the civil rights implications of a positive HIV test result and the fear that HIV-positive patients would receive sub-optimal treatment (Orji and Ogunniyi, 2001).

Cardiopulmonary bypass has been shown not to have any adverse effect on immunity or progression to AIDS (Trachiotis et al., 2003; Mestres et al., 2003). However, in our study, 21.4% of respondents wrongly believed that CBP has an adverse effect while 42.8% of surgeons did not know if CPB has an adverse effect and causes progression of clinical status to AIDS. The majority of our respondents do not perform open heart surgery and this may have contributed to their negative response to this issue. Trachiotis et al. (2003) noted in their study on cardiac surgery patients receiving HAART that, the mean preoperative CD4 of 360 (range 106 to 560) was not

significantly different from the postoperative CD4 of 353.8 (range 174 to 570). Mean preoperative HIV viral load of 11,085 copies/ml (range < 50 to 156,000) was also not significantly different from mean postoperative HIV viral loads of 3,482 copies/ml (range < 50 to 23,000) (Trachiotis et al., 2003). CD4 count has even been found to increase in patients on HAART following cardiac surgery. Mestres et al. (2003) demonstrated an increase in CD4 count from 185.33 to 396.55 cells/µl in nine patients on antiretroviral drugs. In contrast, Yee (1991) reported adverse effect of CPB and warned about its possible potentials in accelerating AIDS. Of six AIDS patients who were said to have coped well with surgery, three died of fulminant AIDS within two months and three developed opportunistic infections within three months.

Some 42.9% of our respondents believed that there is a difference in surgical outcome in HIV-positive patients compared with HIV-negative cases. However, it has been established that the immediate and short term clinical outcomes in HIV-positive patients undergoing cardiac surgery have been found not to be different when compared with similar pathologies in seronegative patients (Kumar et al., 2008). Low morbidity and favourable outcomes have been noted following cardiac surgery on patients who are asymptomatic or patients treated with antiretroviral drugs. Good long term results have been known to follow isolated coronary artery bypass graft in HIV-positive patients (Filsoufi et al., 2006; Jimenez-Exposito et al., 2006). The improvement in operative mortality observed in HIV/AIDS patients may be probably related to significant medical advances in the treatment of HIV infection and AIDS, with the introduction of highly active multidrug regimens, advances in perioperative care achieved over the past decade, decreased number of patients with infective endocarditis and the concomitant increase in the number of patients with coronary artery disease requiring surgical revascularization (Filsoufi et al., 2006). However, postoperative morbidities persist as a major issue among this population (Filsoufi et al., 2006).

Most of the cardiothoracic surgeons in Nigeria and Ghana practice and adhere to universal precautions. It is known that the risk of accidental infection to operating room personnel through blood contact during surgical procedure is not excessive and can be reduced by universal precautions (Klatt, 1994). Cardiothoracic surgeons who neglect these precautions pay the price of not only acquiring HIV infection but also hepatitis which is fatal and more easily transmitted than HIV infection (Frater, 2000). Estimates of the risk of a single needle stick injury indicate a risk of 300 Hepatitis B virus infections (30% risk), 30 hepatitis C virus infection (3% risk) and 3 HIV infections (0.3% risk) per 1,000 respective exposures (Sarrazin et al., 2005). The most important factor militating against the use of universal precaution in developing countries is the non availability of the relevant devices (Olapade-Olaopa et al., 2006). There is therefore need to provide the necessary devices and increase awareness about universal precautions to promote constant adherence to these procedures to reduce intraoperative transmission of HIV infection (Olapade-Olaopa et al., 2006). In cardiac surgery, prevention should also be directed against common wire injuries during sternal closure and self inflicted needle injuries to the surgeon's left index finger which is the most commonly injured during sternal closure (Kjaergard et al., 1992).

CONCLUSION

Cardiothoracic surgeons practicing in Nigeria and Ghana are more likely to operate on emergency cases involving HIV/AIDS patients than elective cases. Patients stable on HAART and asymptomatic patients with HIV infection are more likely to be operated on than AIDS patients. There is need to educate surgeons on the safety of cardiopulmonary bypass in HIV-infected patients and the well established fact that there is no difference in surgical outcome between seropositive and negative cases.

REFERENCES

Cole RP, Gault DT (1989). Glove perforation during plastic surgery. Br. J. Plast. Surg., 42:481-483.

Condit D, Frater RWM (1989). Human immunodeficiency virus and the cardiac surgeon. A survey of attitudes. Ann. Thorac. Surg., 47: 182-186.

Doumgba AD, Kamoune JN, Ngarhio L, Zoguéreh DD, Dan-Houron JM, Nali NM (2006). Surgery and HIV in Bangui (Central African Republic). Sante., 16(3):173-176.

Filsoufi F, Salzberg SP, Harbou KT, Neibart E, Adams DH (2006). Excellent outcomes of cardiac surgery in patients infected with HIV in the current era. Clin. Infec. Dis., 43:532-536.

Frater RW (2000). Cardiac surgery and the human immunodeficiency virus. Semin. Thorac. Cardiovasc. Surg., 12(2):145-147.

Friis-Moller N, Sabin CA, Weber R, d'Arminio Monforte A, El-Sadr WM, Reiss P (2003). Combination antiretroviral therapy and the risk of myocardial infarction. N. Engl. J. Med., 349:1993-2003.

Gerberding J, Littell C, Tarkington A, Brown A, Schecter WP (1990). Risk of exposure of surgical personnel to patients' blood during surgery at the San Francisco General Hospital. N. Engl. J. Med., 321: 1621-1625.

Gray RH, Wawer MJ, Brookmeyer R, Sewankambo NK, Serwadda D, Wabwire-Mangen F, Lutalo T, Li X, vanCott T, Quinn TC (2001). Probability of HIV-1 transmission per coital act in monogamous, heterosexual, HIV-1-discordant couples in Rakai, Uganda. Lancet., 357(9263): 1149-1153.

Grove DI, Mulligan JB (1990). Consent, Compulsion and Confidentiality in relation to testing for HIV infection: the view of Western Australian Doctors. Med. J. Australia, 152: 174-178.

Jahn A, Floyd S, Crampin AC, Mwaungulu F, Mvula H, Munthali F (2008). Population-level effect of HIV on adult mortality and early evidence of reversal after introduction of antiretroviral therapy in Malawi. Lancet, 371: 1603-1611.

Jimenez-Exposito MJ, Mestres CA, Claramonte X, Cartañá R, Josa M, Pomar JL (2006). Mortality and morbidity in HIV infected patient undergoing coronary artery bypass surgery: a case control study. Rev. Esp. Cardiol., 59: 276-279.

Kjaergard HK, Thiis J, Wiinberg N (1992). Accidental injuries and blood exposures to cardiothoracic surgical teams. Eur. J. Cardiothorac. Surg., 6: 215-217.

Klatt EC (1994). Surgery and human immunodeficiency virus infection: Indications, pathologic findings, risk and risk prevention. Int. Surg., 79:1-5.

Martzanez E, Mocroft A, Garczaa-Viejo MA, Pearez-Cuevas JB, Blanco JL, Mallolas J et al (2001). Risk of lipodystrophy in HIV-1 infected patients treated with protease inhibitors: a prospective cohort study. Lancet 2001, 357: 592-598.

Meadows J, Irving G, Chapman K, Gazzard B, Catalan J (1995). Preoperative HIV antibody testing: the views of surgeons and patients. Int. J. STD. AIDS, 6(6): 426-430.

Mestres C-A, Chuquiure JE, Claramonte X, Muñoz J, Benito N, Castro MA, Pomar JL, Miró JM (2003). Long-term results after cardiac surgery in patients infected with the human immunodeficiency virus type-1 (HIV-1). Eur. J. Cardiothorac. Surg., 23: 1007-1016.

Minz RW, Singh S, Varma S, Mathuria SN, Aggrawal R, Sehgal S (2010). Relevance of opt-out screening for HIV in emergency and pre-surgery patients in a tertiary care center in Northern India: A pilot study. Indian J. Pathol. Microbiol., 53(2): 287-289.

Obi SN, Waboso P, Ozumba BC (2005). HIV/AIDS: occupational risk, attitude and behaviour of surgeons in southeast Nigeria. Int. J. STD. AIDS, 16(5): 370-373.

Olapade-Olaopa EO, Salami MA, Afolabi AO (2006). HIV/AIDS and the surgeon. Afr J Med Med Sci., 35 Suppl: 77-83.

Orji EO, Ogunniyi SO (2001). The case against mandatory preoperative HIV screening in Africa. Niger. J. Med., 10(4): 162-164.

Pate JW (1990). Risks of blood exposure to the cardiac team. Ann. Thorac. Surg., 50:248-250.

Phillips AN, Sabin C, Pillay D, Lundgren JD (2007). HIV in the UK 1980-2006: reconstruction using a model of HIV infection and the effect of antiretroviral therapy. HIV Med., 8: 536-546.

Rickerts V, Brodt H, Staszewski S, Stille W (2000). Incidence of myocardial infarctions in HIV- infected patients between 1983 and 1999: the Franfurk HIV-cohort study. Eur. J. Med. Res., 5: 329-333.

Roxburgh JC, Shah SS, Loveday C, Goldstraw P, Yacoub M (1992). Attitudes of Cardiothoracic surgeons in the UK to human immunodeficiency virus. Br. J. Surg., 79: 415-418.

Sarrazin U, Brodt HR, Sarrazin C, Zeuzem S (2005). "Prophylaxe gegenüber HBV, HCV und HIV nach beruflicher Exposition." (in German). Dtsch Arztebl., 102: A 2234-2239.

Sheikh K, Porter JD (2009). "It's 100% for me": Hospital practitioners' perspectives on mandatory HIV testing. Indian J. Med. Ethics, 6(3): 132-137.

Shelly GA, Howard RJ (1992). A national survey of surgeons' attitudes about patients with human immunodeficiency virus infections and acquired immunodeficiency syndrome. Arch. Surg., 127: 206-212.

Trachiotis GD, Alexander EP, Benator D, Gharagozloo F (2003). Cardiac surgery in patients infected with the human immunodeficiency virus. Ann. Thorac. Surg., 76: 1114-1118.

UNAIDS (2010). Global report: UNAIDS report on global AIDS epidemic 2010.Geneva.

Yee ES (1991). Accelerating HIV infection with cardiopulmonary bypass – Case reports. Vasc. Surg., 25: 725-731.